U. S. COMMISSION OF FISH AND FISHERIES,

GEORGE M. BOWERS, Commissioner.

PART XXVI.

REPORT

OF

THE COMMISSIONER

FOR

THE YEAR ENDING JUNE 30, 1900.

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Report of the United States Commissioner of Fisheries

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REPORT

OF THE

UNITED STATES COMMISSIONER OF FISH AND FISHERIES

FOR THE

FISCAL YEAR ENDING JUNE 30, 1900.

I have the honor to submit a report covering the work of the United States Commission of Fish and Fisheries for the year ending June 30, 1900, together with the reports of its different divisions. This, with the papers published in the Bulletins of the Commission and as appendices to this report, describes in full its operations for the fiscal year.

PROPAGATION OF FOOD-FISHES.

The fish-cultural work has been very satisfactory as compared with previous records, notwithstanding the results in some directions have not been as good as usual. The total number of fish distributed was 1,164,336,754, an increase (which consisted principally of shad, cod, flat-fish, white-fish, and lake trout) of about 100,000,000 over the last fiscal year.

At the stations on the Pacific coast, for reasons beyond the control of the Commission, the collections of quinnat-salmon eggs were not as large as in the past few years, and there was consequently a considerable falling off in the output of this species. The excessive drought prevailing in California during the summer of 1899 caused such low water in Battle Creek and in the McCloud River that but few salmon ascended these streams as far as the hatcheries, the larger number depositing their eggs on spawning-grounds below. At Battle Creek, where previous collections of eggs have been almost phenomenal, only 1,600,000 were taken this year. On the McCloud eggs are taken during both the summer and fall runs of fish, and this year from the first run only 6,228,260 were collected, and from the fall run 186,800, making in all 6,414,060, against over 16,000,000 the year before. The eggs taken at the California hatcheries were all hatched in that State, and the fry were liberated in the Sacramento River and its tributaries and in the Eel River.

The results at the stations operated on the Columbia River were better, although the run of salmon was poor; the number of eggs permitted the liberation of 11,000,000 fry in the Columbia and its tributaries.

On the Rogue River the Commission operated a hatchery constructed by Mr. R. D. Hume and collected over 4,000,000 quinnat-salmon eggs, 1,800,000 of which were transferred to Mr. Hume's hatchery at Wedderburn, Oreg., where they were hatched. The fry were there kept in ponds and troughs until they had reached a length of 3 to 5 inches, and were fed during this time on canned salmon prepared from the scraps and waste portions of the fish. The success with this material was so encouraging that, so far as practicable, an attempt will be made to rear all salmon fry to the yearling stage before liberating them. Heretofore the question of a suitable food, which is not too expensive, has been one of the most important factors for consideration in rearing large numbers of fish at stations remote from railroad facilities, and the use of the canned salmon referred to will materially simplify the problem.

Steelhead-trout eggs were collected on Crystal Creek, a tributary of the Rogue River, as the number taken the previous year on the Willamette River did not warrant a continuation of the work at that point. The eggs were all sent to eastern stations to be hatched, in order to maintain the successful plants already made in the Great Lakes and elsewhere. The steelhead appears to thrive in the streams of Montana, and it may be noted that over 50,000 eggs of this species were taken by the superintendent of the Bozeman station from fish liberated two years ago in Bridger Creek, in that State.

At the new station on Baker Lake, Washington, the propagation of the sockeye or blueback salmon, regarded as perhaps the most important of the salmons in the Puget Sound region, from a commercial standpoint, was begun and over 10,600,000 fry were hatched and planted in the waters of Baker Lake and Skagit River. Located as this station is, in the center of a forest reserve, and with the lake and surrounding territory set aside for fish-cultural purposes, it is believed that it will be an important factor in preserving an extensive spawning-ground of this valuable fish.

The passage by the legislature of Michigan of an act allowing the U. S. Fish Commission to catch white-fish and lake trout for fish-cultural purposes during the close season, November 1 to December 15, permitted the propagation of these species on a much larger scale than usual, and as the State failed to provide funds for carrying on its work with the commercial fishes of the Great Lakes, this Commission was enabled to lease the Michigan white-fish hatcheries at Detroit and Sault Ste. Marie.

The collection of lake-trout eggs was undertaken on the most important spawning-grounds in Lake Michigan and continued until November 10, during which time over 15,000,000 were collected, at an almost nominal expense. As only about 10 per cent were taken prior to November 1, it will be seen that this work would have been almost a failure had the old law been in force. On Lake Superior, where

operations were conducted from the Duluth station, over 12,000,000 eggs were taken. The fry hatched from these eggs were planted on the spawning-grounds of the Great Lakes.

The white-fish work was carried on in Lake Erie from the station at Put-in Bay, at Monroe Piers, Michigan, and at the three fisheries on the Detroit River, which were operated as a result of arrangements with the Michigan Fish Commission. At the latter point more than 34,000 white-fish were penned, which yielded 244,000,000 eggs; 479,000,000 eggs were taken altogether, filling all of the available hatcheries, besides permitting 10,000,000 to be sent to the New York Fish Commission and nearly 6,000,000 to that of Pennsylvania. Over 337,838,000 white-fish eggs were hatched and the fry liberated, a gain of nearly 200,000,000 over the year before. As the majority of the eggs were obtained from fish which had been impounded or penned, the excellent results of the season's work verify the prediction in the report of last year as to the advantages of this manner of insuring a supply of spawn.

The taking of spawning pike-perch in Lake Erie was seriously interfered with by the backwardness of the spring, the ice remaining in the lake till an unusually late date, so that when nets could be set and fishing begun but few fish were found on the spawning-grounds. The inference is that numbers had already spawned. The season lasted but a few days, and only 138,000,000 eggs were taken at Put-in Bay, and these were of poor quality, producing but 57,000,000 fry.

The pike-perch season was also shortened in Vermont, where, from the experience of the previous year, good results were hoped for, but freshets in the Missisquoi River prevented the fish from ascending to spawn until April 14, and eggs were only taken between the 22d and 31st. Although 115,000,000 eggs were secured at this point, the percentage hatched was not satisfactory, for a cause which is not yet determined. Steps are now being taken to prevent, if possible, similar losses in future.

At the stations in New England devoted to the propagation of marine commercial fishes very satisfactory results have been attained. Brood cod-fish were captured and held in the pools at Woods Hole for spawning purposes, and collecting stations were established at Plymouth, Mass., and Kittery Point, Me., where spawn-takers could obtain eggs from fish taken by the fishing vessels. From the 2,200 fish impounded at Woods Hole 103,440,000 eggs were secured, and from other sources 251,505,000. These were hatched at the Woods Hole and Gloucester stations and yielded 265,324,000 fry, which were liberated at suitable points along the coast. This record exceeds any previous one by over 50,000,000. The fish remaining of the brood stock at Woods Hole were numbered, tagged, and recorded before liberation, in accordance with the plan of systematic observations concerning the migration, rate of growth, etc., of the cod, which has been already described.

The efforts to increase the production of flat-fish have been continued, and in the propagation of this species better results have been attained by abandoning the method pursued in the past of artificially fertilizing the eggs. This year the brood-fish were taken to Woods Hole and allowed to spawn naturally in tanks at the station, and the percentage of fry obtained greatly exceeded former results. From 102,000,000 eggs 87,115,000 fry were hatched and planted.

The hope was expressed in a previous report that some appreciable effect had been made on the lobster fishery by the efforts which have been made to increase the supply, but the scarcity of lobsters and consequent difficulty in obtaining egg lobsters from the fishermen, notwithstanding the cordial cooperation of the State fish commissions throughout New England, has made impossible a larger output of fry. All available means were employed to obtain the egg-bearing lobsters captured by fishermen along the entire New England coast. The schooner *Grampus* and a steam smack visited the fishing centers of Maine from April to July, and agents stationed at the more important ports from New Hampshire to Connecticut were authorized to purchase egg lobsters from both fishermen and dealers.

From points north of Cape Cod less than 5,000 lobsters were secured. These produced 63,300,000 eggs, which were hatched at Gloucester and yielded 58,600,000 fry. From points south of the cape only 28,000,000 eggs were secured, from which 22,600,000 lobsters were hatched at Woods Hole.

The continued decrease of the fishery is shown by the smaller number of men now engaging in it. In 1900 only 10 men fished for lobsters from Noank, Conn., and 1 man from Block Island, while in 1899 40 men were thus employed from the former point and 15 from the latter. In Buzzards Bay and vicinity a similar decrease was noted. At New Bedford, in 1899, the Commission obtained 347 egg lobsters, while during the present season only 26 were to be had.

The propagation of shad during the season just closed was attended with very good results, some 6,000,000 more fry being hatched and planted than the year before. The new station at Edenton, N. C., was in operation for the first time, and the work in Albemarle Sound was conducted from this point. The regular stations on the Potomac and Susquehanna rivers met with good success, though the season was backward and unfavorable conditions caused the cessation of work on the Potomac by the middle of May. On the Delaware, however, the run of shad was unusually large, the fish being caught in such numbers that there was almost no sale for them. The steamer *Fish Hawk*, which was stationed on this river at Gloucester, N. J., collected over 80,000,000 eggs between April 27 and May 31. In all, 316,000,000 eggs were obtained, from which 241,056,000 fry were hatched and planted.

The constantly increasing applications for the basses and the excel-

lent results attained by the introduction of these fishes east of the Rocky Mountains have made it difficult to meet the demands made during the past few years. While the stations established for this purpose have shown fairly good results, an auxiliary collecting station recently located on the Mississippi River at Bellevue, Iowa, enabled the Commission during the past year, at comparatively small expense, to materially increase its supply of the large-mouth black bass, the crappie, and some of the other sun-fishes. In the Mississippi Valley thousands of the commoner fishes which had been left by the receding waters in the ponds and lakes which are formed by overflows, and which dry up annually, have been transferred to the main river or some of its tributaries, and thus preserved.

The stocking of suitable streams with the various species of trout has been continued, special attention being paid to the distribution of brook trout, rainbow trout, and black-spotted trout. In New England the extent of the work with landlocked salmon and trout was impaired by the severe drought which prevailed throughout that section during the fall of 1899. In Vermont and New Hampshire large numbers of fish were lost by the drying up of streams which had heretofore never been affected in this manner, and in Maine the water in many of the large lakes became so low that the trout and the landlocked salmon were not able to ascend the streams to spawn, which, of course, resulted in a material reduction of the number of eggs collected.

An investigation during the fall of 1899 shows that a large number of Atlantic salmon passed over the falls at Bangor and reached the spawning-grounds at the headwaters of the Penobscot, and from what was learned it is believed that an auxiliary station for the collection of eggs of this species on the natural spawning-grounds of this fish may be profitably established and the supply obtained to better advantage than by the methods now followed.

The propagation of the grayling at the Bozeman station has been continued, and during the spring of 1900 over 3,500,000 eggs were collected, the majority of which will be hatched at Bozeman for stocking the streams of Montana, Idaho, Oregon, and Washington, although consignments have been sent to Colorado, Minnesota, and Michigan and some of the eastern stations with a view to introducing these fish in other waters.

The following tables show the output of the various stations, the total number of fishes distributed by species, and the number of fish and eggs furnished to the States and Territories during the fiscal year ending June 30, 1900.

Fish and eggs furnished for distribution during the year ending June 30, 1900.

Source of supply.	Species.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Green Lake, Me	Landlocked salmon	65,000		309,280
	Steelhead trout			3,653
	Golden trout		6,990	
	Brook trout		323,644	
	Lake trout	350,000	587,000	
Craig Brook, Me	Atlantic salmon	550,000	908,073	542,649
	Landlocked salmon	75,000	10,000	73,493
	Rainbow trout		3,000	3,000
	Brook trout		4,578	5,210
	Steelhead trout		9,000	226
	Scotch sea trout	10,000	35,000	51,647
Grand Lake Stream, Me	Landlocked salmon			111,787
Nashua, N. H	Brook trout		113,000	
	Lake trout		284,630	
St. Johnsbury, Vt	Brook trout	314,000	534,100	6,310
	Steelhead trout		20,000	2,200
	Lake trout		180,000	
	Grayling		20,000	
	Hybrid trout			1,959
	Landlocked salmon			17,280
Gloucester, Mass	Cod		138,403,000	
	Lobster		58,470,000	
Woods Hole, Mass	Cod		126,921,000	
	Flat-fish		87,115,000	
	Lobster*		18,696,000	
Cape Vincent, N. Y	Lake trout		1,875,800	
	Brook trout		280,500	
	White-fish		27,400,000	
	Pike perch		38,000,000	
Steamer Fish Hawk	Shad	15,038,000	47,875,000	
Battery Station, Md	Shad†	21,711,000	87,518,000	
Fish Lakes, Washington, D. C.	Shad			2,000,000
	Black bass, large-mouth			32,967
	Black bass, small-mouth			200
	Crappie			400
Central Station, Washington, D. C.	Shad‡		4,767,000	
	Rainbow trout		6,000	330
	Lake trout		8,368	
	Landlocked salmon		3,850	
	White-fish		256,000	
Bryan Point, Md	Shad§		55,702,000	
Wytheville, Va	Rainbow trout‖	190,000		98,039
	Brook trout			40
	Black bass			1,971
	Rock bass			4,400
Erwin, Tenn	Rainbow trout			39,620
	Brook trout			45,427
Edenton, N. C	Shad		6,500,000	
Cold Springs, Ga	Black bass			238
	Bream			1,000
Put-in Bay, Ohio	White-fish	15,832,000	109,890,000	
	Pike perch	25,000,000	27,000,000	
Northville, Mich.¶	Lake trout	3,150,000	6,535,000	88,000
	Brook trout		257,500	9,254
	Rainbow trout		3,000	385
	Loch Leven trout	20,000	8 000	
	Steelhead trout			4,500
	Grayling		56,000	
Detroit, Mich	White-fish	800,000	102,000,000	
Alpena, Mich.¶	do		38,500,000	
	Lake trout		995,000	
Sault Ste. Marie, Mich	White-fish		25,000,000	

*3,767,000 lobster fry were also delivered by Woods Hole Station to Dr. H. C. Bumpus for scientific purposes.

†In addition to the above there were transferred to Central Station by Battery Station for hatching 8,015,000 shad eggs, and to Johns Hopkins Hospital for scientific purposes 5,000 shad eggs.

‡In addition to the above there were liberated in Fish Lakes Station Ponds for rearing 2,849,000 shad fry; also 280,000 shad fry were furnished for experimental purposes at Central Station.

§In addition to the above there were transferred to Central Station from Bryan Point Station for hatching 1,023,000 shad eggs.

‖In addition to the above there were transferred to stations of the U. S. Fish Commission for hatching 240,000 rainbow-trout eggs and 500 of same to Philadelphia, Pa., for scientific purposes.

¶In addition to the above, there were transferred to stations of the Commission 2,460,000 lake-trout eggs and 23,798,000 white fish eggs, which does not include transfers to any of the substations in the State of Michigan.

Fish and eggs furnished for distribution during the year, etc.—Continued.

Source of supply.	Species.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Duluth, Minn	Lake trout *	1,550,000	9,047,000	
	Brook trout		91,000	
	Steelhead trout		148,500	
	Grayling		34,000	
	White-fish		20,000,000	
Quincy, Ill. †	Black bass			36,248
	Warmouth bass			250
	Crappie			9,200
	Sun-fish			2,100
Manchester, Iowa ‡	Brook trout	75,000	25,000	56,350
	Rainbow trout			2,800
	Loch Leven trout			1,700
	Grayling		35,450	
	Black bass			102,660
	Rock bass			300
	Warmouth bass			1,600
	Crappie			141,384
	Bream			50,400
	Pike			5,000
	Pickerel			189
	Yellow perch			8,175
	Cat-fish			4,024
Neosho, Mo	Rainbow trout §	65,000		57,664
	Black bass			8,610
	Rock bass			10,300
	Strawberry bass			7,797
	Crappie			320
	Quinnat salmon			1,600
San Marcos, Tex	Black bass			110,455
	Rock bass			5,690
	Crappie			3,195
	Bream			300
Leadville, Colo. ‖	Brook trout	95,000	233,000	80,000
	Black-spotted trout	75,000		445,000
	Grayling		21,000	
Spearfish, S. Dak	Brook trout	50,000	123,000	
	Black-spotted trout			15,000
Bozeman, Mont	Brook trout			43,500
	Black-spotted trout	10,000	120,000	277,000
	Rainbow trout			13,000
	Steelhead trout			10,000
	Grayling ¶	372,000	2,242,100	10,000
Baird, Cal	Quinnat salmon	2,905,000	3,533,950	
Battle Creek, Cal **	do	20,000		
Clackamas, Oreg	Quinnat salmon		4,369,422	
	Silver salmon		146,824	
	Lake trout		86,836	
	Rainbow trout		22,603	
	Steelhead trout		99,000	
	Grayling		41,668	
	White-fish		160,000	
Rogue River, Oreg. ††	Quinnat salmon		2,156,945	
	Steelhead trout	100,000		
Little White Salmon River, Wash. ‡‡	Quinnat salmon	250,000	6,626,947	
Baker Lake, Wash	Sockeye or blueback salmon		10,683,000	
	Steelhead trout		26,000	

* In addition to the above, there were transferred to the U. S. Fish Commission station at Nashua, N. H., 300,000 lake trout eggs.

† In addition to the above there were transferred to the Neosho, Mo., station 615 black bass and 725 crappie by Quincy station. There were distributed from Quincy 4,480 rock bass which were produced at Neosho, Mo.

‡ In addition to the above there were collected at Bellevue and released in the Mississippi River 15,000 carp and 20,000 buffalo-fish which would otherwise have perished. 45,750 rainbow-trout eggs were transferred to hatcheries of the U. S. Fish Commission.

§ Besides the above there were transferred to Erwin station 34,000 rainbow-trout eggs.

‖ Besides the above there were transferred from Leadville station to other stations of the Commission, for hatching, 300,000 brook-trout eggs and 100,000 black-spotted-trout eggs.

¶ In addition to the above there were transferred to stations of the U. S. Fish Commission, for hatching, 442,000 grayling eggs.

** In addition to the above there were transferred from Battle Creek to Baird station, for hatching, 1,224,300 quinnat-salmon eggs.

†† In addition to the above there were transferred to Clackamas and other stations of the U. S. Fish Commission, for hatching, 399,000 steelhead-trout eggs from Rogue River station.

‡‡ In addition to the above there were transferred to Clackamas from Little White Salmon station, for hatching, 2,436,000 eggs of the quinnat salmon.

Distribution of fish and eggs among the States and Territories.

State or Territory.	Species.	Eggs.	Fry and fingerlings.	Adult and yearlings.
Alabama	Rainbow trout			1,200
	Black bass			5,000
	Rock bass			974
	Bream			200
Arizona	Rainbow trout			2,400
	Black bass			475
	Rock bass			500
	Strawberry bass			200
Arkansas	Rainbow trout			10,350
	Black bass			1,900
	Rock bass			900
	Strawberry bass			200
California	Quinnat salmon	2,905,000	3,533,950	
	Brook trout	10,000		
Colorado	Landlocked salmon	5,000		
	Rainbow trout			8,500
	Black-spotted trout			445,000
	Brook trout		236,000	30,000
	Grayling		20,500	
	Black bass			1,040
Connecticut	Shad		6,120,000	
	Landlocked salmon			5,000
	Rainbow trout	30,000		
	Brook trout	20,000	24,985	
	Lake trout		50,000	
	Black bass			1,650
	Lobster		1,868,000	
Delaware	Shad		8,650,000	
	Rainbow trout			1,000
	Black bass			800
	Crappie			500
District of Columbia	Shad		2,095,000	2,000,000
	Landlocked salmon		3,850	
	Rainbow trout			330
Florida	Shad		2,016,000	
Georgia	Shad		2,037,000	
	Rainbow trout			3,299
	Black bass			5,893
	Crappie			100
	Bream			800
Idaho	Rainbow trout	10,000		6,000
	Black-spotted trout	10,000	100,000	15,000
	Brook trout	15,000		16,000
	Grayling			5,000
Illinois	Black bass			1,490
Indiana	Loch Leven trout		5,000	
	Brook trout		28,000	
	Pike perch		1,800,000	
	Black bass			14,273
Indian Territory	Rainbow trout			1,300
	Black bass			700
	Crappie			400
	Rock bass			300
Iowa	Loch Leven trout			1,700
	Rainbow trout			1,800
	Brook trout		25,000	37,350
	Grayling		35,450	
	Cat-fish			4,000
	Pike			5,000
	Yellow perch			8,000
	Black bass			28,740
	Crappie			122,875
	Warmouth bass			1,600
	Bream			50,000
Kansas	Rainbow trout			500
	Black bass			7,405
	Crappie			2,955
	Rock bass			1,250
Kentucky	Brook trout			1,080
	Black bass			7,850
	Crappie			3,600
	Rock bass			1,500
Louisiana	Black bass			2,650
	Strawberry bass			270
Maine	Atlantic salmon		908,073	541,858
	Landlocked salmon	30,000	10,000	450,052
	Steelhead trout		8,300	3,879
	Rainbow trout		2,800	9
	Brook trout	318,222	5,210	
	Lake trout	350,000	587,000	
	Scotch sea trout		27,000	51,647

Distribution of fish and eggs among the States and Territories—Continued.

State or Territory.	Species.	Eggs.	Fry and fingerlings.	Adult and yearlings.
Maine	Golden trout		6,000	
	Lobster		30,575,000	
Maryland	Shad	21,711,000	92,527,000	
	Rainbow trout			2,437
	Brook trout			4,756
	Black bass			1,525
	Crappie			1,800
	Cod		3,000,000	
Massachusetts	Shad		500,000	
	Landlocked salmon	30,000		9,000
	Rainbow trout	15,000		
	Brook trout	45,000	65,000	100
	Lake trout		25,000	
	Scotch sea trout	10,000	8,000	
	Hybrid trout			100
	White-fish	300,000		
	Pike perch		1,000,000	
	Black bass			2,075
	Cod		262,324,000	
	Flat-fish		87,115,000	
	Lobster		43,098,000	
Michigan	Landlocked salmon	5,000		
	Steelhead trout		15,000	4,335
	Loch Leven trout		3,000	
	Rainbow trout	25,000	2,000	384
	Brook trout		206,000	154
	Lake trout	1,850,000	10,450,000	86,650
	Grayling	200,000	56,000	
	White-fish		177,340,000	
	Pike perch	25,000,000		
	Black bass			4,045
Minnesota	Steelhead trout		118,500	
	Brook trout		59,000	14,000
	Lake trout		3,550,500	
	Grayling		24,000	
	White-fish		400,000	
	Black bass			4,000
	Crappie			375
	Rock bass			300
Mississippi	Black bass			8,748
Missouri	Quinnat salmon			1,350
	Rainbow trout			14,589
	Black bass			4,075
	Crappie			5,490
	Rock bass			700
	Strawberry bass			4,874
	Warmouth bass			250
	Sun-fish			2,100
Montana	Rainbow trout	10,000		7,000
	Black-spotted trout		20,000	165,000
	Brook trout	20,000		6,000
	Grayling		2,242,100	5,000
Nebraska	Rainbow trout			8,800
	Brook trout			4,000
	Black bass			2,300
New Hampshire	Atlantic salmon	20,000		
	Landlocked salmon	10,000		14,000
	Loch Leven trout	20,000		
	Rainbow trout	20,000		1,550
	Brook trout	20,000	50,000	
	Lake trout		284,555	
	White-fish	500,000		
	Pike perch		1,000,000	
	Black bass			490
	Lobster		1,625,000	
New Jersey	Shad	8,332,000	38,455,000	
	Rainbow trout			5,800
	Brook trout	20,000		1,000
	Black bass			10,000
New Mexico	Rainbow trout			5,100
	Brook trout	10,000		
	Black bass			200
New York	Shad		10,280,000	
	Atlantic salmon	100,000		
	Landlocked salmon	20,000		10,500
	Rainbow trout			400
	Brook trout		253,000	9,100
	Lake trout	1,800,000	1,875,800	
	White-fish	10,000,000	27,000,000	
	Pike perch		21,300,000	

Distribution of fish and eggs among the States and Territories—Continued.

State or Territory.	Species.	Eggs.	Fry and fingerlings.	Adult and yearlings.
North Carolina	Shad		6,445,000	
	Rainbow trout	10,000		17,750
	Brook trout			700
	Black bass			600
	Crappie			800
North Dakota	Brook trout		5,000	
	Cat-fish			24
	Yellow perch			170
	Pickerel			185
	Black bass			9,480
	Crappie			300
Ohio	Rainbow trout		1,000	
	Brook trout		19,500	
	White-fish		101,050,000	
	Pike perch		25,000,000	
	Black bass			4,575
	Crappie			400
	Rock bass			1,700
Oklahoma	Rainbow trout			1,450
	Black bass			1,925
	Crappie			400
	Rock bass			200
Oregon	Steelhead trout		99,000	
	Rainbow trout		22,303	
	Black-spotted trout			10,900
	Brook trout			2,000
	Grayling		41,668	
	Silver salmon		146,824	
	Quinnat salmon		6,526,367	
Pennsylvania	Shad	6,006,000	2,925,000	
	Atlantic salmon	250,000		
	Rainbow trout		6,000	49,400
	Brook trout		27,500	13,400
	Lake trout		8,368	
	White-fish	5,832,000	250,000	
	Pike perch		2,000,000	
	Black bass			4,860
	Crappie			1,500
Rhode Island	Shad		1,000,000	
	Landlocked salmon	10,000		
	Brook trout		23,000	
	Black bass (large-mouth)			2,000
	Black bass (small-mouth)			200
South Carolina	Shad		2,012,000	
	Rainbow trout			400
	Black bass			100
	Crappie			705
South Dakota	Rainbow trout			1,000
	Black-spotted trout			15,000
	Brook trout		123,000	
	Black bass			8,600
	Crappie			30
Tennessee	Rainbow trout			17,500
	Brook trout			19,239
	Black bass			2,400
	Crappie			1,278
Texas	Rainbow trout			500
	Black bass			111,455
	Crappie			3,145
	Rock bass			5,640
	Strawberry bass			2,000
	Bream			300
Utah	Landlocked salmon	10,000		
	Steelhead trout	10,000		
	Brook trout	55,000		
	Lake trout	500,000		
	Grayling	72,000		
Vermont	Landlocked salmon	20,000		19,335
	Steelhead trout		19,650	2,200
	Rainbow trout			1,500
	Brook trout	104,000	483,885	6,209
	Lake trout	300,000	105,000	
	Hybrid trout			1,859
	Grayling		20,000	
	White-fish		400,000	
	Pike perch		12,600,000	
	Black bass			600
Virginia	Shad		27,245,000	
	Rainbow trout			21,876
	Brook trout			1,473
	Black bass			4,345
	Crappie			1,500
	Rock bass			4,200

Distribution of fish and eggs among the States and Territories—Continued.

State or Territory.	Species.	Eggs.	Fry and fingerlings.	Adult and yearlings.
Washington	Quinnat salmon		6,626,947	
	Sockeye or blueback salmon		10,683,000	
	Steelhead trout		26,000	
	Black-spotted trout			67,000
	Brook trout			13,500
	Lake trout		86,692	
	White-fish		160,000	
West Virginia	Rainbow trout	25,000		14,448
	Brook trout	25,000		2,750
	Black bass			6,975
	Crappie			3,500
Wisconsin	Steelhead trout	75,000	15,000	
	Brook trout		20,000	1,000
	Lake trout		2,250,000	
	Grayling		10,000	
	White-fish		12,600,000	
	Black bass			6,500
Wyoming	Steelhead trout	25,000		10,000
	Rainbow trout	45,000		
	Black-spotted trout	75,000		20,000
	Brook trout	110,000		6,000
	Lake trout	250,000		
	Grayling	100,000		
Foreign countries:				
Canada	Lake trout		304,500	
	White-fish		2,000,000	
England	Rainbow trout	20,000		
Ireland	Shad	700,000		
	Rainbow trout	35,000		
New Zealand	Quinnat salmon	250,000		
France	Quinnat salmon	20,000		
Scotland	Rainbow trout	10,000		
	Brook trout	20,000		
	Total	88,682,000	1,070,756,779	4,897,975

Summary of distribution.

Species.	Eggs.	Fry and fingerlings.	Adults and yearlings.	Total.
Shad	36,749,000	202,307,000	2,000,000	241,056,000
Quinnat salmon	3,175,000	16,687,284	1,350	19,863,634
Atlantic salmon	550,000	908,073	541,858	1,999,931
Landlocked salmon	140,000	13,850	508,487	662,337
Silver salmon		146,824		146,824
Sockeye or blueback salmon		10,683,000		10,683,000
Steelhead trout	110,000	301,450	20,414	431,864
Loch Leven trout	20,000	8,000	1,700	29,700
Rainbow trout	255,000	34,103	209,572	498,675
Black-spotted trout	85,000	120,000	737,000	942,000
Brook trout	534,000	1,967,092	195,021	2,696,113
Lake trout	5,050,000	19,577,415	86,650	24,714,065
Scotch sea trout	10,000	35,000	51,647	96,647
Golden trout		6,990		6,990
Hybrid trout			1,959	1,959
Grayling	372,000	2,449,718	10,000	2,831,718
White-fish	16,632,000	321,206,000		337,838,000
Pike perch	25,000,000	64,700,000		89,700,000
Cat-fish			4,024	4,024
Pike			5,000	5,000
Pickerel			185	185
Yellow perch			8,170	8,170
Black bass, large-mouth			282,127	282,127
Black bass, small-mouth			200	200
Crappie			151,653	151,653
Rock bass			18,164	18,164
Strawberry bass			7,544	7,544
Warmouth bass			1,850	1,850
Sun-fish			2,100	2,100
Bream			51,300	51,300
Cod		265,324,000		265,324,000
Flat-fish		87,115,000		87,115,000
Lobster		77,166,000		77,166,000
Total	88,682,000	1,070,756,779	4,897,975	1,164,336,754

RAILROAD TRANSPORTATION.

The five cars of the Commission traveled 101,796 miles in distributing fish, and detached messengers and employees of the stations traveled 157,297 miles. Of the 118,503,583 fish thus transported there was a loss of 50,717.

The Commission is under obligations to the following railroads for material aid in extending the field of its distribution by furnishing free transportation:

Name of railroad.	Cars.	Messengers.	Name of railroad.	Cars.	Messengers.
Alamogordo and Sacramento Mountain Rwy	.....	42	Lake Shore and Michigan Southern Rwy	.....	48
Austin and Northwestern R. R	.....	198	Macon and Birmingham Rwy	.....	150
Bangor and Aroostook R. R	3,018	577	Maine Central R. R	2,204	2,607
Boston and Maine System	.....	2,522	Michigan Central R. R	2,002	.....
Burlington, Cedar Rapids and Northern Rwy	2,233	790	Missouri Pacific Rwy	20	.....
Central Vermont Rwy	.....	530	Mobile and Ohio R. R	1,122	89
Chesapeake and Ohio Rwy	880	125	Montana R. R	.....	112
Chicago and Northwestern Rwy	.....	1,292	Montpelier and Wells River R. R	.....	228
Chicago, Burlington and Quincy R. R	1,698	4,693	Northern Pacific Rwy	6,761	.....
Cleveoand, Cincinnati, Chicaga and St. Louis Rwy	111	.....	Omaha, Kansas City and Eastern R. R	250	.....
Colordo and Southern Rwy	.....	1,123	Oregon Short Line R. R	740	.....
Colorado Midland Rwy	372	942	Pere Marquette R. R	7,880	1,213
Delaware and Hudson Co	384	.....	Plant System	574	.....
Denver and Rio Grande R. R	.....	5,734	Portland and Rumford Falls Rwy	.....	170
Detroit and Mackinac Rwy	646	373	Rio Grande, Sierra Madre and Pacific Rwy	.....	300
El Paso and Northeastern Rwy	326	77	Rutland R. R	.....	384
Florida Central and Peninsular R. R	414	.....	St. Johnsbury and Lake Champlain R. R	.....	897
Florida East Coast Rwy	.....	250	St. Louis and San Francisco R. R	310	38
Franklin and Megantic Rwy	.....	50	St. Louis Southwestern Rwy	125	264
Fort Worth and Denver City Rwy	.....	2,020	San Antonio and Aransas Pass Rwy	.....	348
Grand Rapids and Indiana Rwy	2,570	332	Sandy River R. R	.....	22
Grand Trunk Rwy. System	.....	256	Southern Pacific Co	.....	2,100
Great Northern Rwy	1,535	.....	Texas and Pacific Rwy	2,656	1,449
Gulf, Colorado and Santa Fe Rwy	.....	2,289	Texas Central R. R	.....	157
Houston and Texas Central R. R	.....	353	Vandalia Line	646	.....
Illinois Central R. R	.....	195	Virginia and Southwestern Rwy	.....	32
International and Great Northern R. R	.....	2,937	Wabash R. R	1,452	1,618
Kansas City and Independence Air Line	20	.....	Washington County R. R	204	204
Kansas City, Fort Scott and Memphis R. R	381	.....	West Virginia Central and Pittsburg Rwy	262	14
Kansas City Southern Rwy	338	38	Wilmington and Northern R. R	.....	57
			Wisconsin Central Rwy	514	.....
			Total	42,746	40,239

BIOLOGICAL INQUIRIES.

During the year the Commission has carried on a number of investigations and experiments with the object of giving practical assistance to the oyster industry. The results of the experiments in fattening oysters by increasing, in inclosed waters, the production of their natural food have given considerable encouragement. Oysters planted in the experimental claires at Lynnhaven, Va., reached a degree of fatness unrivaled save in a single limited area of the open waters of that famous oyster field, but they arrived at this condition too late in the season to make the result of immediate practical value. During the coming season certain changes will be made in the plant whereby a better circulation and aeration of the water will be attained. It is expected that this will result not only in an improvement in the general vitality of the oysters and an increase in the reproductive activity of the minute plants upon which they feed, but that the currents created will also place the food more abundantly within the reach of the oysters. The changes in the claire will be completed in time to allow a practical test during the ensuing season.

An investigation was carried on during the winter, with the assistance of the steamer *Fish Hawk*, to determine the reason for the failure of oyster-culture in North Carolina, and is referred to on pp. 119–120.

In August, 1899, Mr. H. F. Moore visited Willapa Bay, Washington, for the purpose of inquiring into the condition of the oysters planted there in 1894. It was found that they had been almost exterminated. At the end of the first year, according to the testimony of the oystermen, a large proportion of those planted had survived and were on the beds. This would indicate that they had not been injured by transportation across the continent. Subsequently, however, they gradually decreased in number, until at the time of Mr. Moore's visit but five oysters were found after a careful search under the guidance of persons familiar with the beds. So far as could be determined this diminution did not result from natural causes, and there is reason to suspect that some of the oystermen in the region have been so indifferent to their own interests and their obligations to the Fish Commission as to view the raiding of the planted beds with a lenient eye. Several private beds in the vicinity are reported to be doing well, but in these cases it is to somebody's immediate interest to protect the planted oysters from poachers.

Owing to the very few oysters taken it was impossible to make experiments in artificial fertilization of the eggs, although two of the females appeared to be ripe. No evidence of natural spawning of the eastern oyster was obtained, and it appeared that the water was too cold to be favorable for their reproductive activity. Culture in shallow inclosed or semi-inclosed ponds appears to be indicated as the most hopeful line of experiment with eastern oysters in this region.

During the year the equipment and facilities at Woods Hole laboratory, which has continued under the direction of Dr. H. C. Bumpus, have greatly improved. The number of able volunteer workers has increased, and much scientific work of practical and theoretical value has been accomplished.

During the summer the steamer *Fish Hawk* has been at the station and rendered important service in the investigation of the marine fauna. The schooner *Grampus* was engaged, under the supervision of the director, in continuing the investigation of the tile-fish, and obtained valuable data concerning its distribution.

Studies were conducted upon clam-culture, the migrations of fish, the economic utilization of certain waste products of the fisheries, the diseases of fishes, and other subjects of importance, which are mentioned in the report of the Division of Inquiry relating to Food-fishes. There is also in preparation a series of papers, which, when completed, will afford to students a much-needed means of identification of the marine animals of the southern coast of New England.

The laboratory at Beaufort was open until September 15, 1899, and was reopened June 1, 1900, and a number of able workers utilized its facilities. The spawning habits of various fishes, sponges, and crustacean parasites were studied, and the basis has been laid for profitable work in the future. At its last session Congress passed an act for the establishment of a permanent biological station on the coast of North Carolina, and as the vicinity of Beaufort offers exceptional advantages it is proposed to locate it at that point.

The urgent deficiency bill approved February 9, 1900, provided for a special investigation concerning the decline of the lobster and clam fisheries, with the object of devising measures for their relief, and in April the following commission was appointed for the purpose of carrying the act into effect: Dr. H. C. Bumpus, chairman; Dr. H. M. Smith, secretary; Mr. William de C. Ravenel, and Capt. E. E. Hahn. Promising results have been already attained with the soft-shell clam (*Mya arenaria*), but the lobster presents greater difficulties and will require comprehensive study.

During the fiscal year investigations of the inland waters to ascertain their biological and physical characteristics, their fitness for the introduction of new species, and the possibility of increasing their productiveness by artificial means have been prosecuted in Maine, New York, Pennsylvania, Ohio, Indiana, Michigan, and North Carolina. While some of the information gathered is capable of local application only, much is of broader significance and applicable to lacustrine waters in general.

Dr. W. C. Kendall continued his work on Sebago Lake, Maine, until about the middle of August, when, at the request of the State board of fish commissioners, he was ordered to Cobbosseecontee Lake, to inquire into the reasons for the nonsuccess of the plants of landlocked salmon which have been made therein. In this connection, a study

was made of the fauna, and the conclusion was reached that the abundance of predaceous fishes and the restricted spawning-grounds were responsible for the failure of the salmon to maintain itself.

The biological survey of Lake Erie was continued during July and August under the direction of Prof. Jacob Reighard. The hatchery at Put-in Bay was used as laboratory and headquarters, but various other parts of the lake were visited by members of the party. An account of the work is elsewhere given in the report.

A comprehensive study of the waters of the hydrographic basin of the Wabash River, Indiana, was undertaken by the Commission during the summer of 1899. A number of the lakes and rivers were studied with some care, but principal attention was paid to Lake Maxinkuckee, in Marshall County. Maxinkuckee is typical of the small glacial lakes of the Upper Mississippi Valley, and it was considered that a thorough investigation of the biological and physical features of its waters would develop facts common to all of the lakes of its class. The work began July 1 and was continued until the latter part of October by a party under the direction of Prof. B. W. Evermann. A topographic and hydrographic survey was begun, meteorological observations were carried on, collections were made illustrative of the flora and fauna of the lake and its immediate environment, and data were obtained concerning the habits and distribution of the various animals, especially the fishes.

Seneca Lake, in New York, and Lake Mattamuskeet, in North Carolina, have been visited and collections of their fishes have been made or arranged for.

Investigations upon the fishes of the principal river basins in West Virginia, begun in 1899, were conducted by a party under Mr. W. P. Hay. The Potomac, Greenbrier, Elk, and especially the Monongahela river systems were well examined. Until recent years these rivers were productive of fine food-fishes, but of late they have become sadly depleted, principally through the denudation of the forest lands, the pollution of the waters, dynamiting, damming of streams, and other changes in the conditions, principally due to industrial operations.

On the Pacific coast the studies of the salmon and other fishes have been continued in the eastern tributaries of the Sacramento. The explorations of the coastal streams begun in previous years have been extended between the northern boundary of California and the Columbia River, and a study of the fishes of the San Pedro River has almost been completed.

Considerable progress upon the study of the collections made by the *Fish Hawk* in Porto Rico during the winter of 1898–99 is reported. The specimens were distributed among a number of specialists, and many of the reports have been received and several are now in progress. These papers will make an important and attractive publication, which it is hoped to issue during the ensuing year.

STATISTICAL INQUIRIES.

During the last calendar year a statistical canvass of the fisheries of the States of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, and New York has been in progress. The present amount of capital invested in these fisheries in the New England States is $19,637,036, which, as compared with the figures of the last canvass, made in 1889, shows a decrease of $437,758. But this decrease is only apparent, being caused chiefly by the transfer of the menhaden industry to New York, and, while the relative values of the different catches have changed, the food fisheries of these States have, in the aggregate, increased in quantity and decreased but slightly in value. 35,445 persons are employed and 1,427 vessels, valued with their equipment at $4,224,339. The total product is 393,355,570 pounds, worth $9,672,702—the fishery for cod, cusk, haddock, hake, and pollock ranking first with a value of $2,798,109, followed by the oyster fishery of Rhode Island and Connecticut, worth $1,910,684. The lobster fishery is next in commercial importance, being worth $1,276,900. While the catch has fallen from 30,500,000 pounds in 1889 to 14,660,000 in 1898, a decrease of more than 50 per cent, the price of lobsters has so advanced that the value of the industry has increased a corresponding degree.

The inquiry conducted on Lake Erie in the calendar year 1899 shows a decided increase in the fisheries of this lake since the last canvass, in quantity and value of the product, capital invested, and number of persons employed. This is chiefly shown in the catch of white-fish and lake herring. The yield of pike perch, though large, is not considerably greater than in former years. 3,728 persons and 104 vessels are engaged in the industry, representing an investment of $2,719,600. In 1899, 58,393,000 pounds of products were obtained, worth $1,150,890. A feature of the fisheries is the number of carp which were taken, the catch amounting to over 3,600,000 pounds, valued at $51,400.

On Lake Ontario, where for several years there has been a decided falling off in the commercial fisheries, there was in 1899 found to be a material improvement, the yield being nearly three times as great as in 1897, and it would appear that this region is beginning to feel the effect of the fish-cultural operations which have been conducted here. The number of persons engaged and capital invested are also proportionately greater. The yield in 1899 amounted to nearly 2,500,000 pounds, valued at over $100,000.

The quantity of fishing products landed at Boston and Gloucester shows an increase of more than 33,000,000 pounds, with an increased value of over $1,200,000. The bulk of the increase is to be credited to Gloucester, though the fares landed at Boston are in excess of the year before. The products landed from American vessels at the two ports amounted to 176,774,301 pounds and were valued at nearly $4,200,000.

Inquiries now in progress along the Great Lakes and in the Mississippi Valley show that an increasing number of carp are being caught

and shipped, chiefly to the markets of the larger eastern cities. From Lake Erie and the Ohio River and certain of its tributaries the quantity of this species taken is nine times as great as it was six years ago. From the Illinois River more carp are taken than all other species combined, the catch for 1899 amounting to 6,332,900 pounds, valued at $189,900. It would appear that this fish will become more and more an important factor in the food-fish supply of the country.

As it was not practicable for an agent of the Commission to visit Alaska during the summer of 1899, the customary records of the fur-seal herds were made up from data furnished by the courtesy of the resident Treasury agents. The American herd continues to decrease in numbers through the continuance of pelagic sealing, and the recent counts show that fewer pups are born each year.

STEAMER ALBATROSS.

During the spring of 1899 it was determined to undertake an investigation among the islands of the southern Pacific Ocean, as it was believed important additions to knowledge could be made in regions where comparatively little work had been done. The scientific work was placed in charge of Mr. Alexander Agassiz, who was accompanied by a staff of assistants.

At the beginning of the fiscal year the *Albatross* was prepared for the expedition, and on August 23 she sailed from San Francisco under the command of Commander Jefferson F. Moser, U. S. N., and until early in the spring, when she reached Yokohama, she was engaged in the work of exploration and biological investigation. The Marquesas, Paumotu, Society, Cook, Tonga, Fiji, Ellice, Gilbert, Marshall, Caroline, and Ladrone archipelagoes were visited, and at the various ports every facility and courtesy were extended by the local authorities, and thanks are due to the governments of Great Britain, France, and Germany, which at the request of the Department of State had directed their representatives in their respective possessions to afford any assistance in their power.

These islands were studied in relation to their geological and biological features, and collections were made in the fields of zoology, botany, ethnology, and geology. The director devoted his attention to the study of coral formations and the biological and dynamic factors which have resulted in the production of coral islands; the civilian staff were engaged in biological research, and the naval officers, besides their duties in navigating the ship, in making surveys, soundings, and observations of value to mariners. Collections of the fauna of the deeper waters of the Pacific were made by means of the beam trawl and dredge, and the pelagic life at the surface and intermediate depths was studied. During the cruise about 250 soundings were made, with numerous temperature and density observations. The *Albatross* arrived at Yokohama March 4, and after she was refitted, some collections were made on the coast of Japan, within the

100-fathom line and along the edge of the Black Current, until June 12, when the vessel left for Alaska to continue the commercial investigation of the salmon fisheries, on which she was engaged in 1897.

The full reports of this expedition are not yet ready for publication, but a narrative of the voyage will be found on pp. 137–161 of this volume.

STEAMER FISH HAWK.

During July and August this vessel, under the command of Mate James A. Smith, U. S. N., was employed in making collections of marine fauna off the southern coast of New England in connection with the biological work of the station at Woods Hole, Mass., and in September she was sent to Beaufort, N. C., to assist in the topographic and hydrographic surveys incident to an inquiry into the cause of the failure of the various attempts at oyster-culture which had been made in that State.

As the time during which the vessel could be available was limited, and as it was desired to make the investigation with some degree of thoroughness, it was considered advisable to limit the field of operations, and the regions examined were selected upon the suggestion of Prof. J. A. Holmes, director of the North Carolina geological and natural history survey, who took keen interest in the subject. At first the work was carried on in the vicinity of Beaufort and Morehead, but in December the *Fish Hawk* proceeded to Pamlico Sound, where Swan Quarter Bay and other productive oyster-grounds were examined. Reports upon the work are in course of preparation and will be published.

On March 25 the vessel was detached from this duty in order to prepare for taking up the customary shad work in the Delaware River. Some time was spent in making necessary repairs at Baltimore, and on April 25 she reached her usual anchorage off Gloucester City, N. J., where shad hatching was successfully carried on until the middle of June, when she was ordered to proceed to Woods Hole. The work above referred to is described in detail in the accompanying reports of the divisions of Scientific Inquiry and of Fish-Culture.

NEW STATIONS.

The development of Cold Spring station, near Bullochville, Ga., and of the stations at Edenton, N. C., and Nashua, N. H., has been carried on during the year, and has been sufficient to permit the beginning of fish-cultural operations.

The water supply at Cold Spring is derived from three springs with an aggregate flow estimated at 2,800 gallons per minute and having a temperature of 62° to 64°. The principal spring has been surrounded with a substantial retaining-wall, a distributing-tank and conduits built, and five ponds finished with their supply and outlet pipes. Four of the ponds contain from 6,000 to 12,000 square feet each, and

all aggregate a little over an acre. A large portion of the property has been fenced in, roads built, and the grounds, which were rough and uneven, have been cleared and graded, marshy places filled, and a system of drainage laid out and completed. In the spring plans for a superintendent's dwelling were prepared, which will be a frame building of two stories, 48 by 52 feet, with wide halls and porches and containing seven rooms. Its construction is now in progress.

At Edenton, N. C., five artesian wells with 2-inch pipes were driven, ranging from 50 to 200 feet in depth, which furnished an average flow of about 3 gallons each per minute, the temperature of the water being 64° F. A two-story frame dwelling, 46 by 63 feet, containing eight rooms, has been completed for the superintendent, certain improvements have been made in the hatchery supply system, a supply ditch leading from Pembroke Creek to the boiler house has been completed, and the construction of six bass ponds has been begun.

At Nashua, N. H., a two-story frame residence, 30 by 50 feet, containing eight rooms, a cellar, and attic, has been erected for the superintendent, and additional drainage pipes laid.

MISCELLANEOUS.

For several years it has been very desirable that the Commission should have another steamer of sufficient size and seaworthiness for cruising at considerable distances offshore, in connection with the scientific and fish-cultural work of the New England stations. Accordingly, under authority of an act of Congress approved March 3, 1899, a steamer of 55 tons displacement, 82 feet long, and 16 feet beam was purchased November 23, 1899, and named *Phalarope*. In May she was put in commission, and has given satisfactory service.

There have been added to the library during the year 130 books and 318 pamphlets. The Bulletin for 1898 and the following pamphlet extracts from the Bulletins for 1898 and 1899, and from the Report for 1899, have been issued:

The salmon and salmon fisheries of Alaska. Report of the operations of the U. S. Fish Commission steamer Albatross for the year ending June 30, 1898, by Jefferson F. Moser. Bulletin for 1898, pp. 1–178.

List of fishes known to inhabit the waters of the District of Columbia and vicinity, by Hugh M. Smith and Barton A. Bean. Bulletin for 1898, pp. 179–188.

Notes on the collection of tide-pool fishes from Kadiak Island, Alaska, by Cloudsley Rutter. Bulletin for 1898, pp. 189–192.

The southern spring mackerel fishery of the United States, by Hugh M. Smith. Bulletin for 1898, pp. 193–271.

Notice of file-fish new to the fauna of the United States, by Hugh M. Smith. Bulletin for 1898, pp. 273–278.

The pearly fresh-water mussels of the United States; their habits, enemies, and diseases, with suggestions for their protection, by Charles T. Simpson. Bulletin for 1898, pp. 279–288.

The mussel fishery and pearl-button industry of the Mississippi River, by Hugh M. Smith. Bulletin for 1898, pp. 289–314.

The peripheral nervous system of the bony fishes, by C. Judson Herrick. Bulletin for 1898, pp. 315–320.

The reappearance of the tile-fish, by Hermon C. Bumpus. Bulletin for 1898, pp. 321–333.

The preservation of fishery products for food, by Charles H. Stevenson. Bulletin for 1898, pp. 335–563.

Notes on the foreign fishery trade and local fisheries of Porto Rico, by W. A. Wilcox. Report for 1899, pp. 1–34.
Check-list of the fishes of Florida, by B. W. Evermann and W. C. Kendall. Report for 1899, pp. 35–103.
Statistics of the fisheries of the Gulf States, Division of Statistics, C. H. Townsend, assistant in charge. Report for 1899, pp. 105–169.
Statistics of the fisheries of the South Atlantic States, Division of Statistics, C. H. Townsend, assistant in charge. Report for 1899, pp. 171–227.
An inquiry into the feasibility of introducing useful marine animals into the waters of Great Salt Lake, by H. F. Moore. Report for 1899, pp. 229–250.
A review of the fisheries in the contiguous waters of the State of Washington and British Columbia, by Richard Rathbun. Report for 1899, pp. 251–350.
Experiments in photography of live fishes, by R. W. Shufeldt. Bulletin for 1899, pp. 1–5.
Notes on the tide-pool fishes of California, with a description of four new species, by Arthur White Greeley. Bulletin for 1899, pp. 7–20.
The synaptas of the New England coast, by Hubert Lyman Clark. Bulletin for 1899, pp. 21–31.
Descriptions of new genera and species of fishes from Porto Rico, by B. W. Evermann and M. C. Marsh. Report for 1899, pp. 351–362.

There have been distributed during the year 1,429 bound and 12,394 pamphlet copies of the publications of the Commission.

The Museum of Comparative Zoology at Cambridge, Mass., has published the following additional papers based on the investigations of the steamer *Albatross* in 1891:

Bulletin, vol. XXXV, No. 1, XXVII. Preliminary account of Planktonemertes agassizii, a new pelagic nemertean, by W. McM. Woodworth.
Memoirs, vol. XXIII, No. 2, XXV. The Ophiuridæ, by C. F. Lutken and Th. Mortensen.
Memoirs, vol. XXIV, No. XXVI. The Fishes, by S. Garman.

Appropriations were made by Congress for conducting the operations of the Commission for the year ending June 30, 1900, as follows:

Salaries	$218,000
Miscellaneous expenses:	
Administration	10,000
Propagation of food-fishes	150,000
Inquiry respecting food-fishes	15,000
Statistical inquiry	5,000
Maintenance of vessels	30,500
For improvement of stations at—	
Leadville, Colo	4,000
Woods Hole, Mass	5,000
For construction of a wharf at Gloucester (Mass.) station	2,500
For purchase of a steam launch for use at New England stations	7,000
For continuing investigations regarding lobsters and clams	7,500

A report of the expenditure of these amounts will be made to Congress, in accordance with law.

GEORGE M. BOWERS, *Commissioner.*

REPORT ON THE PROPAGATION AND DISTRIBUTION OF FOOD-FISHES.

By W. DE C. RAVENEL, *Assistant in Charge.*

PROPAGATION OF FOOD-FISHES.

Fish-cultural work was conducted on the same general lines as in the past, but the results far exceeded those of any previous year. The total number of fish distributed was 1,164,336,754, an increase of about 100,000,000 over the output of the preceding year.

On the Pacific coast special attention was paid to the collection and hatching of quinnat-salmon eggs on the Sacramento River, in the Columbia River Basin in Washington and Oregon, and on the Rogue River. Owing to the excessive drought prevailing in California during the summer of 1899, the water was so low in Battle Creek that but few salmon ascended the stream, and the majority deposited their eggs on sand bars in the Sacramento. As a result only 1,600,000 eggs were taken at this point, where 20,000,000 were taken the previous year and 48,000,000 two years before.

At Baird station, on the McCloud River, a tributary of the Sacramento, where egg collections are made from both the summer and fall runs, the work was affected by the same cause. From the first run 6,228,260 were collected, and from the fall run 186,800, making in all 6,415,060. This was very discouraging, as over 16,000,000 had been taken the previous year with poorer facilities. The eggs were all hatched in California and the fry liberated in the Sacramento River and tributaries and in Eel River.

In the Columbia River Basin stations were operated on the Little White Salmon River in Washington and on the Clackamas River in Oregon; and though the run of salmon in the Columbia River was poor, 10,385,000 eggs were obtained on the Little White Salmon and 2,014,900 on the Clackamas, which resulted in the liberation of 10,997,947 fry in this region. Several hundred thousand of these were retained in Clackamas until they were from 4 to 6 inches long before being liberated.

On the Rogue River 4,364,800 quinnat-salmon eggs, 200,000 silver-salmon eggs, and 530,000 steelhead-trout eggs were collected. Of the quinnat-salmon eggs 1,800,000 were transferred to Wedderburn, Oreg.; the fry resulting were not planted until they were from 3 to 5 inches in length. They were fed on canned salmon, principally the backs of heads and the tails, which are of no commercial value. The

remainder were hatched at the station, and the 2,156,000 fry resulting were liberated in the Rogue River.

As the collection of steelhead-trout eggs on the Willamette the previous year had been very unsatisfactory, arrangements were made to collect on Crystal Creek, a tributary of the Rogue River, about 10 miles above the salmon station. This work proved fairly satisfactory, and it is believed, with the experience gained, that large numbers can be secured next season. The eggs were all forwarded to eastern stations, as plants previously made indicate that the steelhead is well adapted not only for the Great Lakes, but for lakes and streams in Montana and many of the Eastern States.

The propagation of the sockeye or blueback salmon, the most important commercial species on Puget Sound, was undertaken for the first time at Baker Lake, and as a result 10,683,000 fry were planted in Skagit River and the lake.

On the Great Lakes the white-fish and lake-trout work was the most satisfactory ever accomplished. Arrangements were made early in the fall for the collection of lake-trout eggs at Charlevoix, Beaver Island, and Manistique, Lake Michigan, near which are located the most important spawning-grounds of this species. Over 15,000,000 eggs were collected by November 10, but as only about 10 per cent were taken prior to November 1 the work would have been a complete failure under the old law, which provided for a rigid close season commencing on that date. On Lake Superior the season was very successful, over 12,000,000 being taken. The majority of the fry resulting from the total number collected, 27,000,000, were planted on the spawning-grounds of the Great Lakes. The white-fish work was energetically directed on Lake Erie; large numbers of adult fish were penned, as heretofore, at Put-in Bay, Ohio, and Monroe Piers, Michigan, which yielded 235,000,000 eggs. From the three fisheries on the Detroit River, operated as a result of arrangements made with the State commission, over 34,000 white-fish were penned, which yielded 224,000,000, making 459,000,000 eggs collected at the two stations. As a result of the year's work over 337,838,000 white-fish fry were liberated in the Great Lakes, more than double as many as in 1899.

The spring proved most unfavorable for the collection of pike-perch eggs on Lake Erie. Ice remained in the lake for weeks later than usual, so that by the time the fishermen were enabled to set their nets the season was actually over in the neighborhood of Port Clinton, Sandusky, Toledo, and the other important grounds. About 138,000,000 eggs were collected by the force of spawn-takers employed at Put-in Bay, but these were of poor quality and produced only about 57,000,000 fry, which were liberated in Lake Erie and some of the inland lakes of Ohio, Indiana, and Michigan. The collecting station on the Missisquoi River in Vermont, which had proved so promising the preceding year, was opened in April, but the immense amount of snow in the mountains at the headwaters of the Missisquoi melting

at that time caused freshets, which prevented the fish from ascending until April 14, and consequently shortened the season. The season here commenced April 22 and continued until the 31st, during which period 115,000,000 eggs were collected from 1,859 females; 85,225,000 eggs were transferred to Cape Vincent and the balance hatched and distributed under direction of the Vermont Commission. From the Cape Vincent hatchery 25,000,000 fry were distributed, making a total of 37,500,000 as a result of the season's work on the Missisquoi River.

It is difficult to account for the large loss that occurs in hatching pike-perch eggs, unless it is that they are unfertilized. Unfortunately the collecting stations are so distant from the regular station that we have been unable, up to this time, to make careful microscopic examinations to show whether this loss is due to the lack of fertilization or to injury in transportation. It is believed by the superintendent of the Cape Vincent station that very much better results would be secured if the eggs were eyed at the point where they are collected, and transferred afterwards. With a view to determining this matter definitely arrangements were made to erect a small hatchery at Swanton, but it was not only too small to handle the eggs collected, but the water supply was of such poor quality that it was necessary to keep men at work night and day clearing away the trash brought down by the melting snows; consequently the results were very unsatisfactory and no definite conclusions have yet been reached.

Early in October arrangements were made for the collection of brood cod for the Woods Hole station; also for the establishment of auxiliary collecting stations at Plymouth, Mass., and Kittery Point, Me., to supply the Gloucester and Woods Hole stations with eggs. The schooner *Grampus* during the months of October and November captured and delivered at Woods Hole 2,200 brood cod varying from 6 to 20 pounds. These commenced to spawn in November and yielded 103,440,000 eggs. In addition to these the station received from the spawn-takers stationed at Plymouth 71,275,000 cod eggs collected from fishing vessels which ply from that port. The work at Kittery was even more successful than in the past and the eggs collected were of superior quality, due largely to the exceptionally good weather which prevailed from November to February. From this point 180,230,000 cod eggs were shipped to Gloucester between November 28 and March 23, which, with the shipments from Plymouth, gave the station an aggregate of 198,880,000. As a result of the work at the two stations, 265,324,000 cod fry were liberated along the coast of New England from December to March. The results were very gratifying, being over 50,000,000 greater than ever before. The adult cod which survived the spawning operation were tagged and liberated from the Woods Hole station, as heretofore, with a view to getting additional data with reference to their migrations, rate of growth, etc; 1,311

were turned loose, and before the close of the year 11 were captured between Chatham and the New Jersey coast.

It was decided to take up the flat-fish work early in January, as past experience seemed to indicate that a large number of fish spawned during that month or early in February. The work was somewhat delayed by the presence of ice in the bays in which the nets were set, but the season proved very satisfactory; over 102,000,000 eggs were collected, which yielded 87,115,000 fry. In view of the fact that very unsatisfactory results had been secured during the past two or three years where the eggs had been artificially fertilized, it was determined this season to allow the fish to spawn naturally in the tanks at the station, and the results were most satisfactory.

Owing to the continued decrease of the lobster fishery, strenuous efforts have been made during the past two years to increase the output of lobster fry, but the scarcity of lobsters and the difficulties encountered in getting the egg lobsters from the fishermen, notwithstanding the cordial cooperation of State fish commissions throughout New England, has made this impossible. Arrangements were made during the winter months to collect all of the egg-bearing lobsters captured from Eastport to New York. The *Grampus*, assisted by a steam smack, plied along the coast of Maine, and visited all of the important fishing centers from early in April to July. Besides this, local agents were stationed from Kittery to New London, Conn., who purchased egg lobsters, not only from the fishermen, but also from the dealers in large towns. These were then transferred to Woods Hole and Gloucester by sail and steam boats provided for this purpose. Notwithstanding the efforts made, only 4,643 egg lobsters were secured north of Cape Cod. These yielded 63,335,000 eggs, from which were hatched 58,560,000 fry, which were deposited on suitable grounds along the coast. At Woods Hole only 28,140,000 eggs were secured and 22,643,000 hatched.

The propagation of shad was conducted as usual on the Albemarle Sound, the Potomac River, the Susquehanna, and the Delaware. The establishment of a new shad station at Edenton, N. C., obviated the necessity of our utilizing the *Fish Hawk* at that point. The season was very backward, and at one time it appeared as though the work would be materially reduced. The run of shad on the Potomac was seriously affected by the unfavorable conditions and work practically ceased by the middle of May, but operations were vigorously pushed until the end of the month on the Delaware and Susquehanna rivers. The number of eggs collected at the four stations aggregated 316,000,000, which produced 241,056,000 fry, an excess of about 6,000,000 over the previous season. The results secured on the Delaware were particularly gratifying. The run of shad was immense, the fish being caught in such large numbers that there was practically no sale. The *Fish Hawk* between April 27 and May 31, when operations ceased on account of lack of funds, had collected over 80,000,000 eggs.

The propagation of the basses and other fishes suitable for stocking inland lakes and streams was conducted as usual at the various stations provided for this purpose. The results were very gratifying. Notwithstanding the fact that there has been a large increase in the number of applications filed during the year, especially for the basses, all demands were met.

The following stations and auxiliary stations were operated during the year, and the work accomplished at each is reviewed in detail in the abstracts from the reports of the various superintendents:

Green Lake, Maine.
Craig Brook, Maine.
Grand Lake Stream, Maine.
St. Johnsbury, Vermont.
Nashua, New Hampshire.
Gloucester, Massachusetts.
Woods Hole, Massachusetts.
Cape Vincent, New York.
Steamer *Fish Hawk* (Delaware River).
Battery Station, Maryland.
Fish Lakes, Washington, D. C.
Central Station, Washington, D. C.
Bryan Point, Maryland.
Edenton, North Carolina.
Wytheville, Virginia.
Erwin, Tennessee.
Put-in Bay, Ohio.
Northville, Michigan.
Detroit, Michigan.
Alpena, Michigan.
Sault Ste. Marie, Michigan.
Duluth, Minnesota.
Quincy, Illinois.
Manchester, Iowa.
Neosho, Missouri.
San Marcos, Texas.
Leadville, Colorado.
Spearfish, South Dakota.
Bozeman, Montana.
Baird, California.
Battle Creek, California.
Clackamas, Oregon.
Rogue River, Oregon.
Little White Salmon, Washington.
Baker Lake, Washington.

RESULTS OF FISH-CULTURE.

From correspondents in various sections of the country letters have been received from time to time showing the results of plants of brook trout, steelhead trout, rainbow trout, black bass, and crappie. The superintendent of Leadville station received numerous letters from individuals whose lakes had been stocked with brook trout and who, as a result, were engaged in fish-culture from a commercial standpoint. As illustrative of the scale upon which this work is being conducted in Colorado, 4,800,000 brook-trout eggs were collected by the superintendent during the past fall, all except about 250,000 being taken there from private lakes. The correspondence also shows that the brook trout is well established in public waters in various sections of the State, and this is of especial interest in view of the fact that there were no brook trout in the waters of Colorado a few years ago.

From Montana numerous letters have also been received from persons to whom fish had been furnished, and they all show the brook trout to be well adapted for the streams in that State. Mr. W. C. Gilmer, under date of March 24, 1900, reports the capture of a brook trout weighing 2½ pounds, dressed, resulting from a plant made in August, 1897, in a stream tributary to the Madison River, near Ennis.

There is no doubt as to the success of the steelhead trout in some

of the streams and lakes of eastern Montana. During the spring of 1900 over 50,000 eggs were collected from fish taken in Bridger Creek, and Mr. J. A. Davies, of Butte, Mont., reports that steelheads from 9 to 12 inches long were taken from a mountain lake in Madison County which had been stocked the previous year.

A member of the Catlin Land and Live-stock Company, near White Sulphur Springs, Meagher County, writes as follows:

> The 5,000 steelhead trout sent us in October, 1898, were put in our spring creek, grown up with watercress and containing a good supply of snails, water-bugs, and worms. This creek empties into a reservoir of 5 or 6 acres, 6 to 8 feet deep, from which we have caught several varying in length from 9 to 12 inches. The flesh is pink or salmon-colored, and of good quality.

As these fish were only a year old when caught, it would seem that they are admirably adapted to the waters of that section.

Henry Gilmer, of Lewisburg, W. Va., under date of June 19, reports the capture of a rainbow trout weighing a pound in Howard Creek, near Lewisburg, which stream was stocked by the Commission in 1898. Mr. A. H. Gibboney, of Marion, Va., captured a rainbow trout 23 inches long, weighing 4 pounds 9 ounces, in Staley Creek, in August, 1900, and he reports that several hundred have been captured by Dr. Z. V. Sherrell, of the same place, since April 15, some measuring 14 to 23 inches in length, and one weighing 3½ pounds.

It has been the general impression that rainbow trout will not thrive in New England waters, but Hon. H. O. Stanley, of the Maine Fish Commission, under date of June 26, 1900, reports that a large number of these fish entered the trap of the State hatchery at Lake Auburn the previous spring and that eggs were collected from them. They weighed from 6 to 9 pounds, and were supposed to have escaped into Lake Auburn from the State hatchery several years ago, when it had been supplied with eggs by the U. S. Fish Commission.

Mr. J. D. Patton, of Cleveland, Tenn., states that rainbow trout are found in Jack River and Mitchell Creek as a result of plants made in those waters. Mr. William G. De Witt, of the Adirondack League Club of New York, forwarded two specimens of Swiss trout on July 29, 1900, taken in a lake controlled by the club, which had been stocked with a consignment furnished by this Commission.

Reports have reached the Commission from time to time of the capture of quinnat salmon in Lake Ontario and its tributaries. During the past year two specimens have been secured and identified by Mr. Livingston Stone, superintendent of the Cape Vincent Station, one of which was ripe and weighed 12½ pounds, the capture being made near Tibbetts Point light-house in a sturgeon net.

Several years ago the Commission liberated in the tributaries of the Potomac River 200 crappie and 200 large-mouthed black bass, and as a consequence, from January 1 to August, 1900 (excluding April and May), 47,795 pounds of bass were sold in Washington from the Potomac

River. The crappie (an excellent food-fish), though not handled in large numbers in the markets, is also very abundant.

Mr. C. N. Ironsides, of New York, under date of January 10, writes:

> Some four or five years ago, at my request, your Commission sent me 100 crappie to be planted in York Lake, Sullivan County. It gives me great pleasure to report to you that the planting was entirely successful. Ninety-eight were placed in the lake, and the catch last summer and fall was very large. The lake is now well stocked with crappie.

SPECIAL INVESTIGATIONS AND INSPECTIONS.

During December, at the request of the Fish and Game Association of the District of Columbia, arrangements were made to seine the Chesapeake and Ohio Canal just after the drawing down of the water for the winter, with the view to transferring the fishes remaining in the pools to the Potomac River. This work was directed by Mr. L. G. Harron, who between December 14 and 22 removed all the fish in the canal from Middlekauff's Mill to Great Falls, a distance of 92 miles. Over 4,000 small-mouthed black bass were saved, 410 rock bass, 610 crappie, 700 white perch, 3,800 sun-fish, and 3,400 cat-fish, besides 70,000 or 80,000 of the commoner varieties. Nearly 500 carp, weighing from 1½ pounds to 15 pounds, were also captured, but no small ones were seen, and it is supposed they had been eaten by bass and other fishes.

At the request of Mr. Moreton Frewen, of Innishannon, Ireland, arrangements were made in May to forward a consignment of shad eggs to Queenstown with the view to stocking some of the rivers of Ireland with this valuable food-fish. On May 15, Mr. J. F. Ellis, superintendent of the car and messenger service, delivered on board the *Oceanic*, of the White Star Line, 700,000 eggs which had been furnished from the steamer *Fish Hawk*. They were placed in the refrigerator and arrangements were made with the steward to have the temperature kept between 51° and 55°. It is to be regretted that on the arrival of the vessel at Queenstown the eggs were all dead. It is believed that, if an experienced messenger were sent, shad fry, and possibly eggs, could be successfully transported, as the vessels take only about 4½ days to make the trip and there would be no difficulty in obtaining fresh supplies of water and ice en route.

In August the Fish Commission stations at Wytheville, Va., and Erwin, Tenn., were inspected by the assistant in charge of the Division of Fish Culture. The construction work accomplished at Wytheville during the past year was excellent, but in order to make the station efficient it will be necessary to build additional bass ponds and make a number of improvements, which, it was estimated, will cost about $2,500. At the Erwin station the pond system for the propagation of trout was practically completed, but the grounds were in an unfinished condition owing to lack of funds, and it is estimated that it will require about $500 to put them in good shape. The Crow

tract, lying due south of the present site and containing about 40 acres, on which the Commission had secured an option with the view to purchase, was carefully examined, and it was recommended that it be devoted entirely to the propagation of bass and crappie, the ponds to be supplied with water from Indian Creek or the stream running through the station grounds. It is recommended that an appropriation of $5,000 be obtained for this purpose.

Between November 16 and 23 the stations at St. Johnsbury, Nashua, East Orland, Green Lake, and Woods Hole were inspected and conferences held with the various superintendents with reference to the conduct of fish-cultural work. The St. Johnsbury station had been materially improved by the construction of additional rearing-ponds, but the water supply was still inadequate. Plans for the construction of a large reservoir were under consideration, and an estimate of the cost will be submitted with the view to obtaining a special appropriation. The collection of trout eggs, which had just been completed, was very unsatisfactory, owing to the drought which was then prevailing throughout New England and which had caused the destruction of thousands of adult fish by the drying up of streams.

Owing to the incomplete condition of the Nashua Station and to the fact that the superintendent had had no opportunity to establish auxiliary stations, very little fish-cultural work had been done at that point. A few thousand eggs had been collected at Dublin Pond, and it was decided to purchase from commercial hatcheries a sufficient number for supplying applicants in the State. A number of rearing and brood ponds had been completed, but after a careful examination of the station it was decided that it would require from $5,000 to $6,000 to put the station in thorough working order.

The spawning season of the Atlantic salmon at Craig Brook closed on November 20, two days before the assistant's visit. Although the number of fish purchased for this work was larger than in past years, on account of their smaller size the output was less. The landlocked salmon work at Grand Lake Stream was unfavorably affected by the drought. The grounds and buildings at this station were in fair condition and the work was in general satisfactory.

At Green Lake egg collections were still in progress, but the indications here, as at other stations, pointed to a shortage on account of the excessive drought. In many lakes the water was so low that salmon and trout could not enter the streams to deposit their eggs.

As the water supply has not been satisfactory for rearing trout, the superintendent submitted a plan for increasing and improving the supply by raising the dam at Rocky Pond. The suggestion seemed practicable, and it was recommended that a special appropriation be asked for this purpose.

At the time of the assistant's visit to Woods Hole there were on hand over 2,000 brood cod, weighing 6 to 20 pounds, which had been captured by the *Grampus* and placed in live-boxes at the station. The

question of opening the Plymouth and Kittery Point auxiliary stations was thoroughly canvassed with Capt. E. E. Hahn and arrangements made to commence work in November. The steam launch *Blue Wing* was then being overhauled and put in readiness for the work. The buildings and grounds had been much improved during the year, but the wharf was incomplete owing to lack of funds. An additional appropriation of $2,000 was recommended for this purpose.

Late in November, at the request of the superintendent of the Northville station, the assistant in charge visited the Detroit hatchery and the three white-fish fisheries which were then in operation on Belle and Grassy islands. The hatchery at that time contained about 500 jars of eggs, and 15,000 adult white-fish were held in pens on the islands. As it appeared that the hatchery would be overcrowded, arrangements were made with the Michigan Fish Commission for the utilization of the Sault Sainte Marie hatchery, and Alpena was reopened. On the return trip from Detroit a stop was made at Monroe Piers, where the superintendent of the Put-in Bay station met the assistant with the steamer *Shearwater* and took him to the station. The work at Monroe Piers was well organized under direction of Mr. J. C. Fox, the foreman. The crates contained about 10,000 fish. At Put-in Bay there were over 100,000,000 eggs in the hatchery, besides 27,000,000 which had been shipped to Cape Vincent. There were also four or five thousand fish in the crate, and it looked as though from 240,000,000 to 250,000,000 white-fish eggs would be obtained.

The Edenton station was visited in December for the purpose of conferring with the superintendent with reference to the sinking of artesian wells for supplying the bass ponds. The appearance of this station as approached from Edenton is exceedingly attractive, and especially the hatchery, which is not only one of the most artistic ever put up by the Commission, but is also well adapted for the purpose for which it was built.

During the spring months the shad stations on the Potomac, Susquehanna, and Delaware rivers were visited from time to time for the purpose of conferring with the superintendents with reference to the proper conduct of the work. Inspections were also made of the lobster work in progress at Woods Hole and Gloucester, and a careful examination was made, in company with the superintendent, Mr. C. G. Atkins, of the auxiliary station for collecting Atlantic salmon at the headwaters of the Penobscot at Mattagamon. The rack was then being constructed, and it was thought a considerable number of salmon would be secured. En route from Bangor a stop was made at Cape Vincent, as this station had not been inspected for several years. It is very attractive and well equipped throughout. The fish-cultural work was about to close, the pike-perch and brook-trout fry having all been hatched and partly distributed. A conference was held with the superintendent relative to the pike-perch work at Swanton and the taking up of the sturgeon work on Lake Champlain.

STATION REPORTS.

GREEN LAKE STATION, MAINE (E. E. RACE, SUPERINTENDENT).

As the water in Green Lake has been very low for several summers, and particularly low during the past season, it became necessary to construct a floating wharf at Mann Brook as a landing. A scow 26 feet long was also built for transporting fish from the station to the railroad station at Green Lake, the spawning-house which had been used at Great Brook was removed to the station and fitted up as a residence for one of the laborers, and the old hatchery building, which had been removed from the head of the lake to the station in 1898, was remodeled and fitted up as a cottage. A large amount of miscellaneous work was also accomplished by the station force, including repairs to the hatchery, ponds, foreman's residence, and the steamer *Senator*.

The fish on hand at the beginning of the year are shown by the following table:

Species.	Calendar year in which hatched.			
	1899.	1898.	1897.	1896.
Landlocked salmon	311,123	397	.....	277
Steelhead trout	.....	5,126	500	.....
Brook trout	.....	829	.....	.....

The young landlocked salmon were carried through the summer in troughs and ponds with remarkable success; the distribution made during August and September amounted to 309,274, showing a loss of 1,849, or less than 0.5 per cent of the number on hand at the beginning of the year. These fish were fed chiefly on beef liver, purchased in Bangor and shipped to the station by express three times a week. When the landlocked salmon of 1898 were again counted in November there were found to be 301, of which 176 were albinos; 50 were furnished in February to the Boston Sportsmen's Association, and at the end of the year only 24 of the lot remained. Of those hatched in 1896 but one was lost during the year. They were held in the south reservoir and made a fine growth, measuring from 12 to 14 inches in length. It is hoped that they will yield eggs next season.

The brook trout retained from the hatch of 1898 are held in one of the small ponds at the rear of the hatchery, and though apparently healthy, they have grown very slowly. During the summer 349 of them died on account of the high temperature of the water.

The two lots of steelhead trout resulting from eggs hatched in 1897 and 1898 have done very well since they were transferred from the shallow ponds to the reservoir, where there is a considerable depth of water; of the younger lot 3,653 were liberated in Rocky Pond in November, and at the close of the year there were on hand 493 of the hatch of 1897 and 1,368 of the hatch of 1898. They were examined in April and the males were found to be well developed, about 75 per

cent of them being ripe, though no ripe females were found. It is expected that they will produce quite a number of eggs next season.

Early in September arrangements were made for the collection of brook-trout, lake-trout, landlocked-salmon, and golden-trout eggs at the various field stations operated in previous years. The outlook was very discouraging, on account of the protracted drought, the water in all the surrounding ponds and streams being very low.

The following table shows the field stations operated, number of fish captured, and yield of eggs from the various sources:

Stations.	Species.	Males.	Females.	Total.	Yield of eggs.
Winkempaugh Brook	Brook trout	34	71	105	100,500
Do	Landlocked salmon	38	54	92	191,000
Patton Pond	Brook trout	78	60	138	116,000
Do	Landlocked salmon		2	2	
Flood Pond	Brook trout	49	11	60	12,500
Do	Golden trout	43	21	64	10,000
Cold Stream Pond	Lake trout (togue)	457	511	968	750,000
Do	Landlocked salmon	37	36	73	60,000
Green Lake	Brook trout	4	8	12	13,000
Do	Landlocked salmon	47	48	95	93,000

The fish captured at the various auxiliary stations were liberated as soon as stripped, with no loss. The eggs collected at Winkempaugh, Flood Pond, and Patton Pond were transferred to the station as soon as fertilized, and arrived in fair condition, the losses averaging from 7 per cent to 14 per cent. Those from fish penned at Great Brook were delivered without loss. The eggs collected at Enfield were eyed at the State hatchery and then transferred, the lake-trout eggs arriving on November 28 and the salmon eggs in February.

The water supply at this station was very unsatisfactory throughout the winter. The temperature of the water dropped in November from 45° to 32½°, and it remained intensely cold until spring. This seriously retarded the development of the eggs, those of the brook trout being in the water 125 days and of the salmon 132 days before showing the eye-spots. These unfavorable conditions caused serious losses.

In addition to the eggs collected in Maine, 300,000 lake-trout eggs were received from Northville and 200,000 brook-trout eggs were purchased from dealers in Massachusetts. The latter arrived in excellent condition, the entire loss on the 200,000 being about 13 per cent. Of the lake-trout eggs collected at Cold Stream Pond, 350,000 were turned over to the State of Maine.

The fry commenced hatching early in March, and in April and May 587,000 lake-trout, 323,644 brook-trout, and 6,990 golden-trout fry were distributed. At the close of the year the following were on hand:

Species.	Calendar year in which fish were hatched.			
	1900.	1898.	1897.	1896.
Landlocked salmon	183,077	149		270
Steelhead trout		1,368	493	
Brook trout		448		

CRAIG BROOK STATION, MAINE (C. G. ATKINS, SUPERINTENDENT).

The fishes handled at this station during the year were Atlantic salmon, landlocked salmon, quinnat salmon, steelhead trout, rainbow trout, brook trout, Scotch sea trout. On July 1, 1899, there were on hand nearly a million fish, as indicated in the following table:

Species.	Calendar year in which fish were hatched.					
	1899.	1898.	1897.	1896.	1895.	1894 or earlier.
Atlantic salmon	658,860					*408
Atlantic salmon, domesticated						2
Landlocked salmon	†220,459	3,887				
Quinnat salmon			157			
Steelhead trout	1,647	287		186		
Rainbow trout	4,829	9				
Scotch sea trout	56,551				513	10
Brook trout	6,800					
Total	949,146	4,183	157	186	513	420

* Wild fish inclosed. † 130,586 at Grand Lake Stream.

The large stock of young Atlantic salmon hatched the previous spring were fed as usual upon chopped food, mainly hog-plucks, though the flesh of old horses and other domestic animals formed a very considerable item. They were carried until autumn with fair success, when 542,849 were liberated, over 521,000 being planted in the upper waters of the Penobscot and its tributaries; the balance were deposited near Craig Brook. It is thought that fry liberated well up the river have a better chance of life than those planted below Bucksport.

In October and November the adult fish impounded at Dead Brook the previous June yielded 1,881,608 eggs. Of these, 1,854 were lost in incubation and 550,000 were shipped to State fish commissions and other applicants. The U. S. Fish Commission received 1,500,267 eggs as its share of the collections at this point, but in April the Maine commission returned its proportion, amounting to 187,533. The hatching was done at Craig Brook, and 1,135,946 strong, healthy fry were produced. They suffered very little during the sac stage, and of the total number hatched only 13,867 were lost. In June 908,073 were planted in the upper waters of the Penobscot at Brownville, Grindstone, and Oakfield, leaving 194,572 on hand at the end of the year, which will be carried until fall and distributed in the same waters.

The superintendent visited the upper waters of the Penobscot several times during the year, with the view to determining how many salmon reach the natural spawning grounds, and whether it would be possible to obtain eggs from this source in sufficient numbers to permit the discontinuance of operations at Dead Brook. As a result of these investigations it was decided to reduce the scale of operations materially at Dead Brook and to establish an auxiliary station on the east branch of the Penobscot River at Mattagamon, in township 3, range 7 west from the east line of the State, by river about 20 miles

above Medway, where the east and west branches unite, about 150 miles above Bucksport, and 7½ miles from Staceyville, on the Bangor and Aroostook Railroad. The temporary camp and works are located on the west side of the river at the entrance to a cove known as "Hunt Logan," formed by an ancient river bed from which the stream has by natural causes been partially diverted, though the connection between the old bed and the new is still maintained.

After careful consideration it was estimated that about 200 salmon had passed over the dams to the upper waters of the Penobscot and spawned the previous summer, but the nests are scattered over about 50 miles of stream, and unless the fish can be captured and held at one point it would be impossible to collect any considerable number of eggs. It was therefore necessary to select a site where all the fish ascending the stream could be captured and held until September or October, and for this reason "Hunt Logan" was selected. By means of a weir across the river, it is proposed to turn all the fish into the mouth of the "Logan" and then into a trap without any handling whatever. The problem of constructing a weir that would give passage to boats and logs, which are floated down past this point in July, and still maintain itself and its efficiency without interrupting the work, has been a very difficult one, but an attempt will be made to meet it in the following manner: A leader will be run diagonally across the river, with pounds for entrapping the salmon at the upper or western end, and from these pounds the fish will be admitted to the inclosure in the "Logan." The pounds will be made by driving stakes in the bottom, but the leader which spans the river will consist of a series of small peeled, seasoned, and buoyant poles, anchored by attaching one end to a heavy chain cable, about 1 foot apart, and allowing the other end to swing free in the current, which will permit them to rise aslant to the surface and keep them swaying constantly to and fro. This weir is now in course of preparation.

During the months of May and June 212 adult salmon were purchased at the mouth of the river and impounded at Dead Brook, so that in the event of failure at the head of the river it will still be possible to collect a fair number of eggs.

The landlocked salmon on hand at the beginning of the year at Craig Brook and Grand Lake Stream were carried through the summer with slight losses, and during the fall months 70,836 were distributed from Craig Brook and 111,787 from Grand Lake Stream. The loss at the latter point during the summer amounted to 18,799, most of which probably escaped through the foot screens in the troughs into Grand Lake Stream.

The trap for the capture of adult salmon was completed on October 28, and fishing commenced immediately and continued uninterruptedly until November 20. The water in the stream was unusually low, but the fish commenced running in large numbers and 541 had been penned by November 3. The run stopped abruptly at this time, and though

operations continued for over two weeks the total catch amounted to only 371 females and 256 males. Of the females 24 proved barren; the others yielded 242,559 eggs, of which 182,300 were eyed and half of them transferred to Craig Brook. The balance were held at Grand Lake Stream and hatched. The fry did well until June 27, when they were suddenly attacked by an epidemic which carried off a third of them in three days, so that 53,715 remain at the close of the year. Of those transferred to Craig Brook 75,000 were shipped to State fish commissions and private applicants; the balance were hatched, producing 15,944 fry. Of these, 10,000 were distributed in the spring and 5,092 remain at the close of the year.

In one of the deep ponds 166 steelhead trout have been held for several years for experimental purposes, and from these 42,000 eggs were collected during the spring of 1900. They were of very poor quality, however, and only 33,275 fry were hatched from them. Of these, 9,000 were distributed and there are on hand 21,092.

During the spring of 1897 a number of adult rainbow trout were turned loose in Alamoosook Lake. The following spring and each spring thereafter, though in decreased numbers, the survivors of the fish have entered Craig Brook to spawn. Some eggs have been taken from them each season, but mostly of poor quality. During the past spring 12,600 eggs were obtained from this source.

The two adult broods of Scotch sea trout on hand are the result of eggs imported from Scotland in 1891, the oldest brood being the result of the eggs imported, and the other their first descendants. Eggs were collected from both broods this spring, and though not of first-class quality they were no worse than the average eggs from domesticated fish. In fact this species stands at the head of all the *Salmonidæ* reared at Craig Brook for vigor and hardiness in the face of unfavorable influences. Of the 144,145 eggs collected 10,000 were shipped, and the balance were hatched at the station, producing 98,575 fry; 35,000 were liberated in May, and on June 30 there remained on hand 6,416.

The food consumed at this station during the year was as follows: 3,574 pounds of beef liver, 22,234 pounds of hogs' plucks, and 8,560 pounds of horse flesh, in all 34,368 pounds, costing $449.57, in addition to $56.04 for freight, $71.26 for drayage, and $37.80 for ice and its preservation, making the total cost of fish food for the year $614.67.

Following are the fish on hand at the close of the fiscal year:

Kind.	Calendar year in which fish were hatched.						Wild fish inclosed.
	1900.	1899.	1898.	1897.	1896.	1895 or earlier.	
Atlantic salmon	194,572	523					210
Quinnat salmon				78			
Landlocked salmon	58,807	984	803				
Scotch sea trout	6,416	273				218	
Steelhead trout	21,092	974			165		
Brook trout	211	283					
Rainbow trout	4,464	299					
Total	285,562	3,336	803	78	165	218	210

ST. JOHNSBURY STATION, VERMONT (J. W. TITCOMB, SUPERINTENDENT).

The fish on hand at the beginning of the year were as follows:

Species.	Calendar year in which fish were hatched.				
	1899.	1898.	1897.	1896.	1895.
Rainbow trout	310	.....	.....	310	.....
Steelhead trout	4,335	67	.....	.....	26
Brook trout	7,665	.....	.....	.....	.....
Landlocked salmon	42,329	.....	.....	.....	.....
Hybrids (female brook trout crossed with lake trout)	2,241	.....	.....	.....	.....
Grayling	8,000	.....	.....	.....	.....
Total	64,880	67	.....	310	26

The rainbow-trout fry on hand on July 1 were obtained from fish hatched at the station in 1896, but only 77 of them lived to the close of the year. From the 256 adults available in the spring 58,574 eggs were taken, but many of them were shotty and hard, so that only 48,740 were placed in the troughs; and though these appeared to be of good quality, only 6,000 of the fry hatched from them survived to the close of the year. These are apparently strong and healthy. The first eggs taken were laid down in cold water in the hatchery; later on troughs were set up at the source of a spring and these eggs were transferred to them, as well as all eggs subsequently taken, and it was found that the eggs which had been carried in cold water for a few weeks eyed about as well as the others, though most of them burst before hatching. It is estimated that only 10,000 of the total take were actually fertilized.

Of the 4,335 steelhead-trout fry on hand at the beginning of the year, 3,340 were reared to the fingerling stage and 2,200 of them were planted. The others were retained for domestication, but by the last of the year their number had been reduced to 348. As the pond in which they were held during the winter was covered with ice 2 feet thick, it is impossible to assign any reason for so large a loss.

Of the 7,665 brook-trout fry on hand at the first of the year, 6,310 were distributed as fingerlings and the balance retained; 470 of them survived the winter.

The landlocked salmon suffered extremely during the hot summer months, and in the fall only 17,260 remained for distribution. In order to keep landlocked salmon in a healthy condition it is necessary to salt them thoroughly at least three times a week.

The hybrid trout obtained by crossing the *fontinalis* with the *namaycush* were carried without difficulty for several weeks, when 100 were delivered to Prof. W. J. Moenkhaus, of Harvard College, and 1,859 were planted in Caspian Lake.

The 8,000 grayling fry resulting from a shipment of eggs from Bozeman dwindled rapidly after the absorption of the sac, but the few strong ones among them took food readily and made a more rapid growth than any other variety of fish ever hatched and reared at this

station. Another peculiarity in connection with them was the remarkable variation in the size of the fingerlings. They were fed on an emulsion of liver, obtained by grinding it as fine as possible, straining, then mixing with water and allowing it to stand for the coarser portions to settle. The liquid portion of the food thus obtained was fed to the grayling and the settlings utilized as food for the trout fry. At the close of the year 73 of this lot remained.

During the summer and fall field collecting stations were established at Darling Pond, Groton; Lake Mitchell, Sharon; Lake Dunmore at Salisbury, Big and Little Ponds in Averill, and also at the State hatchery, Roxbury.

Darling Pond, where operations have been successfully conducted for several years, changed ownership recently, and a contract was made with the present owners whereby they are to receive one half the eggs taken there and the Fish Commission the other half. The trap was put in place on July 25, but at that time the stream feeding the pond was nearly dry on account of the long-continued drought. The catch of fish was far below that of any previous season, and many that were taken in nets below the trap appeared to be clearing off spawning-beds. The total number of eggs secured was 390,828, of which 172,828 were lost in incubation. Half the balance were turned over to the owners of the lake and the remainder were shipped to St. Johnsbury. Besides reducing the catch, the drought tended to impair the quality of the eggs secured. Its effects were very noticeable on the spawning fish, whether detained in pens or having free range. Trout will not spawn naturally when the water is low. A few stragglers ascend the stream, and if caught and retained in the pens they will ripen in time, but the percentage of eggs saved is never large. The majority of the fish swim around the mouths of the streams awaiting an opportunity to ascend on a rise of water. If a sudden rain falls and causes even a temporary rise it will start them, and apparently has an immediate effect upon the eggs and milt.

At the field stations, for rough measurement, an 8-ounce tin dipper is used, it being necessary to establish a measure for each stripping, owing to the great variation in the size of the eggs. The largest ones are obtained at the first stripping and the smallest at the last. At Darling Pond the first stripping yielded 2,800 eggs to the ounce and the last 4,500, the intermediate ten strippings varying between these two measures, the number per ounce becoming greater at each consecutive stripping.

The work at Lake Mitchell was very satisfactory and more eggs were taken than in any previous season, notwithstanding the excessive drought. The good results of stocking this lake were very apparent this year in the largely increased take of fish, 3,136 being captured, 1,691 being females. During the season 726,649 eggs were obtained from 1,339 females; 355,649 died during incubation or were not fertilized, and the remaining 371,000 were transferred to St. Johnsbury.

It was noticed that the number of females exceeded the number of males, and to such an extent at times that it became impossible to secure an adequate amount of milt. At Quimby mill-pond, 4,000 eggs were fertilized with milt taken at Lake Mitchell (about 2 miles distant) several hours earlier. On November 24 the traps and racks were removed and the fish liberated. It was then found that most of the males were ripe, just twenty-five days after the last female had been stripped. This peculiarity was attributed to the drought.

Lake Dunmore is in the town of Salisbury and has an area of about 3,000 acres, one-half of which is suitable for lake trout and bass. The other half is shallow and is inhabited by pickerel and other coarse varieties. An examination of the spawning-grounds in 1898 seemed to indicate that a large number of lake-trout eggs could be secured, consequently on October 16 a field station was established and a careful watch of the spawning-beds was kept. A camp was started, troughs set up and connected with a spring, and a trap was set near the spawning-grounds off White Rocks. No fish were caught and the position of the net was changed, but with no better success. On the 25th of October 208 lake trout were captured by using a 200-foot gill net as a seine off Birch Point, about a half mile from White Rocks, the catch being made between 8 p. m. and 5 a. m. As soon as it was discovered that they could be taken in apparatus of this character a 40-rod seine was used and 761 were captured by the 14th of November, 639 being males. Of the females 102 were ripe and yielded 212,000 eggs. The fish averaged 3½ pounds in weight, though the largest weighed nearly 15 pounds. Difficulty was also experienced here in securing milt, in one instance over 100 males being handled in order to obtain enough to fertilize the eggs from 12 females. Only about 84.5 per cent of the eggs taken were successfully eyed. The station was closed on December 20 and the eggs transferred.

A field station was established at the Averill ponds, principally for the collection of golden trout (*aureolus*) and incidentally for brook trout, both species being abundant there, but no ripe fish of either species were captured, though an assistant was kept at the ponds throughout the spawning season.

Arrangements were made with the State Commission to collect at Roxbury, and as a result 340,000 eyed eggs were secured.

The total collections of eyed eggs transferred from all points to St. Johnsbury amounted to 820,000 of the brook trout and 212,000 of the lake trout. In addition to these, 30,000 rainbow-trout eggs were transferred from Manchester, 40,000 landlocked-salmon eggs from Maine stations, 55,000 steelhead-trout eggs from Clackamas, and 72,000 grayling eggs from Bozeman, all arriving in excellent condition except the rainbows. These came in two lots and were transferred from a temperature of 42° to 33°. The losses on both lots occurred chiefly about a month after their receipt and just as they commenced to hatch, only about 800 fry resulting from the two consignments.

During December and January 314,000 brook-trout eggs were shipped to State fish commissions and private applicants, including one shipment to Scotland. The lake-trout fry hatched in March and April, producing 180,000, which were distributed in suitable waters in Vermont, Connecticut, and Massachusetts. The distribution of the brook trout commenced in April and was completed the last of June, 534,100 being distributed during that period by employees of the station.

At the close of the year there were on hand the following:

Species.	Calendar year in which fish were hatched.				
	1900.	1899.	1898.	1896.	1895.
Rainbow trout	5,411	77	.....	245	.....
Steelhead trout	23,981	348	39	.....	9
Brook trout	16,018	470	.....	.....	.....
Hybrid brook and lake trout	.....	13	.....	.....	.....
Grayling	3,550	73	.....	.....	.....
Landlocked salmon	30,914	.....	.....	.....	.....
Total	79,874	981	39	245	9

It has been found here that brook trout thrive best in a temperature ranging from 55° to 60° and grayling in a temperature from 65° to 70°. Both grayling and trout have been tested in temperatures ranging from 48° to 70° during the last two months of the year, and from the observations it has been possible to make with the varying conditions it is believed that landlocked salmon, steelheads, and rainbow trout all do best in temperatures most favorable to the brook trout, while grayling thrive best in water somewhat warmer. One trough of grayling kept in spring water at 48° (the same in which they were hatched) did not take food readily and nearly all of them died. While the landlocked salmon have endured the highest temperature of any variety tested, they do not take food readily in water above 70°.

NASHUA STATION, NEW HAMPSHIRE (W. F. HUBBARD, SUPERINTENDENT).

On July 1 the personnel provided for by Congress, consisting of a superintendent, a fish-culturist, and two laborers, was appointed. The superintendent relieved Mr. W. F. Page, who had been in charge of the construction work, on July 12.

During the summer, with the assistance of a temporary force, considerable work was done on the grounds and ponds. All of the ponds were dried, the mud removed, and the bottoms covered with sand. Eleven wells were driven on the south side of the hatchery building to furnish water. These are of 2-inch iron pipe, driven from 14 to 20 feet deep, and when completed, in August, they furnished 192 gallons of water per minute, or an average of 17½ gallons per well. The wells discharge into a wooden flume on the outside of the building, which connects with the hatching-troughs by means of iron pipes through the sides. The grounds around the hatchery and the walks between the ponds were graded and sown with grass, and various other minor improvements were made.

In September the adult trout, numbering 114, were transferred from the stock pond to one of the smaller ponds, where they could be more easily handled during the spawning season. The first eggs were collected on October 20 and the last on November 29. An auxiliary station for the collection of eggs of the native brook trout was also established at Dublin Pond, New Hampshire; but only a small number of eggs were secured, and at the close of operations there the 240 adult fish that had been stripped were transferred to ponds at the station.

Owing to the unprecedented drought prevailing all through New England, the water supply from the wells was seriously affected in the fall and it became necessary to use water from the western reservoir.

In January 350,000 brook-trout eggs were received from the New Hampshire commissioners to be hatched at the station, and the fry resulting were returned to them in May and June. In February 358,000 brook-trout eggs were purchased from Mr. L. B. Handy, of South Wareham, Mass., but they proved to be of very poor quality and produced only 223,750 fry. Of these 113,000 were distributed in May and June to applicants in Massachusetts, New Hampshire, and Rhode Island, together with 284,630 lake-trout fry resulting from a shipment of 300,000 eggs received from Duluth in March. On the 11th of May 50,000 grayling eggs arrived from Bozeman in excellent condition, and were hatched without any appreciable loss, though quite a loss occurred just after the absorption of the sac. They were transferred at this time from troughs in the hatchery, where the temperature of the water was 48°, to some of the outside troughs, where the water temperature was 60°. After that there was comparatively no loss, and on June 30 there were 29,785 fingerlings on hand.

The superintendent received from the New Hampshire Commission a large number of adult lake trout, landlocked salmon, and golden trout, which were held in the ponds from November until February for the Boston Sportsmen's Association.

A contract for the construction of the superintendent's cottage was made in December, and by May 31 the building was completed. It is a frame building 30 by 38 feet with cellar. The first floor consists of a hall, parlor, dining room, pantry, and kitchen, with four bedrooms and a bathroom on the second floor, and an attic extending over the entire house above.

The following table shows the number of fish and fry on hand at the close of the year:

Species.	1896.	1897.	1898.	1899.	1900.
Brook trout	104	*198	68	.....	128,530
Steelhead trout	.....	.....	.....	266	.....
Rainbow trout	.....	.....	77	.....	.....
Landlocked salmon	.....	.....	92	.....	.....
Grayling	.....	.....	.....	.....	29,785

* Dublin pond trout.

WOODS HOLE STATION, MASSACHUSETTS (E. F. LOCKE, SUPERINTENDENT).

In October the *Grampus* commenced the collection of brood-cod, as usual, and by November 18 had delivered at the station 2,200, varying in weight from 6 to 20 pounds; 152 were also purchased from one of the commercial fishermen, making a total of 2,352. These fish yielded 103,444,000 eggs. Of these 630 died from natural causes during the season and 1,311 barren and spent ones were tagged and released, and by the close of the year 11 of them had been reported captured between Chatham, Mass., and the New Jersey coast.

The Plymouth auxiliary station was opened in November under direction of Capt. E. E. Hahn, Mr. G. F. O. Hanson, mate of the *Grampus*, being placed in immediate charge of the work with a force of spawn-takers. The first eggs at that point were obtained on November 28, and by the 17th of February 71,275,000 had been transferred to Woods Hole, bringing the total for the season to 174,719,000. The quality of the eggs was excellent and the fry from them were apparently strong and healthy. As a result of the season's work 126,921,000 fry were liberated in Vineyard Sound, near Gay Head. It is recommended that this work be extended and that at least 3,500 brood cod be provided for next season.

As the experience of past years has shown that a majority of the flat-fish had spawned before the work was undertaken, arrangements were made this year, early in January, to set fyke nets in Woods Hole Harbor, but no fish were captured until the end of that month. On January 30 nets were also sent to Waquoit Bay, but could not be set until February 7 on account of the large amount of ice in the harbor. From these two fields 250 adults were secured, 29 of which died from natural causes before spawning. The spawning lasted from January 31 to April 18, during which time 102,381,000 eggs were secured, 47,069,000 being obtained from fish caught in Woods Hole Harbor and 55,312,000 from those caught at Waquoit Bay. It is worthy of remark that the Woods Hole fish yielded more eggs per fish than those from Waquoit, the average of the former being 475,000 per fish and of the latter 357,000. This is the reverse of the experience of past years.

As great difficulty had been experienced in the past two years in artificially fertilizing the eggs, the plan was adopted this year of holding the brood-fish in live-boxes and allowing them to spawn naturally. The results were very gratifying. But few unfertilized eggs were observed, and the output of fry was the largest in the history of the Commission, the plants in Waquoit Bay and Woods Hole Harbor amounting to 87,115,000.

Although every effort was made to enlarge the lobster work, the season was very discouraging. Early in April arrangements were made for collecting egg-lobsters at Plymouth and Scituate, and also from fishermen operating in Buzzards Bay and Vineyard Sound. Subsequently a sailing smack was employed to attend the pots in the

vicinity of Noank and Stonington, and Block Island and Newport. Early in May, when the majority of the lobsters are usually caught, the coast was swept by high easterly winds, causing heavy seas, which interfered materially with fishing operations. In addition to this, lobsters were scarcer than ever before in the history of the fishery, and in many localities operations were abandoned entirely and the fishermen engaged in other pursuits. This was particularly noticeable at Noank and Block Island. At the former place, where there are usually 40 fishermen, only 10 set pots, and even these discontinued work on June 9, on account of the poor results attained and loss of gear. At Block Island the conditions were even worse; where 15 or 20 men usually engaged in this fishery, only one set pots this year, and he abandoned them later to go cod-fishing. The same conditions existed to a certain extent at New Bedford, Buzzards Bay, and elsewhere. From New Bedford, which has been in the past one of the most productive fields, and which yielded last year 347 egg-lobsters, only 26 were secured. The season closed on June 27, the take amounting to 28,142,000 eggs, from which 22,463,000 fry were hatched and planted or turned over to Dr. H. C. Bumpus for experiment, with the view to feeding them in pens until after the fourth molting.

During the summer all of the buildings were painted inside and out, the old plumbing in the residence was replaced with new, and the whole system of water-pipes was overhauled. In many instances the old pipes, which had been in use for a number of years, were so badly corroded that more than three-fourths of the opening was closed. In the hatchery and laboratory a number of additional bedrooms were provided. Work on the wharf commenced in the fall, but it was not completed owing to lack of funds. The old boiler and engine in the launch *Blue Wing* were condemned and new machinery installed, the main boiler being also repaired and the old tubes removed. The engines in the launch *Cygnet* were also overhauled and repaired.

GLOUCESTER STATION, MASSACHUSETTS (C. G. CORLISS, SUPERINTENDENT).

Operations at this station were confined to cod and lobsters. During the summer no fish-cultural work was in progress, but the station force was fully occupied in making repairs to the buildings and getting the hatching apparatus ready for fall work. The old wharf, which had been practically destroyed by the storms of the previous winter, was removed and a new one 155 feet long by 16 feet wide, with a T at the outer end 42 feet by 16 feet, was constructed, in accordance with plans prepared by the architect of the Commission. As soon as it was finished the suction box, which extends from the hatchery to the end of the wharf, was replaced and the suction pipe laid into it, packed in sawdust to prevent its freezing in winter.

By November 15 the station was in thorough order, but no eggs were received until the latter part of the month, when Captain Hahn with the crew of the *Grampus* commenced collections at Kittery. At

the same time another force, under the direction of Mr. Hanson, began work at Plymouth, Mass. The first eggs were received at the station on November 28, and collections continued uninterruptedly until March 23, during which period 180,230,000 were obtained at Kittery and forwarded to Gloucester, besides 17,792,000 from Plymouth and 858,000 from local fishermen, making a total of 198,880,000 for the season.

The number of eggs collected was larger than usual, and of excellent quality, which was due to a large extent to the favorable weather throughout the winter. As a result of the season's work, 135,693,000 fry were hatched and planted along the Massachusetts coast from Rockport to Beverly, and 3,000,000 were deposited in the Chesapeake Bay as an experiment.

As soon as the last of the fry were distributed arrangements were made to commence the collection of egg lobsters. The *Grampus* proceeded early in April to the coast of Maine, and with the steam smack collected from all points between Portland and Eastport, shipping the lobsters to the station. Arrangements were also made—at Kittery, Cohasset, Boston, and all points in the vicinity of the station—with fishermen for holding their egg lobsters. By the middle of May the receipts from Massachusetts were very satisfactory and the prospects seemed good for a large season's work, but about this time the catch decreased steadily to the end of the season. On the Maine coast the season opened badly and the collections were smaller than usual, no lobsters being received from Nova Scotia. Between April 1 and the 10th of July 4,643 egg-bearing lobsters were purchased, which yielded 63,335,000 eggs.

The following table shows the number collected in the various localities and the yield of eggs from same:

Locality.	Egg lobsters.	Eggs.
Gloucester, Mass., and vicinity	555	7,813,000
Boston, Mass., and vicinity	1,461	20,044,000
Kittery Point, Me., and vicinity	683	9,687,000
Maine coast, schooner Grampus	1,944	25,791,000
Total	4,643	63,335,000

Dr. H. C. Bumpus, at Woods Hole, was supplied with 1,300,000 eggs for experimental purposes. The balance yielded 58,560,000 fry, which were planted as shown in the table of distribution.

The lobster eggs shipped from Maine and other points arrived in much better condition than in the past, consequently the loss in hatching was small and the fry were strong and healthy. In accordance with an agreement made with the Maine Fish Commission the fry hatched from eggs collected on that coast were distributed in the waters of the State. They were shipped both by the schooner *Grampus* and by messenger and were planted in fine condition. The adults

were all liberated in the waters of the State from which they were obtained, care being taken to plant them well out at sea so that they would not be recaptured immediately.

As in previous seasons large numbers of dead lobster fry were sometimes found in the cans, special attention was paid to this matter on each trip, and on the completion of the work the messenger in charge reports that there was practically no loss. The new eggs made their appearance fully two weeks in advance of any previous year, which was attributed to the mild winter and to the fact that the water offshore during the winter and spring was several degrees warmer than has been the case for several years.

CAPE VINCENT STATION, NEW YORK (LIVINGSTON STONE, SUPERINTENDENT).

During July and August a part of the force was engaged at Swanton, Vt., in cleaning up the fishing-grounds preparatory to collecting pike perch there the following spring. Early in April operations were commenced on the Missisquoi River 3 miles below Swanton. A substantial shed 11 by 27 feet, with a platform 17 by 27 feet, was constructed on the river bank as a spawning-house, and three pens for holding fish were placed in the river near by. In the middle of the spawning-shed, and running lengthwise of it, a trough 12 feet long and 15 inches wide, divided into two compartments, was provided for holding ripe fish. This was supplied by a constant stream of water from tanks located on the platform. Fishing commenced April 14, but no ripe fish were found until the 22d, when they began coming on in large numbers, and from that time to the end of the month operations were pushed vigorously and large numbers captured, as many as 657 male pike perch being landed at one haul of a seine 22 rods long; 1,859 spawning fish were taken, which yielded 130,300,000 eggs, according to measurements made on the grounds, although when remeasured at the hatchery there were less than 116,000,000. Of these 85,225,000 were transferred to Cape Vincent and 30,500,000 were hatched at Swanton for distribution in Vermont waters, producing 12,600,000 fry, or about 41 per cent of the number of eggs retained. The fry were planted under the direction of the Vermont Fish Commission during June.

The hatchery is a small wooden building located near the Missisquoi River, in the town of Swanton. It was fitted with a battery of two tiers, containing 28 jars each, and a tank for the reception of the fry. The building was provided with heat and light and was leased at a small rental, the water supply being furnished by the village of Swanton at the rate of $1 per day. It was very unsatisfactory, however, as it was filled with sediment washed down from the mountains in which the river rises, and though two men were kept busy night and day changing the filters and cleaning the jars, very heavy losses ensued. It is believed that under ordinary conditions a much larger percentage of fry would have been hatched.

The eggs forwarded to Cape Vincent were packed on canton-flannel trays and sent in charge of a messenger. The first two shipments, forwarded on April 27 and 28, arrived in good condition, but the third and fourth, transferred on April 30 and May 1, turned out very badly, though there was no evidence to show that they were injured by transportation. They were probably of inferior quality. The eggs commenced hatching late in May and finished early in July, producing 25,400,000 fry, or a little over 30 per cent of the eggs received at Cape Vincent. The distribution was made with comparatively small losses in lakes and streams in western New York.

In October arrangements were made as usual for the collection of lake-trout eggs in Lake Ontario in the vicinity of Cape Vincent and in Lake Erie at Dunkirk, N. Y. The results at both places were unsatisfactory, only 47,800 being obtained from Lake Ontario and 126,000 from Dunkirk, although the spawn-takers remained on the collecting-grounds for nearly a month. The failure at both points was due to the fact that storms continued almost uninterruptedly during the fishing season, destroying nearly all of the nets. Early in December 2,000,000 lake-trout eggs arrived from Northville in excellent condition, and were hatched in the Stone salmon baskets placed in Williamson troughs, the losses being comparatively light. The fry, amounting to 1,875,800, were distributed in February and March, except a few thousand which were planted in May.

As there are no fields in the vicinity from which brook-trout eggs can be collected, arrangements were made to purchase a supply from dealers in New England, and during the early part of September 360,000 were obtained in this way. They were hatched in ordinary trout troughs, and the 280,500 fry resulting were planted in May and June, immediately after the absorption of the sac.

No attempt was made to collect white-fish eggs on Lake Ontario this year, as repeated efforts in that field in past years had proved fruitless; and as the collections on Lake Erie were larger than ever before in the history of the Commission, 34,560,000 eggs were transferred from Put-in Bay. They arrived in good condition, and 75 per cent were hatched in the McDonald jars. It is worthy of remark that during the distribution no white-fish fry died in the tanks or in the cans in transit. It seems extraordinary that in the process of handling and shipping so large a number not a single dead fish should have been found. A plant of 400,000 was made in Lake Champlain at the request of the Vermont Commission.

It was hoped that some effort would be made this year to continue the experimental sturgeon work undertaken the previous season, but lack of funds prevented. Through the efforts of Mr. Myron Green, a temporary employee, and several fishermen, however, over 70 sturgeon caught on the Missiquoi River were confined in pens and examined from time to time for ripe eggs. A few were found in one partly spent fish and were hatched at Swanton in the ordinary jars. A small

number of the fry produced were transferred to Cape Vincent. Much interest is manifested in this work, and it is hoped that some practical results may be secured next season.

The following table shows the number of eggs handled and the fry distributed during the year:

Species.	Eggs handled.	Fry distributed.
Brook trout	360,000	280,500
Lake trout	2,176,000	1,875,800
White-fish	34,560,000	27,400,000
Pike perch	85,225,000	38,000,000
Total	122,321,000	67,556,300

STEAMER FISH HAWK (JAMES A. SMITH, COMMANDING).

On April 23 the vessel left Baltimore for the Delaware River, arriving there April 26. The crew were at once employed in getting the hatching apparatus in order, and arrangements were made with the fishermen to supply eggs on the same terms as heretofore, namely, $10 per million. Mr. W. H. Johnson and G. L. Hopper were placed in charge of the hatchery and the crew were utilized as spawn-takers. The first eggs were collected on April 27, and collections continued uninterruptedly until the close of the season on May 31. During this period the work was most successful; 80,559,000 eggs were secured, from which 47,975,000 fry were hatched; 6,006,000 eggs were transferred to the Pennsylvania State Fish Commission hatchery at Bristol, and 8,332,000 were deposited on the spawning-grounds in Howell Cove and near Bennett's fishery, owing to the fact that the hatching facilities of the vessel were overcrowded. In addition to this 700,000 eggs were shipped to New York for transshipment to Ireland.

As in former seasons the Howell Cove fishery yielded the largest number of eggs, 36,194,000 being taken at that point, 16,035,000 from Bennett's Fishery, and 5,515,000 from Cramer Hill. The balance, 22,815,000, were collected from the gill-net fishermen off Billingsport, N. J. There is little doubt but that if funds had been available and the work could have been continued as heretofore until June 10, the collections would have reached 100,000,000.

The gill-net fishermen in the vicinity captured 7 Atlantic salmon, weighing from 10 to 15 pounds, during the season.

On June 4, the last of the fry having been planted, the hatching apparatus was dismantled and the vessel shortly after proceeded to Woods Hole.

BATTERY STATION, HAVRE DE GRACE, MD. (J. N. WISNER, JR., SUPT.).

On March 12 the superintendent opened the station with a force of six men and began fitting up the launches and placing the hatchery in condition for work. The mess-room, which had been much crowded in the past two years, was enlarged and repairs were made to the cottages occupied by the machinist in charge and the superintendent.

By April 15 the launches had been thoroughly overhauled and the hatching apparatus tested. The force was increased and vessels hired and stationed at various points to receive eggs from the fishermen.

The season was late, no eggs being collected until the 19th, on which date the water temperature registered 54°. As heretofore, arrangements had been made with all the gillers fishing from Battery station, and within a radius of from 8 to 10 miles, to furnish eggs at the rate of $20 per million, and 20 spawn-takers and assistants were employed for the purpose of attending the floats and doing other work.

The nightly collections were small (not exceeding 2,000,000) until April 26, when 4,900,000 were secured. They increased materially from that time, reaching a maximum of 16,332,000 on May 2. The season continued uninterruptedly until May 30, the total collections aggregating 167,582,000.

During the latter part of May ripe females were taken in large numbers, but male fish were very scarce. On one night 12,000,000 eggs were brought in, but the next day only 3,000,000 of them were found to be impregnated. On June 2 the water became so salt that operations were discontinued and the force dismissed. The season's work, though not as great as in the past two years, was exceedingly satisfactory. Of the eggs collected 17,711,000 were planted on the spawning-grounds in the vicinity of the station, as the hatchery was overcrowded; 12,040,000 were shipped to Central station, Washington, D. C., and to the Maryland Fish Commission in Baltimore, and 87,518,000 fry were hatched and planted in the Chesapeake Bay and its tributaries and in the Hudson River.

The following shows the number of eggs collected during April, May, and June, with the average temperature of air and water:

Month.	Eggs taken.	Average temperature.	
		Air.	Water.
		°F.	°F.
April	43,484,000	56	55
May	122,093,000	63	62.2
June	2,005,000	72.3	71
Total	167,582,000	.....	.....

On May 19 the temperature fell very suddenly from 70° to 64°, and on the following day it was noticed that many of the fry had bubbles of air in the sac. A large percentage of them exhibited this phenomenon in the next five days, the bubbles being easily discernible with the naked eye and so large as to cause the fry to float. This has been noticed before, but there are no data to show that it followed a sudden fall in temperature. Many theories might be advanced to cover this peculiar occurrence, but no definite conclusions have been reached.

During the spring 100,000 striped-bass eggs were received at the station, but as no apparatus had been prepared for hatching them,

the results secured were poor. A number of methods were tried and a few eggs hatched by each, and there seems to be no doubt that if many eggs were collected, apparatus could be devised for hatching them as successfully as the eggs of the shad. The eggs hatched in forty-four hours, and it was noticed that immediately after hatching the eye-spot could not be seen with the naked eye; but a small sac of oil was noticed at the head of the fish. Under the microscope the bubble of oil proved to be just under the head of the fish, apparently at its mouth. With a strong quarter-inch lens the pupil of the eye was discernible as a clear circle within another circle of greater density. The oil-sac gradually decreased in size, the eye becoming plainer until the third day, when it disappeared entirely and the eyes could be seen without the aid of the microscope. Attention is called to this, as the eye-spots of other fishes usually become visible about the middle of the period of incubation. It was proved that a large number of striped-bass fry may be retained a considerable length of time in a vessel of water without changing. This would indicate that they can be transported with great ease.

BRYAN POINT STATION, MARYLAND (L. G. HARRON, SUPERINTENDENT).

The station was opened on March 20 and a small force employed to make the necessary repairs and improvements preparatory for the coming season's work. The launch *Blue Wing* also arrived from Gloucester on that day and was utilized in carrying supplies and material from Washington and Alexandria to the station until the spawning season commenced, after which she was engaged in collecting eggs from the seines and gill nets. Spawning fish having been observed on April 15, the regular force was taken on the next day and active operations commenced. An additional steam launch was chartered for a month to assist in attending the gillers between Alexandria and Bryan Point and to carry supplies to the station.

Commencing April 17, eggs were collected each day until May 15, 67,904,000 being secured, all of which were hatched at the station, except 1,023,000 transferred to Central Station. Of the fry hatched (55,702,000, or 83⅓ per cent of the eggs retained) 6,065,000 were delivered on board the Fish Commission cars at Alexandria for shipment to streams in South Carolina, Georgia, and Florida, and the balance planted in the Potomac between Broad and Occoquan creeks.

The outlook at the beginning of the season indicated a very large collection, over 49,000,000 eggs being taken between April 16 and 30, but in May the catch of fish declined so rapidly that all of the seine fishermen suspended operations and the gillers became indifferent on account of the small returns and would not fish regularly. Frequently no fishermen were operating on many of the important fishing-grounds. On May 19, all of the eggs being hatched and the fry planted, the *Blue Wing* was transferred to Gloucester, Mass., and on the 25th the station was closed and left in charge of a watchman.

FISH LAKES, WASHINGTON, D. C. (RUDOLPH HESSEL, SUPERINTENDENT).

During the summer 43,844 black bass were removed from the breeding-ponds to retaining-tanks. Of these 32,967 were carried through the summer in the rearing-pools and distributed in October and November, when they varied in size from 3 to 6 inches. The large loss of young fish is attributed to some extent to their being held for several weeks in the retaining-tanks, at which time the water was constantly roiled. In one of the smaller ponds 200 small-mouth bass were reared and distributed with the large-mouth bass during the fall. During the winter the west pond, which covered an area of 6½ acres, and which had been devoted for a number of years to the rearing of shad, was divided by means of a partition (397 feet long) into two ponds, one to be devoted to the rearing of bass and the other to shad.

In April the adult black bass were placed as usual in the partitions in the north and south ponds and in that part of the west pond devoted to their culture, but owing to the low temperature prevailing in the spring months they did not commence spawning until about the middle of May. A number of nests were observed about the 20th and one pair spawned on the night of May 23 in the Eagle Pond, where an excellent opportunity for watching the development of the eggs was afforded. On May 25 the dark spots indicating the eyes were conspicuous, and on the fourth day the fry burst from the shell. They seemed to lie motionless at the bottom of the nest until the 29th, when they rose a few inches in the water but did not leave the nest until the following day, when they began to take on a darker color. Another nest in the south pond was first noted on the 25th. Two days afterwards the first fry appeared, and by the 28th the entire brood was hatched. They remained on the nest until June 1, when they commenced to rise in a similar manner to those observed on the first nest. A number of other nests were noticed on the 26th and 29th of May, and it was observed that the eggs remained 4 to 4½ days before they hatched, the fry rising from the nests 3 to 5 days later. The period of incubation depends on the temperature of the water.

A series of temperatures taken at 7 o'clock in the evening from May 23 to June 2 was as follows, the mean being 73°:

Date.	Temp.	Date.	Temp.
	°F.		°F.
May 23	74	May 29	70
May 24	73	May 30	72
May 25	70	May 31	76
May 26	67	June 1	81
May 27	73	June 2	77
May 28	72		

As soon as the spawning season was over the adults were removed from the spawning partitions and the young were allowed to pass into the main body of the pond, which had been thoroughly stocked with

aquatic plants and water lilies, where they found an abundance of natural food. In addition to this several hundred thousand carp were liberated in the pond, which fell victims to the young bass in two or three weeks.

During the fall 400 crappie were distributed as the result of the season's spawning. In the spring of 1900 the adults were again placed in two small ponds and, though no definite estimate can be made as to the number of fish on hand, it is believed that the pond will yield several thousand in the fall.

When making collections of food-fish in the Potomac River a number of sun-fish, *Lepomis pallidus*, were captured. These spawned in the spring, and as a result 850 young fish were available for distribution in the fall. This fish was undoubtedly introduced from the Mississippi River, as it is not indigenous to the Potomac. It is believed that it will be well adapted for stocking small inland ponds.

As in previous years, hundreds of thousands of carp were raised as food for the bass. Some little attention was also paid to the rearing of yellow and green tench for stocking public parks and lakes.

During September the shad which had been placed in the ponds the previous April were liberated. It is estimated that about 2,000,000 passed into the Potomac River. In the following spring 2,849,500 shad fry were placed in this pond. They are apparently doing well and will be liberated in the fall.

Central Station, Washington, D. C. (J. E. Brown in charge).

Work at this station has been conducted on the same lines as heretofore, the most important being the distribution of the output from the fish ponds, which amounted to 32,967 young black bass, 400 crappie, and 500 sun-fish. These were distributed without loss. There were also received from Wytheville, Va., 600 rock bass and 2,839 yearling rainbow trout, and from Erwin 4,931 brook trout.

During the fall and winter months consignments of landlocked salmon and white-fish eggs were received from various stations of the Commission and hatched for the purpose of illustrating fish-cultural methods. Consignments of shad eggs were also received from Battery and Bryan Point. The following table shows the number of eggs of various kinds received and fry hatched and distributed:

Species.	No. of eggs received.	No. of fry hatched and distributed.
Rainbow trout	9,285	6,000
White-fish	475,000	258,000
Lake trout	10,000	8,368
Landlocked salmon	4,000	3,850
Shad	7,896,000	7,896,000
Total	8,394,285	8,170,218

AQUARIUM AT CENTRAL STATION, WASHINGTON, D. C. (L. G. HARRON IN CHARGE).

During the summer the aquaria were thoroughly overhauled, broken glass replaced, and the slate and iron work of the salt-water tanks painted with asphaltum to prevent rust; a new trough for carrying off the overflow from the salt-water tanks to the filter was built, and the salt-water supply, amounting to about 5,000 gallons, was renewed.

In September the superintendent, assisted by Mr. W. T. Lindsey, commenced the collection of marine specimens at Willoughby Spit, Va., near Fortress Monroe, where the shipping facilities are good, and by the end of that month 549 specimens, representing 30 species, had been collected and transferred without loss to Washington. In October 319 specimens, representing 11 species, including two tropical fishes—the snowy grouper and the big-eye—were brought from Woods Hole, Mass. These with the addition of sea-anemone and starfish from Gloucester, filled all the available space. The salt-water fishes were carried without loss until February, but at that time the water temperature became too low for them, due to inability to circulate it fast enough through the heaters to produce the desired warmth. Aside from this there was little mortality until May, when the death-rate increased on account of the rapid rise in temperature, though a number of specimens, representing 12 species, were on hand at the close of the year.

As usual, a good exhibit of fresh-water fishes was kept during the summer, consisting principally of species indigenous to the Potomac River and the Chesapeake Bay, with the various ornamental fishes. Most of these specimens have been kept in the aquarium from two to four years. Consignments of brook trout, rainbow trout, steelheads, Atlantic and landlocked salmon transferred from Wytheville, Va., and Craig Brook, Me., in October, were exhibited in the aquarium until May, when the temperature rose above 70; they were then planted in suitable streams in the vicinity. While in the aquarium they grew very rapidly, and when disposed of were more than twice as large as when received from the stations.

Two species spawned in the aquarium during the year—four yellow perch and two yearling brook trout—but none of the eggs hatched.

The food used during the year consisted chiefly of beefsteak, beef liver, clams, oysters, and minnows, the principal articles being steak and liver. The meat is prepared for them by first removing the fat and then cutting it in pieces according to the size of the fish. Clams, oysters, and minnows are fed only to such fishes as will not take meat when first captured, but all of them learn to eat beef after being in captivity for some time.

As the water pressure is not sufficient in extremely cold weather to operate the salt-water pump fast enough to keep the temperature where desired, it is recommended that a small engine be installed for this purpose.

Following is a list of marine and fresh-water fishes and crustaceans exhibited during the year:

Salt-water fishes: Pig-fish, pipe-fish, toad-fish, file-fish, sea trout, pin-fish, sea bass, gray snapper, black drum, croaker, spot or goody, hog-choker, pompano, flounder, tautog, lizard-fish, yellow-tail, spade-fish, sea-robin, jumping mullet, striped bass, sea anemone, bur-fish, skate, sculpin, cunner, big-eye, snowy grouper, scup, remora, chætodon, stickleback, mummichog, blue crab, lobster, hermit crab, spider crab, shrimp, horseshoe crab.

Fresh-water fishes: Brook trout, Atlantic salmon, steelhead trout, rainbow trout, quinnat salmon, Scotch sea trout, landlocked salmon, large-mouth black bass, small-mouth black bass, rock bass, pickerel, gar pike, common tench, golden tench, golden ide, gold-fish, crappie, common suckers, sun-fish, yellow perch, white perch, mill roach, paradise-fish, common eel, yellow cat-fish, channel cat-fish, salamander, terrapin, snapping turtle.

The following shows the salt-water and fresh-water temperatures:

Month.	Fresh-water temperatures.		Month.	Salt-water temperatures.	
	Max.	Min.		Max.	Min.
	°F.	°F.		°F.	°F.
July	82	70	September	69	54
August	82	70	October	69	52
September	78	71	November	64	51
October	66	60	December	60	48
November	60	46	January	58	44
December	46	34	February	68	42
January	38	34	March	60	48
February	38	34	April	68	48
March	42	35	May	72	54
April	63	42	June	80	62
May	71	62			
June	78	68			

During the summer and fall 26 fry-collector aquaria were built under the direction of the superintendent of the aquarium for use at the Bryan Point, Battery, and Edenton stations. These were made with glass sides and ends, slate bottoms, and galvanized iron frames, the dimensions being 48 inches by 18 inches by 16 inches. The lowest bid received for their construction from private firms was $40.77 each, and the actual cost of building them, exclusive of labor of regular employees, was $13.62 each.

Wytheville Station, Va. (George A. Seagle, Superintendent).

The number of fish on hand at the beginning of the year is shown by the following table:

Species.	Calendar year in which fish were hatched.					
	1899.	1898.	1897.	1896.	1895.	1894 or earlier.
Rainbow trout	128,360	3,008	2,972	511	647	512
Black bass (small-mouth)	.....	26	21	.....	5	.....
Black bass (large-mouth)	.....	.....	37	36	18	.....
Crappie	.....	.....	12	.....	.....	.....
Rock bass	.....	.....	32	.....	80	.....
Quinnat salmon	.....	.....	100	.....	.....	.....
Carp	.....	.....	.....	.....	20	.....
Total	128,360	3,034	3,174	547	770	512

The distribution commenced in September and continued until December 21, and included 96,965 yearling and 1,074 adult rainbow trout, besides 16,147 brook trout transferred to Wytheville from Erwin, Tenn., 4,400 rock bass and 8,540 black bass, of which 6,569 were reared at the fish ponds in Washington.

The food used in the summer consisted as usual of beef liver and mush boiled in varying proportions, according to the size of the fish.

The stock of breeding rainbow trout on hand at the commencement of the spawning season numbered about 5,000, ranging in age from 1 to 10 years old, though fish under 3 years of age are not apt to produce many eggs. The spawning season opened November 6 and lasted to February 12, during which period 990,000 eggs were taken from 998 fish, an average of 992. The number of male fish used was about 800. The variation in the size of the eggs taken was unusually great, and was no doubt caused by the great difference in the age and size of the spawners. They ran from 312 to 445 to the ounce, the average for the season being about 387. The eggs from all of the fish were smaller than they have ever before averaged at this station, and there appears to have been a decided change in the habits of the fish for the past two years as regards the time of spawning. Formerly at least 80 per cent of the eggs taken were secured at night, but this season and last 50 per cent or more have been collected during the day. This change is thought to be due to modification in the shape of the spawning-ponds, the new ones being diamond-shaped and offering a more inviting entrance to the raceways. Of the eggs collected 174,500, or a little over 17 per cent, were unfertilized or lost during incubation, 377,000 were hatched, and 438,500 were shipped to other stations and to foreign applicants. The consignments to Ireland and England reached destination in excellent condition, although en route from 10 to 12 days. The fry hatched did well through the sac stage, and are being reared in indoor troughs and ponds outside for distribution in the fall.

For the purpose of introducing new blood in the brood stock, a consignment of 20,000 rainbow-trout eggs collected from wild fish in California were shipped here by the California Fish Commission in April. They had been packed by Mr. W. H. Shelby at Sisson, Cal., and arrived in good condition, considering the distance traveled and the warm weather at the time. They were at once transferred to hatching-troughs and produced 16,500 fry, 3,500 of which died in a few days, having hatched prematurely. The balance were on hand at the close of the year and in excellent condition.

A consignment of 38,400 brook-trout eggs was received in February from Massachusetts, but they were of inferior quality and hatched slowly and unsatisfactorily, thousands dying before leaving the shell. By the time the yolk-sac was absorbed over 22,000 had been lost, and on June 30 there remained about 14,000 fingerlings. A few brook trout were retained from the hatch of last year and are now being

held in the ponds as an experiment. They have grown well so far and it is hoped they will spawn next season.

Owing to the unsatisfactory condition of the ponds the black-bass work at this station has not been successful in the past, but it is hoped, with the improvements made during the past year, that better results will be secured hereafter. Early in the spring the brood stock, consisting of 82 large-mouth and 47 small-mouth bass, was transferred to the breeding-ponds. Large beds of clean creek gravel were provided for nest building, and by June a number of nests containing young fish and eggs had been observed. The fry will be transferred to rearing-ponds as soon as they are large enough and every effort will be made to rear a good crop.

For the reasons given above rock-bass culture has been a failure during the past few years. The brood stock has been increased and there are now 190 on hand. These were placed in the ponds in the spring and artificial portable nests (heretofore described) provided for them. Nearly all the 100 nests put in the ponds have been occupied, and a number of fry have been noted, though it is impossible to give an estimate at this season of the number on hand.

About 20 adult carp are kept at the station. In May they are placed in the trout ponds for the purpose of cleaning out foreign matter and for destroying the lime plant, algae, etc. As soon as they spawn the fry are transferred to the bass ponds as food for young bass.

In December, 1896, about 4,000 eggs of the quinnat salmon were received from the Cape Vincent station. The eggs were hatched and a part of the fry were distributed at the age of one and two years, about 1,000 being retained for further developments. From the time of hatching up to the yearling stage these fish made a very fine growth, but in the spring of the third year they began to grow weak and to lose their sight. The disease continued through the summer and fall, and but few of them were alive by the following winter. The balance were planted in the spring, as it was feared they would all die in the ponds. The water in the pond in which they were confined was less than 4 feet in depth, and it is supposed this was the cause of the failure to acclimatize them.

Edenton Station, North Carolina (S. G. Worth, Superintendent).

Mr. S. G. Worth was appointed superintendent on July 1 and took charge of the station on the 14th, relieving Mr. G. A. Schneider, who had been directing the work of construction.

Notwithstanding the incomplete condition of the station, steps were taken early in March to organize a force for the collection and hatching of shad eggs. There were no trained spawn-takers available in the vicinity, as the fish-cultural work in recent years has been conducted by the steamer *Fish Hawk*; consequently it became necessary to transfer a few from Havre de Grace and Washington to be used as a nucleus in training new men. In addition to other drawbacks the

season proved two or three weeks later than usual, the weather being very unfavorable, and though all the seines, nets, and traps within a radius of 10 to 15 miles were visited daily the new men had little chance to gain experience, and as a consequence became despondent. When the water attained the right temperature for the shad to spawn they came on so suddenly that the apprentices were helpless, having had no opportunity of acquainting themselves with the work. Toward the end they became efficient and sufficiently interested to insure their being reliable spawn-takers in the future, but many eggs were lost in the meantime. Work was pushed vigorously, however, night and day, so that we succeeded in enlisting the sympathy and active cooperation not only of fishermen operating on well-known spawning-grounds, but new fields were developed in the Roanoke River and at Skinner Point, several miles east of Edenton.

The grounds on the Roanoke are virtually confined to the drift gill-netters, who operate very short nets, but they catch ripe shad and in such a way that all of the eggs can be saved. It required unremitting personal effort to enlist their interest, but another year will find them anxious to save the eggs. Their nets were operated mainly within 3 miles of the river mouth, making them easy of attendance and much more profitable than the seines on the upper river, which capture large numbers of fish but furnish very few eggs. It has also been found that numbers of eggs can eventually be secured from trap nets. A number of ripe fish were reported from Mackayes Ferry, but owing to lack of experienced men the nets there could not be attended.

In the shallow waters around the mouth of the Roanoke and Cashie rivers the cooperation of the stake-net gillers was secured and a few eggs obtained. An excellent spawning-ground was developed at Hornblower or Skinner Point, 4 miles below Edenton, one trap net yielding over 800,000 eggs. There is no doubt that this will prove a valuable field next season, but the most important spawning-grounds in the vicinity are on the Chowan River. Unfortunately, no gill-net fishing is done here, but the four seines operated will undoubtedly yield large numbers of eggs. It is also hoped that additional eggs will be received from the traps, large numbers of which are fished on the river. The area covered embraces about 86 square miles, and it is urged that a first-class steamer, capable of running in all kinds of weather, be provided as a part of the permanent equipment of the station. A second boat should also be available for a month or six weeks during the season.

The following table shows the number of eggs collected by localities:

Collected by--	Roanoke River.	Chowan River.	Albemarle Sound.	Totals.
	Number.	*Number.*	*Number.*	*Number.*
Gill-nets	2,989,000		1,660,000	4,649,000
Seines	353,000	4,319,000	173,000	4,844,000
Traps		107,000	803,000	910,000
Total	3,342,000	4,426,000	2,636,000	10,404,000

The collecting season lasted from April 25 to May 10, and the 6,590,000 fry hatched were distributed by May 15 in the Albemarle Sound and tributaries. The loss during incubation was 3,814,000, or about 36 per cent. In view of the fact that there were only four trained spawn-takers available for work, and of the incomplete condition of the station, the results are considered very satisfactory. Moreover, there is no question as to the entire suitability of the water of Pembroke Creek for hatching purposes; the only possible objection that could be made to it is that it is rather warm, making it risky to hold the fry, but this is unnecessary, and it need not be considered an adverse factor. The water was clear throughout the season, without a trace of sediment.

ERWIN STATION, TENNESSEE (ALEXANDER JONES, SUPERINTENDENT).

On July 3 Mr. S. G. Worth was transferred to Edenton, N. C., as superintendent, and Mr. Alexander Jones was appointed in his place, with Mr. J. E. Guard as fish-culturist. During the summer the balance of the special appropriation was expended in the erection of a five-room cottage on the northwest corner of the reservation for the occupancy of the fish-culturist, and other minor improvements were undertaken, the most important of which was the laying of a 12-inch terra-cotta pipe in the south berm ditch to carry off the waste water from the depression at the back of the residence. This added materially to the effectiveness of the station and improved its appearance.

At the beginning of the year there were on hand the following fish:

Species.	Calendar year in which hatched.			
	1900.	1899.	1897.	1896 or earlier.
Brook trout	70,588	991	.....	806
Rainbow trout	48,545	2,975	704	.....

These were kept in troughs and ponds during the summer as usual and fed on ground beef-liver and mush made from wheat shorts; herring roe being also used for feeding the fry. The rainbows are especially fond of this, taking it greedily from the beginning, but the brook trout do not seem to relish it, preferring the beef-liver.

In August the distribution of rainbow trout commenced and was continued until the 9th of December, 43,110 in all being shipped. Of the brook trout on hand at the beginning of the year 31,126 were available for distribution. These were shipped to applicants in Virginia and Tennessee. From the beginning of July to the time of distribution the death-rate was exceedingly heavy, both in ponds and troughs; a great portion of the loss was due to popping of the eyes, though snakes and frogs destroyed quite a number of the fry.

The brook trout spawned from October 27 to December 16, yielding 79,100 eggs. As these fish refused to ascend the raceway it was

necessary to resort to seining to secure their eggs. At first this was done once a day and later twice a day as long as it was necessary. Of the eggs collected 48,000 were hatched, but most of them were affected during the embryo stage and developed white spots on the sac. The death-rate became heavier daily, and it was deemed advisable to plant the remainder at once. Accordingly 9,380 were deposited in streams in the vicinity of the station.

On the 6th of February 145,000 brook-trout eggs were received from Mr. L. B. Handy, of Massachusetts, but they were in very bad condition on arrival, many having hatched in transit, and proved a total loss. On account of the poor success attained with brook trout at this station it has been determined to abandon that work entirely, and the adult fish on hand have been turned over to Mr. B. F. O'Bryant, county fish commissioner, for stocking streams in this county.

The spawning season of the rainbow trout extended from October 25 to January 27, and resulted in the collection of 110,800 eggs from the 3-year-old fish and 30,000 from the 2-year-olds. In addition to these, 238,000 were received from Wytheville and 34,600 from Neosho. The eggs taken at the station yielded 53,570 fry, those from Wytheville 216,137, and from Neosho, 25,912, giving a total of 296,137. At the close of the season there were 130,560 on hand. They were held in troughs in the hatchery until April, when most of them were transferred to the small ponds.

During the fall 15 black bass were purchased and placed in ponds at the station; 9 of them died during the winter; the other 6, 3 of which were females, accepted the artificial nests that had been prepared in pond 31, and about May 20 deposited their eggs, which produced about 25,000 fry. These are on hand at the close of the year. As soon as the schools began to break up the parent fish were removed from the pond, as this was better than to remove the fry.

Natural enemies, such as predatory birds, muskrats, frogs, etc., are very abundant. Those killed during the year comprised 115 snakes, 25 muskrats, 4 Indian hens, 3 wild ducks, 30 kingfishers, 1 osprey, 2 minks. Snakes and frogs are regarded as the most destructive. One of the snakes had 24 young fish in its stomach.

PUT-IN BAY STATION, OHIO (J. J. STRANAHAN, SUPERINTENDENT).

During the summer a new storehouse, 20 by 30 feet and 14 feet high, was built at an expense of $331. The steamer *Shearwater*, which had been in use for a number of years, was thoroughly repaired, so that it is now in serviceable condition and will last for several years. The 10-inch suction pipe running into the lake to the westward of the station, which had been carried away by ice in 1899, was replaced by the station force at an expense of less than $100. The lowest bid received for the performance of this work by contract was $750.

The white-fish season opened unfavorably and was peculiar in certain important particulars; the temperature of the water during

November was very warm, closing at 44°, the lowest point reached during the month. The season was consequently very late and short, lasting only about fifteen days, the first eggs being taken from the nets on November 17 and the last on the 30th. It was also remarkable from the fact that not a single gale or storm occurred during the month to interfere with operations.

The methods followed were the same as heretofore; that is, in addition to the eggs collected directly from fish caught in pounds and gill nets, a large number were penned at Put-in Bay and Monroe Piers, Michigan. From the pound and gill nets 94,843,000 eggs were secured, 54,639,000 from fish penned at Put-in Bay, and 86,688,000 from those at Monroe Piers. The difference in the expense of collecting at the various points and by the various methods was as follows: Eggs furnished by fishermen, 60 cents per quart; those collected at Put-in Bay, 58 cents; from Monroe Piers, 69 cents.

The loss of fish by disease in the live-boxes was very slight. Of the 14,706 placed in the subnets and transferred to crates, 13,257 were returned to the fishermen, 233 died, and 1,216 escaped through accidents which could not be foreseen. The total number of females stripped from the pens was 4,432. The average yield of eggs at Put-in Bay was 36,547 per fish, and at Monroe Pier 23,387. The total cost of collection at both points was $3,995.

Of eggs collected at Monroe Piers 35,000,000 were shipped to Cape Vincent and 21,000,000 to Duluth. The balance were transferred to the Put-in Bay hatchery and later in the season 5,832,000 were assigned to the Pennsylvania Commission and shipped to their Erie station; 10,000,000 were also assigned to the New York Fish Commission. The remainder were hatched, and produced 109,890,000 fry, which were planted in April on the spawning-grounds in Lake Erie.

During the winter a series of experiments was carried on with the view to determining whether fertilization takes place when the eggs and milt are brought together without the admixture of water. On three successive days, December 17, 18, and 19, several lots of eggs and milt were so held, great care being exercised to prevent the admixture of any water. They were kept twenty-four hours in corked glass jars submerged in running water, and at the end of this period lots of 100 each were examined separately under the microscope. The first series showed an average of 16 per cent where the second cleavage was complete. About one-third of the rest were in all stages of development, from those where the disk was forming to those where the second cleavage was well under way. After these eggs had been twenty-four hours longer in running water, about half of them showed the second cleavage complete, and the rest were more or less advanced in development. The temperature of the water while the experiments were being made was from 36° to 37°.

A series of experiments was also conducted to discover, if possible, the causes of monster embryos in fish eggs, especially those partaking

of the twin character or having more than the normal number of organs. It is conceded that monsters can be produced in the eggs of chickens by injury to the eggs at a certain critical period, but it is held by some embryologists that they are also likely to be produced by more than one spermatozoon entering the egg through the micropyle at a time when sufficient water has entered the egg through its membranes to lift them from the disk.

The first experiments were with the view to producing monsters by injury to the egg. For this purpose a half ounce of eggs from a given lot was placed in a strong 4-ounce glass jar, which was then half filled with water and securely corked. It was then dropped ten times into a wooden pail, half filled with water, from a height of 4 feet, striking the bottom of the pail with considerable violence. Nine lots were subjected to this treatment, commencing with the first lot half an hour after impregnation, the second lot an hour later, and from then once an hour until they had all been handled. After the eggs had been forty-eight hours in running water, 100 of each of the nine lots were examined under the microscope, and only one twin disk was found, and that not well defined, showing that injury had not caused the monstrosity to any extent. The experiment resulted, however, in what to the writer was a most startling discovery. Five lots of 100 each, taken from the same lot from which eggs for the experiments had been procured, showed but 3.4 per cent unimpregnated eggs and but few ruptured yolks, while those subjected to the injury process showed large numbers that appeared unimpregnated, the disk being hemispherical, semitransparent, amber-colored, and devoid of all appearance of segmentation. It is certain that all of these eggs were dead.

The following table shows the number appearing normal, number with ruptured yolks, and number having the appearance of being unimpregnated:

Character.	30 minutes.	1½ hours.	2½ hours.	3½ hours.	4½ hours.	5½ hours.	6½ hours.	7½ hours.	8½ hours.
Eggs, normal	36	53	61	64	68	65	66	89	88
Eggs, ruptured yolk	57	36	27	15	12	9	8	3	3
Eggs, unimpregnated	7	11	12	21	22	26	26	8	9
Twin disks							1		

One twin disc was also found among the five lots of eggs which had not been submitted to the injuring process. In another experiment eight lots of eggs were given ten shakes each with as uniform force as possible with the right arm. The results were substantially the same as in the above, with the exception that there were more ruptured yolks than in the former case. There is obviously but one conclusion to be drawn from these experiments, and that is that the larger portion of the eggs which seemed under the microscope to be unimpregnated were really fertilized, but that segmentation had been arrested as a result of the injuries received. If this be true, it demonstrates that in many instances where eggs have been thought to be unfertilized they

were impregnated, but segmentation had been stopped on account of injury to the disc, and as this loss often runs up to one-third of the whole number in the case of pike-perch eggs, it is apparent that much care should be exercised in handling them up to the point where they are fully cushioned with water. This view was fully sustained during the season of 1899, in the case of several lots of eggs taken from the boats of the fishermen in the immediate vicinity of the station and manipulated with great care on the floor of the hatching-house. These eggs, some twenty jars in all, yielded from 80 to 90 per cent of fry, and were by far the best in the house.

Four lots of eggs were held for a short time in a weak solution of common salt before applying the milt, it being maintained by some biologists that the brine would tend to weaken the resistive power of the egg, and that therefore more than one spermatozoon might enter the micropyle. One lot was held 3 minutes in a 2½ per cent solution, washed for 1 minute with several changes of water, the milt then being applied. In the next lot a 5 per cent solution was used, the eggs remaining in it for 3 minutes before washing, and with the next two lots 2½ and 5 per cent solutions were employed, the eggs remaining therein for 4 minutes. Not a twin disc was found among 2,000 eggs so treated and examined.

It seems remarkable that this treatment did not appear to materially injure the eggs. Only in the lots where they were held in the solution for a period of 4 minutes was there any perceptible difference, the percentage of unfertile eggs being greater in these than in the lot normally treated from which they were taken, but this was doubtless owing to the length of time that elapsed between the taking and the fertilizing of the eggs.

On the 1st of April Mr. Stranahan was appointed superintendent of the Bullochville station, and pending the arrival of Mr. S. W. Downing, who had been appointed superintendent at Put-in Bay, the pike-perch work was directed by the foreman, Mr. J. C. Fox. The season was late. The ice did not disappear until the latter part of March, and by the time the fishermen got their nets set a large proportion of the fish had spawned. In fact, there was apparently no run of spawning fish, only a few scattered ripe ones being found.

As the experiment of penning pike perch had been very unsatisfactory the previous season, it was not attempted this year. The first eggs were received from the Port Clinton field on the 19th of April, and the last from the same point on April 28. Spawn-takers were also stationed at Monroe, Mich., Toledo, North Bass Island, and Put-in Bay, the collections from all points aggregating 138,900,000 eggs. These were of such poor quality that only 57,000,000 of them were eyed, of which number 25,000,000 were transferred to the Michigan Fish Commission, at Detroit. The balance were hatched and distributed, 20,500,000 being planted on the spawning-grounds in Lake Erie and 6,500,000 sent to applicants in Ohio and Indiana for inland lakes.

NORTHVILLE AND SUBSTATIONS IN MICHIGAN (F. N. CLARK IN CHARGE).

The results attained at Northville and auxiliary stations in Michigan the past year have been most satisfactory, the output far exceeding that of any previous year. The failure of the State legislature to provide the necessary funds made it impossible for the Michigan Commission to propagate any of the commercial fishes of the Great Lakes; hence arrangements were made early in the year for the U. S. Fish Commission to operate the Detroit white-fish hatchery, including fishing rights on Belle and Grassy islands, and later on it was also decided to utilize the State hatchery at Sault Sainte Marie for hatching a part of the eggs collected at Detroit.

Under the provisions of the Milliken act, passed by the Michigan legislature the previous year, the U. S. Fish Commission was authorized to collect lake trout and white-fish during the close season, which extends from November 1 to December 15. Although fishermen from all parts of the lakes applied to the agent of the Commission for permission to fish during the close season, he determined, after careful consideration, to confine lake-trout operations to three important spawning-grounds in Lake Michigan—Charlevoix, Beaver Island, and Manistique. It was feared that this decision would arouse the enmity of influential fishermen in other sections of the State, but the difficulty was overcome by a candid statement of the facts by the superintendent, and the pleasant relations which have always existed between the U. S. Fish Commission and the lake-trout fishermen of Lakes Michigan and Huron still continue.

The agreement entered into with the fishermen provided that after October 30 they should fish under the direction of the superintendent, at such times and points as he might designate, they to pay the expenses of the men and furnish tugs and fishing paraphernalia, receiving all of the fish taken, while the Commission was to have the eggs free of expense. About the middle of October, Mr. B. G. Filkins proceeded to Charlevoix and arranged with the fishermen for fishing and spawning operations at that point. After getting everything in satisfactory condition there, the work was left in charge of Mr. R. K. Robinson, and Mr. Filkins went to Beaver Island to make similar preparations. The fish at the latter point commenced spawning on October 24, but only 10 gallons of eggs were taken during the balance of that month. The fishing was continued until November 10, and resulted in the collection of over 7,000,000 eggs. Of the total number secured here only about 700,000, or 10 per cent, were taken during the open season; consequently the work would have been a failure had operations ceased on October 31.

At Charlevoix the fish were very late in making their appearance on the spawning-grounds and no eggs were collected until after November 1. From that time to the 8th, 1,842,000 were obtained, and on that date Mr. Robinson was directed to discontinue fishing in view of the fact that large numbers of eggs were being taken at other points.

Mr. George Platts, who has been in the employ of the Commission for a number of years, was placed in charge at Manistique, and as the fish had been observed to spawn there in the past much earlier than at any other point in Lake Huron or Lake Michigan, it was supposed large numbers could be collected during the open season, but none were taken until October 26. From that time to November 10, when work was discontinued, over 6,000,000 were secured.

As the result of operating at these three points 15,250,000 lake-trout eggs were obtained and shipped to Northville, packed as usual on canton-flannel trays, the first shipment reaching the station on November 2 and the last November 13. From Northville 1,500,000 were transferred to the State Fish Commission, 1,000,000 were sent to Alpena, and 4,117,000 were consigned to other stations of the Commission, State fish commissions, and private applicants, leaving 8,633,000 to be hatched. These produced about 7,000,000 fry, 6,535,000 of which were planted in Michigan waters in February, March, and April. The balance were retained and at the close of the year they number about 145,000. They are between 2 and 3 inches long and are apparently healthy and strong.

Although the hatchery was overcrowded with eggs, no heavy losses occurred from disease or other causes. On December 21, the creek water ceased to flow about 5 o'clock in the morning, but the incident was promptly discovered by the watchman and the spring water turned on. There were a great many eggs in the house at the time, and but for his prompt action heavy losses would have ensued.

The wisdom of limiting the work to the three points mentioned was clearly demonstrated by the results, the eggs being collected and delivered at Northville for less than $700, or about 5 cents per 1,000.

To guard against all of the eggs hatching at once and overcrowding the hatchery, the development of a part of them was retarded by the use of creek water, which is colder than that from the spring, the creek water at this time averaging about 35° and the spring water 45°. In this way the distribution was extended from the middle of February until April, whereas had the warmer water been used they would all have come out at the same time, and it would have been impossible to have handled them. The first eggs hatched on January 17 and the last on March 8, a difference of fifty-one days.

At the beginning of the year there were 90,000 lake-trout fry on hand; when distributed in August they numbered 88,000, and ranged from 3½ to 4½ inches in length.

On July 1, 1899, there were on hand at Northville 31,493 brook trout. These were held in ponds which had been lined with stone cement, but they commenced dying in July, though special attention had been given them and the ponds had been kept perfectly clean and were exposed to the sun and air before they were introduced. On August 7, when the distribution commenced, there were only 8,000 fingerlings,

1,100 two year olds, and 154 two and three year olds. These were distributed in New York with the exception of the 154, which were liberated in Sturgeon River, Michigan. In the winter 368,710 brook-trout eggs were purchased from one of the commercial hatcheries in Massachusetts. On their arrival at the station 9,675 were dead. The balance hatched in March, producing 333,518 fry, or 93 per cent of the good eggs received. They were hatched in spring water between March 7 and 28, and the fry commenced feeding April 10. Half of them were fed on beef liver and the remainder on carp. Those fed on the liver were in better condition at the close of the year than the others, being larger and healthier, though it seemed at first that the carp-fed fry would be superior. The poor results attained with the latter are attributed to the fact that the use of carp as food pollutes the water, discoloring it and leaving an oily scum on the surface. This difficulty is not encountered to any extent in using liver.

On April 12 the distribution of the fry was commenced, and by the 25th of May 257,500 had been liberated.

For purposes of experiment 1,000 grayling fry were held over from the hatch of the previous year and fed on finely pulverized liver, the size of the pieces increasing with the growth of the fish. On July 31 the largest of them were an inch long and by the end of August 1½ inches. In September, when they were counted and transferred from the troughs to Pond Q, they numbered 585. They grew slowly during the winter, but increased in size very perceptibly during the spring months, and at the close of the year the remaining 300 measured from 3½ to 7 inches in length. On the 11th of June 70,000 eggs arrived from Bozeman. The temperature at the top of the case on arrival was 52°, but in the center it registered 47°. The eggs showed evidence of great care in packing, and about 25 pounds of ice remained in the case. They measured 810 to the fluid ounce. The hatching was done on trout trays with spring water, the first fry appearing on June 13 and the last on the 23d. When first hatched the fry lay on the bottom from two to four days, until the sac was absorbed. They then rose to the surface and appeared to be vigorous and active. From the 70,000 eggs received 56,000 fry were planted in the various branches of the Rifle River, Pere Marquette River, and Baldwin Creek.

During February 13,650 rainbow-trout eggs arrived from Manchester in very bad condition, and though they yielded 12,860 fry they were so weak that 7,000 of them died before the absorption of the sac. The 385 rainbow trout hatched at the station several years ago were given to private applicants in August, it having been decided to discontinue the rearing of these fish at Northville.

Of the 3-year-old Loch Leven trout, 195 females spawned in November and December, which is much later than usual. The older fish also produced a few eggs, but they were of no value, 50,950 being secured from the entire stock. When they were sufficiently developed for shipment, 20,000 were sent to the New Hampshire Commission and

6,000 to Prof. W. A. Locy of the Northwestern University, Evanston, Ill., for experimental work. The balance were hatched in February, and after being fed for several weeks 8,000 of the fry were distributed, and there remained on hand at the close of the year 8,590.

Of the 5,000 steelheads on hand from the hatch of June, 1899, 4,500 were planted in September in Baldwin Creek. In May, 1900, the 2-year-old steelheads numbered 1,633 and the 3-year-olds 469. These fish showed no signs of spawning.

The hatchery at Detroit, which was turned over to the Fish Commission, is located in the center of the city and is a frame structure 80 feet long by 40 feet wide, with a wing 48 by 36 feet. The building belongs to the Michigan Fish Commission, and the grounds on which it is located to the estate of John Pridgeon, the rental being $425 per annum. The hatchery is equipped with 1,000 Chase jars, which have a capacity for about 162,000,000 eggs, estimating 162,000 per jar. The water, which is well adapted for this work, is furnished by the Detroit Board of Water Commissioners, at the rate of 1¾ cents per 1,000 gallons. Its average temperature in March was 33°, and in April it ranged from 33° to 50°, reaching that point on the day the hatching was completed.

The three fisheries included in the transfer are the East Point, Willis Ground, and Grassy Island, the two former being located on Belle Island, and the other on an island about 8 miles southwest of Detroit in the Detroit River. At the time of the transfer the hatchery was in only fair condition, as new sills had to be put in two sides of the building, the floor needed repairing, and the tanks painting.

To simplify the work arrangements were made with the Wolverine Fish Company, of Detroit, to operate the fisheries and to receive as compensation the fish captured after the eggs had been stripped and turned over to the Commission. Fishing commenced in October and continued to December 20, resulting in the capture of 33,112 white-fish. Of these 6,046 undersized ones were liberated, and the balance were held in live-cars until ripe. The apparatus used at all of the fishing-grounds was the ordinary haul seine, operated by means of capstans and horsepower. Fishing was conducted night and day by separate crews, and the catch was unprecedented, the most successful work ever recorded before only aggregating about 14,000, less than half the number captured this year. This is believed to be attributable to the large plants of white-fish fry made in past years by the National and State Fish Commissions in Lake Erie and the Detroit River.

The fish caught at East Point were transferred to the Willis Ground fishery, where the live-boxes and ponds were established. The live-car was a boat about 14 feet long, 3 feet wide, and 14 inches deep, pointed at both ends, with slats on the bottom running lengthwise. Two water-tight bulkheads were fitted in either end to keep the water from rushing through and crowding the fish into the rear end and smothering them. One of these boats can safely carry 200 fish from

2½ to 3 pounds in weight, and as many as 270 have been brought down on one trip. At first only 100 were placed in the boat, but on arrival at destination many of them were found to be badly bruised, and after that they were packed in tightly, so that they would be unable to move around and injure themselves. The experiment was successful, and thereafter all fish were transferred packed in as closely as possible.

Owing to the warm weather a great many of the females became plugged early in November, 105 being removed at one time. This condition was believed to be also due to some extent to their confinement in the crates. A pond, 16 feet by 40 feet, was therefore constructed in water 3 feet deep, by sharpening 6-inch boards and driving them into the river bottom, which was covered with 3 inches of soft mud, with gravel underneath. In this inclosure 2,200 male and female white-fish were placed, and at the end of 3 days it was noticed that they had whipped off all the mud, the gravel being plainly in sight. Commencing a week later, all of the females except 173 were stripped, and only 10 plugged fish were found. The 173 were transferred to a crate, and though apparently in perfect health, in less than a week half of them were plugged. It would thus appear that it is better to hold the fish in ponds constructed in the river, though at Grassy Island the percentage of plugged females was less than at Willis Ground, although the fish were held altogether in crates. The process followed in stripping the eggs was practically the same as in past years, all of the fertilizing being done by the dry method, though the milt was taken before the eggs.

Fishing commenced at Grassy Island on October 7 and closed the 3d of December, 4,563 male and 5,870 female fish being taken. The spawning season here lasted until the 19th of December, 4,460 of the females crated, or about 76 per cent, yielding 108,288,000 eggs.

At the other two points fishing commenced on October 23 and continued to the end of November, resulting in the capture of 7,323 females and 9,310 males. 4,905 females yielded 137,952,000 eggs, an average of 28,124 per fish.

All of the eggs collected were transferred promptly to the Detroit hatchery, where they were either placed in jars or reshipped to other stations. During the season 2,508 hauls of the seine were made. The average number of white-fish taken per haul (including also immature specimens) was 13, the catch of mature white-fish per haul averaging 11.

The total number of eggs collected was 246,240,000, of which 48,020,000 were transferred to the Alpena hatchery, 40,732,000 to the Sault Ste. Marie, 22,220,000 to Duluth, and 2,379,000 to other stations and private applicants. The balance were hatched at Detroit and distributed in April, by tugboats, in the Detroit River, Lake St. Clair, and Lake Michigan, near Frankfort, Charlevoix, and Beaver Island, most of them being liberated in Detroit River and Lake St. Clair.

As the Detroit hatchery was overcrowded, the Alpena station was

opened on November 27, on which date 47,520,000 white-fish eggs were received. Later on 500,000 more were transferred. The eggs were hatched in the Chase and the McDonald jars and produced 36,500,000 fry, or about 76 per cent of the number of eggs handled. These eggs were green, having been transferred direct from the seining-grounds, consequently the percentage hatched was better than would at first seem. In April the fry were distributed by tugboats in Lake Huron and tributaries, inside a radius of 50 miles from the station.

The water supply for the Alpena station is pumped from Thunder Bay and is quite clear and pure. When the eggs were first received its temperature was 42°, but by December 13 it had fallen to 34°, where it remained until February, when it registered 33°. In March it ranged from 33° to 35°, and in April averaged 41°.

On February 15th 1,000,000 eyed lake-trout eggs were transferred from the Northville hatchery. They hatched with practically no loss and all of the fry were planted in Lake Huron during April, with the exception of 100,000 deposited in Beaver Lake. The plants were made with tugboats loaned by the fishermen.

To further relieve the Detroit hatchery it was arranged to transfer a part of the eggs to the State hatchery at Sault Ste. Marie, and 40,732,000 were sent to that point in December, January, and March. In December the water was cut off from the hatchery for 11½ hours by the formation of anchor ice and the freezing of the wheels belonging to the electric power company. The eggs were at once placed on flannel trays and the temperature kept down to 34°. No further trouble was experienced, but it is probable that the eggs then in the hatchery were slightly damaged by this accident. The temperature of the water reached 32° by December 24 and remained at 32° until April 13, when it ranged from 33° to 43° until May 1, when the last of the fry were planted. From the eggs transferred 25,000,000 fry were hatched, 10,000,000 being planted in Lake Huron, off Detour, and 15,000,000 in Lake Superior and tributaries.

The Commission is indebted to A. Booth & Co. for transferring fry without expense; also to fishermen at Detour for similar courtesies. The work at this point was under the immediate direction of H. H. Marks, of the Michigan Commission. At the close of the season the hatchery was cleaned up and turned over to the State Fish Commission.

The following table shows the total number of eggs collected during the year, eggs shipped, and fry distributed:

Species.	Eggs collected.	Eggs shipped.	Fry distributed.
White-fish	246,240,000	24,601,000	163,500,000
Lake trout	15,250,000	5,617,000	7,530,000
Brook trout	350,035	----------	257,500
Loch Leven trout	50,950	25,000	8,000
Rainbow trout	13,650	----------	8,000
Grayling	70,000	----------	56,000
Total	261,983,635	30,244,000	171,354,500

The following shows the fish on hand at the close of the year:

Species.	Calendar year in which fish were hatched.				
	1900.	1899.	1898.	1897.	1894 or earlier.
Steelhead trout			1,630	460	
Loch Leven trout	8,400		244	677	50
Lake trout	145,000				
Grayling		292			
Brook trout	15,000				
Total	168,400	292	1,874	1,137	50

DULUTH STATION, MINNESOTA (S. P. WIRES, SUPERINTENDENT).

In the summer arrangements were made for collecting lake trout and white-fish in the vicinity of Port Arthur, Ontario; Grand Portage, Minn., and at Isle Royale, Ontonagon, Houghton, Keystone, and Montreal River, Michigan. Lake trout commenced spawning in the vicinity of Port Arthur and Isle Royale about September 20 and in Michigan during October. The collections were unusually large, and could have been greatly increased had it not become necessary to discontinue fishing in compliance with the closed-season laws of Michigan and Canada. The total collections aggregated 12,400,000, as follows: Rossport and Port Arthur, Ontario, 4,177,000; Houghton, Keystone, and Montreal River, Michigan, 2,076,000; vicinity of Isle Royale, Michigan, 3,758,000; vicinity of Ontonagon, 2,100,000; Grand Portage, Minn., 289,000. During January and March 1,550,000 eyed eggs were shipped to the commissioners of New York, Utah, and Wyoming, and 300,000 transferred to Nashua station; from the balance 9,047,000 fry were hatched and planted during April, May, and June. The total loss of eggs and fry during the season was 1,503,000.

As white-fish had just commenced spawning in the vicinity of Rossport and Port Arthur when the closed-season law took effect, only 200,000 eggs were collected, but in December 44,222,000 were transferred from Put-in Bay and Detroit. The Michigan eggs arrived in very poor condition, and the losses among them were very heavy. In April and May 20,000,000 white-fish fry were liberated.

At the beginning of the fiscal year there were 14,000 grayling fry on hand. These were planted in August in Baptism River, Minnesota. On the 12th of the following May 72,000 grayling eggs arrived in excellent condition from Bozeman; they were placed in McDonald hatching-jars, 36,000 to the jar, and sufficient water was turned on to give them a gentle motion. They commenced hatching on the 19th and finished in four days. As the current of water in the jar was not strong enough to carry the fry out, they were permitted to remain in the jars until all of them had been hatched, when they were transferred to an ordinary trout trough 14½ feet long, 10 inches deep, and 2 feet wide, well supplied with fresh water. They remained on the bottom of the trough, acting very much like lake or brook trout, for from 36 to 40 hours, after which they began swimming near the surface

and commenced feeding. Beef liver chopped very fine and strained through a cheese-cloth bag was given them four times a day. The fry appeared healthy until May 29, when they commenced to drop back in the troughs in an exhausted condition and died rapidly. This was due to the rapid rise in the temperature of the water, which varied from 60° to 72°. Had they been a week or ten days older when the warm weather commenced it would not have affected them seriously, as grayling fry were held the previous summer in warmer water without loss. Plants aggregating 34,000 were made during the spring in suitable waters in Minnesota and Wisconsin.

All of the steelhead trout on hand at the beginning of the year were planted in July in streams in Minnesota and Michigan. On the 17th of May 100,000 eggs arrived from Clackamas, Oreg., in fine condition. These commenced to hatch on the 28th, and by June 5 a large proportion were feeding; by the 10th all of them were taking food nicely. To all appearances the steelhead trout are exceptionally hardy and grow rapidly at this station, and, judging from reports received from streams already stocked, are well adapted for the waters of Minnesota. During the year 148,500 were planted in waters in Minnesota, Michigan, and Wisconsin.

The 100,000 brook-trout eggs received from Colorado in March were hatched late in April and retained in troughs and fed until June, when 91,000 were planted, the total loss of eggs and fry being less than 9,000. At this station brook-trout fry are brined once a week from the time the sac is about one-fourth absorbed until they are distributed.

QUINCY STATION, ILLINOIS (S. P. BARTLETT, SUPERINTENDENT).

The season opened very favorably, young bass being plentiful all along the shores, though the water was too high to work the overflows and ponds. When it receded it was found that the weeds and grass had grown so rapidly that it would be impossible to collect from some ponds which had heretofore yielded large numbers. The bass handled during the summer were much larger than usual, the bulk of them having been hatched the previous year. A large number of adults were captured and shipped.

Crappie were very abundant, but owing to the difficulty in transporting these fish from the fishing-grounds to the station only a limited number were handled until fall. The catch of all kinds of fishes in the river has been larger than for many years, especially of the commoner species, hundreds of thousands of which are saved annually by the Commission.

As a result of the season's work 36,248 yearlings and adult bass were distributed, 9,260 crappie, 2,100 sun-fish, and 22 warmouth bass, besides 4,480 rock bass transferred from Neosho.

The station was reopened in June, 1900, and many thousands of young fish captured, and by the close of the year there were over 18,000 on hand for distribution.

MANCHESTER STATION, IOWA (R. S. JOHNSON, SUPERINTENDENT).

The construction work in progress at the close of the year was completed during the summer and a considerable number of improvements were made by the station force, the most important being the construction of a frame building, 14 by 21 feet, to be used as a fuel-shed and store-room. The roadways around the 80-foot ponds were graded and graveled, and the land behind the stone protection-wall from the upper spring reservoir was filled in and graded; the walls of the kitchen, mess-house, boiler-house, office, reception-hall, and stairway in the hatchery building were given a coat of paint, and all of the hatching apparatus was thoroughly overhauled and repaired; the rearing-ponds, which were damaged by frost during the winter, were torn out and rebuilt, and considerable repairing was done to the stone protection-wall and dam, which had been injured by the ice-gorge.

Fish-cultural operations were conducted on the same lines as in the previous year, ponds Y, Z, and V being used for the propagation of large-mouth black bass and rock bass. The propagation of crappie was abandoned, as they do not do well at the station, and it is possible to collect large numbers at small expense from overflowed lands at the substation at Bellevue.

In the summer and fall of 1899 a very peculiar disease appeared among the adult and 2-year-old brook trout in the 80-foot ponds, which resulted in the almost total loss of the younger fish and a large number of the adults. It first appeared among a lot of 2-year-old fish during the summer and gradually spread until late in the fall, the greatest loss occurring just before and during the spawning season. The symptoms varied greatly, some of the fish being attacked with inflammation of the gills, some with a slimy skin disease, some with tumorous sores, while many died without any outward sign to indicate the trouble. The majority that died, though, were affected with the sores, which seemed to originate from some internal cause, first appearing as a knotty substance under the skin and gradually enlarging and breaking out in a running sore. The sores were not confined to any particular part of the fish, but were distributed over the entire body, sometimes appearing on the head and back, and at other times on the abdomen and tail. The development of the disease was rapid, death taking place two or three days after it appeared. When the epidemic began every effort was made to check it by the liberal use of salt and clay baths, a change of food, and the transferring of the diseased fish to isolated ponds, but all remedies proved unavailing, and it continued until all the brook trout at the station were more or less affected.

It is questionable whether the disease was infectious, for, while it spread to all of the ponds, they all have independent water supplies and drains, none of the water being used more than once. In addition to this, the rainbow trout, confined in the same kind of ponds

and fed on the same food and under the same conditions, were not diseased in any way. The superintendent is unable to account for its appearance. The ponds used were 80 feet long, perfectly new, and, so far as known, the water supply is absolutely pure. As a result of this epidemic 457 adults and 4,450 2-year-old fish were lost. It appeared again during the spring of 1900 and caused the loss of 3,470 yearlings that were held for brood stock.

At the beginning of the year there were on hand 63,000 fry hatched the previous spring. Of these, 55,565 were distributed to applicants and planted in public waters during the fall, and 5,270 were held for rearing, the loss during the summer amounting to 2,165.

The stock of breeders at the commencement of the spawning season consisted of 5,250 two-year-olds and 957 adults. The first eggs were taken on November 8, and collections continued daily till January 15. From the 1,331 ripe females, 513,080 eggs were secured, an average of 385 per fish. Of this number 348,930 fry, or about 80 per cent, were hatched, and 75,000 eyed eggs were shipped to other stations. The fry were of low vitality and died in great numbers during the sac stage, only 55,800 healthy ones resulting from the season's work. Of this number, 25,000 were planted in public waters in the vicinity of the station, and 30,800 are held for distribution in the fall.

The stock of rainbow trout on July 1 consisted of 2,500 three-year-olds, 4,200 two-year-olds, and 1,900 fry. The three-year-old fish commenced to spawn on December 30 and continued until March 24, only 216 of them yielding eggs. These produced 132,225, of which 45,000 were shipped to other stations and 65,450 fry were hatched. The eggs appeared to be in good condition, the percentage of fertilization being 84, but the fry, like those of the brook trout, were of low vitality, and only 15,500 healthy ones resulted. The two-year-old fish yielded no eggs.

On the 1st of July 1,840 fry, hatched the previous winter, were on hand. Of this number 1,700 were planted in the public waters in the vicinity of the station during the fall, the loss during the summer being 140. At the beginning of the year the brood stock consisted of 45 adult fish. The spawning season extended from November 18, to December 6, resulting in the collection of 9,100 eggs. Eight thousand of these eggs were hatched, but losses during the summer reduced the number of fry to 3,000, which are now held at the station for distribution in the fall.

The grayling resulting from eggs hatched in June, 1898, were kept in ponds at the station with a loss of 626, leaving at the end of the year 824 two-year-olds, which should produce eggs next season. On the 12th of May 50,000 eggs were received from Montana in good condition, the loss on arrival amounting to only 3,100 and subsequent losses to 6,450. The fry hatched, numbering 40,450, were liberated with the exception of 5,000, which will be held.

The breeding-ponds contained large numbers of young bass in June, but during the next month natural food became so scarce that the

loss from cannibalism was large. Late in July the ponds were drawn and the fry placed in troughs, where they were fed on live maggots. Though large numbers of them died on account of weakness and insufficient nourishment while in the ponds, their improvement after being transferred to the troughs was marked. As an article of food the maggots proved far superior to anything ever used at this station. They remain alive a long time after being placed in the water, thereby attracting the notice of the young bass, which snap them up greedily. It is believed they will also prove a most economical food, as they can be produced in large quantities from the refuse of livers, at little cost. As a result of the work with this fish, 4,300 were distributed in the fall and 200 were held for brood stock.

The rock-bass work has not been as successful as was anticipated, due to low temperature of water and lack of natural food in the ponds. The construction of a new pond will permit the extension of this work, and it is believed that large numbers can be reared in the future.

At the close of the year there were on hand the following fish:

Species.	Calendar year in which fish were hatched.				
	1900.	1899.	1898.	1897.	1896.
Brook trout	30,800	1,810	.....	.....	500
Rainbow trout	15,500	.....	3,600	.....	1,340
Grayling	5,000	.....	824	.....	.....
Loch Leven trout	3,000	.....	.....	16	.....
Black bass	.....	.....	.....	.....	140
Rock bass	.....	.....	.....	.....	58
Total	54,300	1,810	4,424	16	2,038

Investigations made during the spring of 1899 indicated that large numbers of fish could be collected in the vicinity of Bellevue, Iowa, from the overflowed lands of the Mississippi River, as it is the center of a vast territory extending on the Illinois side of the river from Galena to a point 22 miles south, and on the Iowa side from Dubuque to the mouth of the Maquoketa River. Bellevue was also selected on account of the good railroad facilities and its excellent water supply. The preparatory work of fitting up a small temporary station was commenced on July 14 and completed on the 25th. The equipment consisted of four wooden retaining-tanks, 12 feet by 4 feet by 3 feet, set up on the levee in front of the city, the city council having granted permission to use the ground free of charge. The tanks were supplied with water from the city works through a half-inch galvanized-iron pipe, under pressure of 100 pounds, and escaped into the tank through a one-fourth-inch pet-cock, which reduced the volume but caused it to flow into the tank with great force, taking with it large quantities of air. The average number of gallons of water used in each tank per day was 2,000. This water was furnished at a cost of 10 cents per 1,000 gallons. A light wooden frame was constructed above the tanks, over which was stretched a canvas cover to protect the fish from strong sunlight. The daily collections were held in these tanks

until ready to be distributed. In one tank 2,500 bass, from 2 to 5 inches long, were held for ten days without loss except by cannibalism, and in the latter part of the season, when the weather was cool, 1,200 crappie, 3 inches long, were held in one tank for two weeks without loss. The tanks were kept clean, the fish assorted according to size, and no food given, and to this was attributed, to a great extent, the success met with in holding them. Of the 95,260 placed in the tanks during the season not over 100 were lost by fungus, and the loss from cannibalism was very small.

A gasoline launch 26 feet long, 4 feet beam, with 3-horsepower engine and twin screws, was purchased for $300 and used for towing live-boxes and flatboats from the lakes to the retaining-tanks at Bellevue. The live-boxes were 5 feet by 2½ feet by 2 feet. There was also a flatboat, with a capacity for carrying 15 round-shouldered cans, which was used for transporting fish in rough weather when it would have been impossible to tow the live-boxes.

The fish were captured by means of seines, which were operated under the direction of Mr. Charles Hruby, assisted by five laborers. Operations commenced on July 25 and continued to November 10, during which time 95,260 black bass and 41,364 crappie were taken from lakes and bayous in the vicinity of Bellevue, where they would certainly have died, and were transferred by the cars to various parts of the country.

While making the collections of bass and crappie for distribution large numbers of fish, which it was impossible to hold, were liberated in the Mississippi River. As it was impracticable to count these they were handled in galvanized-iron bushel baskets, and on the counts of individual baskets it was estimated that there were thus transferred 5,000 black bass, 100,000 crappie, 5,000 pike, 8,000 yellow perch, 50,000 bream, 4,000 cat-fish, 15,000 carp, and 20,000 buffalo—a total of 207,000. This represents a very small percentage of the fish in the lakes and bayous in the vicinity of Bellevue that died when the waters dried up. There is little doubt but that the number would run up into the hundreds of thousands, if not millions.

The total cost of operating this station for the season was $1,387.98 Of this amount $536.51 was used for the purchase of apparatus and equipment, leaving the actual cost of collection a little over $851.47.

The following table gives the mean temperatures of the air during the year, arranged by months. The water temperature was stationary at 50 degrees.

Month.	Mean minimum.	Mean maximum.	Mean average.	Month.	Mean minimum.	Mean maximum.	Mean average.
1899.	°F.	°F.	°F.	1900.	°F.	°F.	°F.
July	71	88	81	January	−3	42	27
August	70	90	82	February	−2	37	19
September	37	93	68	March	3	52	33
October	42	77	61	April	29	74	57
November	31	59	45	May	52	88	68
December	−2	44	25	June	66	86	76

SAN MARCOS STATION, TEXAS (J. L. LEARY, SUPERINTENDENT).

During the summer a pond 1 acre in area was constructed on a triangular space lying between the roadways and the circular ponds. This was built particularly for the propagation of crappie, and receives its water supply from the current wheel through a 6-inch pipe. Concrete walks were laid around the office and artesian well, the office and buildings were painted, and 200 loads of gravel were procured for improving the bottoms of the ponds.

The weather conditions during the year were very favorable for work until January 15, when tremendous rainfalls commenced and continued until the middle of April, causing floods in many parts of the State and doing a great deal of damage. On April 7 the San Marcos River overflowed its banks, flooding the entire pond system supplied by the artesian well and causing the loss of all the black bass that were ready for distribution and a large number of brood-fish, besides destroying many nests of eggs by depositing on them a heavy coat of sediment. Over 10,000 fry had been counted out into one of the ponds for distribution, and it is estimated that the loss of fish between 2 and 3 inches long was over 50,000. Fortunately the overflow occurred during the day, and by stretching a seine across Pond H as the water receded a part of the brood stock was saved. The rainfall has been of decided advantage, though, in increasing the water supply, the well now flowing 1,000 gallons per minute. The winter was mild, the lowest temperature being 16° above zero on February 18. June 22 was the hottest day of the year, the thermometer registering 102 in the shade. The temperature of the water from the well is stationary at 73° the year round. The average temperature in the ponds is about 69°.

The methods employed in the propagation of black bass, crappie, rock bass, and bream, were practically the same as in the past, the increase in pond area permitting the utilization of additional ponds for black bass, the most important fish handled at the station. The spawning season began on February 2, seven days earlier than usual, and it was noticed that more fish used gravel for their nests than ever before. As the winter was mild the young fish grew rapidly and were large enough to be distributed by April 1, but the work had to be deferred until May on account of the freshet. As heretofore, the young bass were transferred from brood-ponds to rearing-ponds when from 1 to 1½ inches in length, the seine used for the purpose being of bobinet, 40 feet long, 5 feet deep, supplied with the usual float and lead lines. As many as 2,500 were moved at one haul of the seine.

The method of feeding is the same as in the past, chopped fish and crawfish being used to a great extent, in addition to live food. The distribution was commenced as soon after the subsiding of the water as possible, and resulted in the shipment of 110,455 bass, 5,690 rock bass, 3,195 crappie, and 300 bream, to applicants in Texas.

The calico bass, rock bass, crappie, and bream spawned as usual in

the spring, and though the brood stock was small, it is believed that considerable numbers of young fish will be available for distribution in the fall. The crappie have done particularly well, and the new pond constructed for them promises to yield a large crop. In order to keep the water of this pond stirred up 26 large carp have been kept in it, as it has been found by experience that crappie do not thrive in clear water at this station. Although much difficulty has been experienced in distributing this fish during the warm months, 125 crappie over 2 inches in length were shipped late in June and were carried for 36 hours without any loss, though the air temperature on the trip was over 100°. Ice was, of course, used for keeping the water cool.

Carp and mud shad are propagated for supplying live food for the bass and crappie, and answer the purpose well. In one of the ponds 75 adult mud shad were introduced with the bass, and from this pond 27,000 young bass were taken. Occasionally a young mud shad was captured with them, showing that the bass had eaten nearly all of them.

Salamander and shrimp continued to come up from the artesian well until the overflow in April, but since that time none have been seen. A female salamander which showed well-developed eggs was kept in a can, to see if it would produce young. It seemed to do well for 41 days, but then died without spawning. As heretofore, schools of science have been furnished with salamander and shrimp.

Very few aquatic birds have been killed during the year, showing that the warm weather carried them further south or that they are becoming less numerous. Turtles and snakes, however, are on the increase, but it is not believed that they are especially harmful to the young fish, as an examination of their stomachs showed that they consume large numbers of frogs and tadpoles, only a few fish being found.

NEOSHO STATION, MISSOURI (H. D. DEAN, SUPERINTENDENT).

The output of fish in the fall was not so large as that of the preceding year, but it is believed that the improvements now going on will enable us to increase very materially the effectiveness of this station in future. Of the rainbow trout on hand at the beginning of the year, 57,525 were distributed during the fall, and 2,500 kept for brood stock—94 per cent of the number on hand July 1. The fish were held in ponds and troughs as heretofore, and fed on a mush made of liver and shorts. The new ponds, Nos. 17 and 18, were used for spawning and proved a great convenience, the only difficulty being to give them a full supply of water when the small ponds were filled with young trout. For this reason they could not be used until the distribution was nearly over, it being December 7 before the fish were assorted and placed in them. The spawning season extended from December 13 to March 2, and though the brood-fish seemed to be in fine condition, of the 397,649 eggs collected from the older fish only 212,616, or 53 per cent, were eyed. The 2-year-old fish produced 99,048, of which 49 per cent were eyed. Assignments amounting to

99,600 were shipped to private applicants and other stations, and the balance were retained for hatching. The first of the fry made their appearance on January 2, and although the eggs had apparently been of poor quality, the fish were strong and healthy, and at the close of the year there were 97,000 on hand. The eggs from the 2-year-old trout were kept separate and hatched about the same percentage as the others, the fry from them being as strong as those from the older fish, and the losses among them no heavier.

There were no epidemics of any kind during the year and no losses of old trout except in one instance, where 425 of the 2-year-old fish were lost during the night. There is no accounting for this except on the theory that the water supply was cut off in some way in the night, though it was running in the morning.

The black-bass ponds were drawn as usual in July and the young transferred to troughs and supplied with water from pond 5. The loss during the summer was much larger than usual, and of the 15,145 placed in the troughs only 8,765, or about 58 per cent, remained in the fall when the distribution was undertaken. In the spring the brood-fish were again placed in ponds 4, 10, and 11, and though there appear to be many young fish in them, no estimate can be made as to the exact number. Several thousand, three-fourths of an inch long, were taken from pond 11 and transferred to Nos. 9 and 16, where they have grown rapidly. Observations this season seem to indicate that there is a much longer period of time between the hatching of the young bass and the absorption of the sac than has generally been supposed. It is believed at this station that it does not disappear in less than ten days and sometimes lasts two weeks.

One of the ponds which had been set aside for the rearing of strawberry bass was drawn on July 24 and 25, but owing to heat and the difficulty encountered in handling the young fish it was decided, after 5,000 had been taken out, to allow the pond to fill and leave the balance of the fish until cooler weather. On September 11 it was again drawn and 6,000 young transferred to the troughs. From all of the ponds 17,279 were taken, but the fish were so frail and so hard to feed that only 7,804 were distributed. It is noted that the young of this species are more liable to attacks of fungus than any of the other basses. The breeders were placed in ponds 3 and 7, but it has been impossible to make any observations of their spawning habits, owing to the unusual roiliness of the water; but this feature is favorable to the production of young, and it is thought there will be a good crop when the ponds are drawn in the fall. It is believed that these fish are very prolific and could be distributed in large quantities were it possible to handle them in the summer like the other basses.

It had been determined not to draw down the ponds containing the young rock bass until cool weather, but in order to supply applicants from Quincy it became necessary during a very warm spell to remove them from the pond. The results were very disappointing, as

only 12,582 were obtained as against 31,000 the previous year. From one pond that had yielded 20,000 the preceding year only 90 young fish were found. No explanation of this can be given unless it be that they were smothered by confervæ, which appeared in this pond in large quantities during the season and entirely stopped the growth of vegetation. Of the fish taken from the ponds 10,500, or 83 per cent, were successfully distributed. From observations made it is obvious that it takes fourteen days for the absorption of the sac—that is, two weeks from hatching to scattering—with a daily water temperature ranging from 62° to 75°.

Nearly 2,000 pounds of crawfish were removed from the ponds during the year and fed to the bass. No special effort has been made to exterminate them, as it is thought their value as food for the fish more than counterbalances the damage they cause to the pond banks, etc., and with proper care in drawing the ponds it is not probable that their presence is detrimental to the young fish.

The following shows the fish on hand at the end of the year:

Species.	Calendar year in which fish were hatched.				
	1900.	1899.	1898.	1897.	1896 or earlier.
Rainbow trout	97,000	2,500	1,375	370	80
Black bass	.....	155	.....	81	75
Rock bass	.....	177	.....	.....	50
Strawberry bass	.....	200	.....	58	.....
Golden ide	.....	.....	.....	.....	11
Salmon	.....	140	.....	.....	.....
Total	97,000	3,172	1,375	509	166

LEADVILLE STATION, COLORADO (E. A. TULIAN, SUPERINTENDENT).

The brook trout on hand at the beginning of the year were kept in troughs and ponds until August, when they were distributed, with a loss of about 5,000, to applicants in Colorado.

Arrangements were made during the summer for the collection of eggs on shares from various private lakes. The brood-fish at the station commenced spawning early in October and continued until the 8th of December, 214,600 eggs being collected from them. They were of poor quality, however, and only 117,000 were eyed. Of these 45,000 were shipped and 72,000 fry were hatched. The period of incubation varied from 131 to 138 days.

The following table shows the number of brook trout eggs collected at the various points and the period of spawning:

Point of collection.	Spawning period.	No. of eggs.
Station	October, November, December	214,600
Musgrove lakes	do	805,800
Young's ponds	October and November	498,800
Ridgeway's ponds	November and December	305,100
Smith's ponds	October and November	131,400
Wellington Lake	October, November, December	1,956,400
Uneva Lake	October and November	245,400
Decker Lake	November	239,200
Derry Lakes	November and December	420,700
Total		4,815,400

The take of eggs was largely in excess of the previous year, but the quality was exceedingly poor, the best being obtained at Uneva Lake, where the loss was only 10 per cent. At Smith Lake, where 131,400 were taken, it reached 44 per cent, as against a loss of 28 per cent the previous year. At Ridgeway the loss was 77½ per cent; at Wellington, 56 per cent; at Young's, 42 per cent; at Decker's, 80 per cent; at Musgrove's, 56 per cent, and at Derry's, 54½ per cent. This mortality on brook-trout eggs was greater than has ever been experienced before at the Leadville station, and is very discouraging, as the work was carried on under the same conditions as heretofore, and all of the eggs were taken by the superintendent and foreman, the greatest care being exercised in transferring them from the field stations to the hatchery. It can only be attributed to the fact that about three-fourths of the eggs were taken from young fish—as at Uneva Lake, where the fish were 3 years old and over, the loss was light. At all of the other points where collections were made the owners rear fish for market and do not care to keep them longer than two years, as they do not find a ready sale after that age.

During the winter 395,000 eyed eggs were shipped to other stations and private applicants, all of them reaching destination in excellent condition except one consignment to Bozeman. On May 1 there were on hand 1,796,650 fry, of which 760,700 belonged to the Government and the balance to the owners of the various lakes. The distribution of fry began on May 27 and by the end of June 233,000 had been planted in Colorado waters.

The Loch Leven trout on hand July 1 consisted of 180 two-year-olds and 300 fingerlings. The fingerlings all died during the year, and the others were reduced to 120 by July 1, 1900. In November 6,100 Loch Leven eggs were collected at Uneva Lake and produced 5,400 fry.

The rainbow-trout work was very unsatisfactory. Of the 18,000 fry hatched in July, 8,000 were turned over to the Lake Loveland Company, and the fry resulting from the balance, together with those derived from Twin Lakes and Sisson, California, were placed in one of the ponds at the station, and on September 1 there were 32,000 fingerlings, but by the last of June 28,000 of them had been lost. Arrangements were made in the winter for the collection of eggs from fish belonging to Mr. R. M. Ridgway, at Salida, Colo., and from this source 54,500 were secured. The eye-spots appeared within 63 days, and the fry commenced hatching in 97 days. These eggs were taken from fish 3 years of age, which had spawned for the first time this year, and though they appeared excellent when stripped the loss was very heavy, only 11,100 fry resulting from them.

In March 64,700 eggs were collected from Lake Loveland, but they were also poor. It is impossible to account for their condition unless it was caused by the unusually warm and stagnant water in the lakes the previous summer, and this theory seems untenable in view of the fact that Mr. T. H. Johnson, State fish commissioner, captured a large

number of wild rainbow trout weighing from 2 to 10 pounds each in the Gunnison River, and spawned them during April and May, and fully one-half the eggs from them were bad when taken. As the Gunnison is a cold, clear stream and quite rapid, the quality of the eggs in this instance can not be attributed to the cause mentioned above. If the eggs of other wild rainbow trout are found in this condition, it would seem that there is a limit to the usefulness of that fish in the waters of Colorado.

An effort was made in April to collect eggs from Stover Lake, about 50 miles north of Fort Collins, but when the ice melted all of the fish were dead. Numbers of them were found floating in the water. One lake near Fort Collins, which had been well stocked with black bass, was practically stripped of fish, a hole 12 feet long and 5 feet deep being found full of dead bass. The same condition was found to exist in a number of other lakes in the vicinity, and it was thought the fish had smothered under the ice.

The lake trout on hand at the beginning of the year were carried through the year with a loss of about 43 per cent. In December 50,000 eyed eggs arrived from Northville in excellent condition, but the fry were not strong. The loss during the hatching period was only about 10 per cent, but since then the mortality has been very heavy.

During May 78,000 eyed grayling eggs arrived from Bozeman. They hatched with a loss of 21,000, and the loss of fry to June 30 was 36,000, leaving on hand at the close of the year 21,000 fingerling fish.

A consignment of 50,000 steelhead eggs arrived from the Pacific coast in May. They commenced hatching within five days, and finished with a loss of 300, or about 0.6 per cent. The loss of fry to July 1 amounted to 1,100.

From the 1,735,000 black-spotted trout eggs on hand in July 870,980 fry were hatched. The eggs collected at Grand Mesa Lake turned out very badly, about 50 per cent being lost in incubation. This was attributed principally to the fact that they were eyed at the lake on trays with such large mesh that they were liable to fall through; consequently it was necessary to cover the trays with mosquito netting, which collected a great deal of sediment. The fry were carried to October and distributed with a loss of about 50 per cent. Arrangements were again made this year to collect eggs of the black-spotted trout at Grand Mesa Lake, and by the close of the year 1,857,400 had been collected at Grand Mesa Lake and 16,000 at Freeman Lake, or a total to the close of the year of 1,873,400. These were at once transferred to the station, and appear to be of excellent quality.

SPEARFISH STATION, SOUTH DAKOTA (D. C. BOOTH, SUPERINTENDENT).

On July 3 Mr. D. C. Booth was appointed superintendent of this station, relieving Mr. H. H. Buck, who had directed the work of construction. In addition to the superintendent, the personnel consists of a fish-culturist and two laborers.

The hatchery, which was completed on July 25, is a frame building 66 feet long by 33 feet wide, with a 17 by 17 foot transept for main entrance. The first floor contains the hatching room (48 feet long by 32 feet wide), the boiler-room, reception-hall and office, and on the second floor are two bedrooms. The whole building is fitted with hot-water heating apparatus. The water supply is obtained from a series of springs rising in Amos Canyon within the hatchery grounds, and is conveyed by closed plank flumes, 700 feet long, to the hatchery.

During the summer various streams in the Black Hills, in South Dakota and eastern Wyoming, were investigated by the superintendent with the view to the establishment of auxiliary stations for the collection of brook and Loch Leven trout eggs, but judging from information so far gained it is believed the collections for a time will be somewhat limited, though there are many streams in this region which will eventually become productive if stocked with suitable fish. A permit was obtained from the governor of South Dakota for seining fish from Spearfish Creek, and within an area of 8 miles 900 brook trout and 140 Loch Levens were secured and transferred to the station ponds. Arrangements were also made with individuals to collect eggs on shares from private ponds. A temporary retaining-pond was constructed on Sand Creek, about 7 miles from Beulah, Wyo., in the Black Hills, and 3,000 adult trout, averaging 10 inches in length, were collected. These commenced to spawn on November 15, and by January 20 the 1,100 females had yielded 374,000 eggs.

From all sources in South Dakota and Wyoming 581,000 brook trout and 41,500 Loch Leven trout eggs were obtained, and 100,000 brook-trout eggs were shipped from Leadville. Of those obtained at Sand Creek 50,000 were sent to the Wyoming Fish Commission and to an applicant in Idaho; the balance were hatched with comparatively light losses and yielded 300,000 fry, or 93 per cent of the eggs reserved. As a result of the season's work, 579,568 brook-trout fry were hatched, 85,145 were lost during the sac stage, 87,423 were given to the owners of stock fish from private ponds, and 123,000 distributed, leaving on hand at the close of the year 284,000. A consignment of 100,000 black-spotted trout eggs, shipped from the Leadville station in July, hatched the following month with a loss of 18,240. The fry were held in troughs at the station during the winter, but the losses were very heavy, and when distributed in the spring only 20,260 of them remained; 15,000 of these were planted in May and June.

The superintendent made a trip through northern Wyoming in April with the view to establishing an auxiliary station for the collection of black-spotted trout eggs, and after several days of investigation along the Big Horn Mountains, Tongue River was decided upon as the most feasible field for operations. An egg-eying station was accordingly erected near Dayton, Wyo., early in May, and by the close of the year several hundred adults had been collected and a few thousand eggs secured, but the outlook was very unfavorable on account of the

immense quantities of snow on the mountains, which not only retarded the spawning season, but raised the streams to such an extent as to practically stop work. Permission has been obtained from Mr. S. H. Campbell, of the Wyoming Fish Commission, to operate next season for brook trout in the vicinity of Laramie, where there are a number of good streams.

The Loch Leven trout eggs collected during the fall hatched in the spring with a loss of only 2,450. The owner of the pond was given 8,000, and at the close of the year there were 27,000 on hand.

The following table shows the stock at the station on June 30:

Species.	Calendar year in which fish were hatched.			
	1900.	1899.	1897.	1896.
Brook trout	284,000	.....	300	600
Loch Leven trout	27,000	.....	40	100
Black-spotted trout	5,000	5,280	154	.....
Total	316,000	5,280	494	700

BOZEMAN STATION, MONTANA (JAMES A. HENSHALL, SUPERINTENDENT).

The freshet which occurred in June prevented the use of the creek water for the grayling fry, and as many were dying in the hatching-troughs, which are supplied by spring water of a low temperature, 300,000 were planted in Bridger Creek early in July. By the time the rest of the fry were hatched the ponds were again supplied with the creek water and they throve well in it, though the losses from cannibalism were heavy. It would seem from the experience at this station that the methods used in hatching and rearing trout are not entirely applicable to the grayling. The fry can not be retained in troughs supplied by cold spring water, as trout are. This is probably because trout when first hatched have a large yolk-sac, which supplies them with nourishment for a month or more, and by that time they are able to take artificial food. The yolk-sac of the grayling is quite small and is absorbed in a few days, consequently the fry have but little strength when they begin to swim and are apparently incapable of taking artificial food, and as there is little or no natural food in spring water, it is imperative that they be transferred to water containing it. This food can easily be seen with the naked eye. In holding a glassful to the light hundreds of small crustaceans (Entomostraca), resembling specks of dust, can be seen floating in the water. Another reason why the fry of the grayling should be transferred at an early stage to creek water is that they may get plenty of sunlight, as they have been observed to be partial to the sunny parts of the water. Within a week or two after the absorption of the sac the fry learn to take finely chopped liver very readily.

Operations at Red Rock commenced much earlier than ever before, collections of grayling eggs extending from April 30 to June 1. Mr. G. H. Tolbert, who had charge of the work, secured 3,687,000; of

these, 119,500 were lost in incubation, 1,625,000 were transferred to Bozeman, and the balance, 1,942,000, were hatched and distributed in the vicinity. The eggs were eyed in white-fish hatching-jars, and were then transferred to troughs and hatched like trout. The shipments, many of which were to distant points, reached their destination in excellent condition. This was attributed chiefly to the use of a new shipping-case, devised at the station the previous winter. The outside of this case is of the usual form, 30 inches square, from 12 to 18 inches deep, and fitted with hinges, hinged hasps, and staples, in order to allow ready access for re-icing en route. An inner case of half-inch stuff, of the same depth as the outer case, but without top or bottom and about 26 inches square, fits into the outer case, the space between the two being packed with dry sphagnum-moss or sawdust. The egg trays are 12 inches square outside and 1½ inches deep, and as it has proven impracticable to place moss over the eggs, the only covering is a piece of mosquito netting on each tray. The stack of trays is placed in the center of the space in the case, which is then filled in with broken ice. On the top of the trays is a hopper of the same size with perpendicular sides filled with ice, which allows ready access to the ice chamber. On the outside is a notice to the express messenger that the contents are perishable and must be re-iced en route. No difficulty has so far been experienced in sending eggs to any part of the United States in this form of case. In every instance they have arrived in good condition, with a temperature of 40° or less.

The black-spotted trout eggs on hand at the first of the year were hatched in July, and the fry resulting from them were distributed in September and October in the States of Montana, Oregon, Idaho, and Washington, the output amounting to 277,000. The season at Henry Lake was about a month in advance of the usual time. The first eggs were taken on April 2, the last on June 5, the total collections being 1,441,000. The work at this point was directed by Mr. W. F. Jarvis, and was satisfactory except for the heavy loss of eggs during incubation, which was due to the fact that sufficient help could not be secured to pick out the dead ones. The losses in hatching were 398,500. During June 923,000 were transferred to Bozeman and 120,000 were hatched and distributed in Henry Lake and vicinity.

In the summer of 1897 a number of steelhead trout escaped from the ponds into Bridger Creek, which flows through the station grounds, and as a result some 200 steelheads this year entered the waste ditch from the creek and 52,000 eggs were secured from them and hatched with little loss, producing fine healthy fry. The fish from which they were taken were scarcely three years old, from 12 to 20 inches long, but were much larger than those of the same age that are confined in ponds at the station and which did not spawn this season.

The brook-trout fry on hand at the beginning of the year were distributed with the other fingerlings in the fall, having been carried through the summer with comparatively light losses.

In November 60,000 eggs were collected from the two-year-old trout reared at the station, and two consignments, comprising 100,000, were shipped from Leadville. The first of these arrived in fair condition, but the last were of poor quality and the losses consequently heavy.

At the close of the year there were on hand the following fish:

Species.	Calendar year in which fish were hatched.			
	1900.	1899.	1898.	1897.
Brook trout	128,000	.....	1,750	932
Black-spotted trout	800,000	.....	4,700	133
Steelhead trout	44,000	.....	170	5,945
Rainbow trout	.....	1,550	.....	.....
Grayling	700,000	50	.....	.....
Total	1,672,000	1,600	6,620	7,010

BAIRD STATION, CALIFORNIA (G. H. LAMBSON, SUPERINTENDENT).

During June the racks were put in by the regular employees of the station, but it was noted that the number of salmon in the pool was much smaller than in past years. The equipment for the new hatchery, which had been completed just before the close of the fiscal year, was installed during the summer and consists of 86 troughs, arranged in sections of eight, so that the water from each gate of the supply-trough passes through four troughs of eggs, with a fall of about 9 inches. The upper troughs are 52 inches above the floor and are provided with platforms for the pickers to stand on; the lower troughs are 20 inches above the floor. The troughs are 15 feet 6½ inches long, 15⅞ inches wide, and 7½ inches deep, inside measurement, and are equipped with 6 baskets each, 24 inches long, 15 inches wide, and 6⅞ inches deep. These baskets are of galvanized-wire cloth, 5 wires to the inch, ¾-inch mesh, and are substantially made, the corners being soldered to an L strip of galvanized sheet iron extending seven-sixteenths of an inch on each side, and the wire cloth attached at the top to the wooden frame by double-pointed tacks. The compartments in which they are placed are 25 inches long and are separated by pairs of steel plates placed 1½ inches apart. The first division plate is 12 inches from the upper end of the trough and the lowest division 14 inches from the lower end. The troughs are fastened together in pairs by two iron braces made of ⅝-inch by 1-inch iron, which extend across the bottom and up the sides in the shape of a double L, and are attached by screws. This arrangement leaves the top of the trough open, with no braces in sight, and, moreover, allows the baskets to be shifted without being lifted from the water.

The water supply for the station, which had been very unsatisfactory in the past two years, was increased by the installation of a No. 4 Byron Jackson centrifugal pump, geared to supply about 450 gallons per minute. The power for operating this pump is furnished by an undershot water-wheel, designed by Mr. Leroy Ledgerwood, one of the regular laborers at the station. It is 13 feet long with a radius

of 6 feet 1½ inches, with 18 paddles 19 inches wide. It runs on a 3½-inch shaft, and makes about 6 revolutions per minute when driving the pump. The power is conveyed by an 8-segment gear of 184 teeth bolted to the framework of the wheel and driving a 24-tooth pinion, to the shaft of which is keyed the main driving-pulley, 6¼ feet in diameter. The pump is operated by a 7-inch pulley, driven by an 8-inch rubber belt 80 feet long. This wheel is so built on its supporting frames that by means of a tackle it can be raised or lowered to meet the exigencies of rising or falling waters in the river, as at certain heights of water it becomes impossible to use the water-wheel. To meet such emergencies a steam pumping-plant was installed, capable of furnishing 300 to 400 gallons of water per minute. This plant consists of a Blake special duplex pump, operated by a 15-horsepower Atlas locomotive boiler, and is set about 17 feet above the river at extreme high-water level. It is operated when the regular supply is disabled, and has proved very satisfactory. A suitable building with corrugated-iron roof was erected over this plant.

Fish-cultural work commenced August 21 and continued steadily until September 27, when the summer run was over. The fall run commenced October 18 and continued until November 9. During the first run 14,017 females and 8,047 males were captured in the 353 seine-hauls made; of these, 914 males and 1,222 females were placed in the spawning-pens. From the trap, which is located in the upper rack, 108 females were secured and 34 were taken with a dip net. The total number of fish handled does not indicate the real number in the pool, as it is customary to count them as often as they are caught. There were, perhaps, between 3,000 and 4,000 fish in the pool during the summer run, though not over a third of that number were in the pool at one time. The fall run was very irregular, and only 173 fish were captured; of these, 101 females were placed in the pound.

The seining is done in the pool between the upper and lower racks, and is carried on daily from 5 to 10 a. m. and from 5 to 10 p. m. The seine is run out in a flat-bottomed boat and hauled in by a windlass, operated by two men and a one-horse whim. While operating the seine at night it is necessary to keep a fire on the bank for warmth and light, and lanterns are hung up around the fishing-grounds to enable the men to examine the fish as they are captured.

Many fish are necessarily held in the pool for eight or ten weeks, and it has been noticed that there is a decided difference in the condition of the ripe fish, some being dark, with fins frayed, noses bitten, and of a generally dilapidated appearance, while others are bright, silvery, plump, and pliable. The former are those that have been in the pool for a long time, the latter are fresh-run fish. It is much more difficult to take eggs from the old-run fish, but no experiments have been conducted to determine whether they are actually inferior to the eggs from fresh-run fish.

The methods of taking the eggs are the same as heretofore. After

the fish are stripped the females are knocked on the head and given to the Indians for winter stores, though a few were put up by the white residents during the past season. The males are returned to the river unless there is a scarcity, when they are retained in the pound to be used again, as one male will frequently furnish milt for several pans of eggs.

From the summer run 6,228,260 eggs were secured; from the fall run 186,800, a total of 6,415,060. The summer run averaged 4,896 per fish; the fall run 5,494. After the eggs are taken to the hatchery they are measured and put in baskets, 40,000 to the basket. As the eggs were much smaller this year than heretofore, it was discovered later in the season that the first 72 baskets filled contained 48,800 each.

As soon as the water is turned on the baskets are covered and the dead eggs are picked out every other day until they reach the critical stage, which is usually the fourth or fifth day at this station. They are then left undisturbed until the day after the closing of the blastopore, which usually occurs about the eleventh or twelfth day. At that time they are uncovered and washed without lifting the baskets from the water, which is done by removing the division plates, and after that are picked daily until all dead eggs have been removed.

When the eggs were from 25 to 28 days old 1,000,000 were shipped to the California Fish Commission station on Eel River, and 1,905,000 to the Sisson hatchery. The remainder, with 1,224,000 from Battle Creek, were hatched at the station. Of the eggs taken during the summer run 1,115,000 were lost during incubation and from the fall run 11,880, making a total of 1,126,880, or 17.9 per cent loss on the eggs taken at Baird. Of those transferred from Battle Creek 24,400, or 1.9 per cent, were lost.

Very unfavorable reports were received from the California Fish Commission as to the condition of the eggs sent to Sisson. The shells seemed to be spotted by a thinning of the membrane, and this was followed later by its rupture and consequent death of the aborted fry. The superintendent, accompanied by Mr. Wallich, the foreman at Baird, examined the eggs at Sisson and found the disease present, though not to so great an extent as had been reported. It is believed by the California Commission that it was due to fungus, but as the eggs at Baird during the season had been exceptionally free from this disease, the superintendent was unable to concur in this opinion. Later Mr. Cloudsley Rutter, of the Division of Scientific Inquiry, was detailed to examine into the trouble, but not arriving at Baird until the affected eggs had hatched and most of the fry had been planted, he was unable to make as thorough investigation as was desired. This is not the first appearance of this disease. It has been observed several years previously, but no systematic study involving an examination of the parent fish, eggs, and fry has ever been made, nor has there been any attempt to cultivate the bacteria and determine its

exact nature. The majority of the eggs retained at the station were taken from the first run and commenced to hatch on September 27. They finished on October 27, the yield amounting to 2,208,260.

The eggs from the fall run and from Battle Creek were hatched in October and November, and yielded, respectively, 174,920 and 1,187,050. The loss of fry during the sac stage was comparatively small, amounting to 49,130, or 3.6 per cent of the total fry hatched. Several days before the eggs commence to hatch at this station the baskets are placed in clean troughs, two to each trough, where they remain until all have hatched except a few hundred. The baskets are then transferred to the last section of the trough, as these eggs produce a large percentage of deformed fry. This was particularly noticeable in the eggs from Battle Creek; in some cases both the caudal fin and the caudal vertebræ were apparently lacking. During the process of hatching the baskets are shaken up twice a day to sift the fry through and prevent their smothering. The fry are cleaned daily, but the troughs can not be thoroughly scrubbed until the hatching is completed. Upon the removal of the baskets the troughs are given a good scrubbing and the operation is repeated twice a week until they are planted.

Early in the season the eggs retained for hatching seemed to show an unusual mortality late in their development, but the measurement of losses did not reveal anything to cause alarm. A considerable mortality occurred in the alevins after they were somewhat advanced in development, but in most instances the losses seemed to be individually selective. The victims showed no preliminary affection, and were usually taken from the oldest, strongest, and best lots of fry. As this loss was not due to the fish smothering, it was believed that the depth of water in the troughs might be too great; consequently it was lowered from 6 to 4 inches in another line of troughs, but the results were identically the same. A mud bath was also tried without effect. The greatest loss occurred among the scattered baskets of eggs, which had been retained at the station on account of extraordinary losses upon first picking. This would seem to point to the cause as antedating the taking of the eggs from the fish.

The following table shows the daily take of eggs, eggs lost, and mean temperature of water:

Table showing daily take of eggs, eggs lost, etc., at Baird Station.

Date.	Females stripped.	Eggs taken.	Eggs lost.	Mean water temperature.	Date.	Females stripped.	Eggs taken.	Eggs lost.	Mean water temperature.
1899.					1899.				
Aug. 21	.....	.....	.....	55	Aug. 29	20	102,200	350	55
22	32	175,000	.....	54	30	21	106,000	275	55
23	25	117,900	600	54	31	31	155,400	200	55
24	13	80,200	60	54	Sept. 1	40	206,594	4,400	54½
25	14	80,200	900	55	2	40	205,455	4,100	53
26	.....	.....	1,200	55	3	50	218,043	9,900	53
27	28	151,000	200	55	4	45	209,855	4,000	53½
28	24	116,500	90	55	5	53	254,343	11,000	52½

Table showing the daily take of eggs, eggs lost, etc.—Continued.

Date.	Females stripped.	Eggs taken.	Eggs lost.	Mean water temperature.
1899.				
Sept. 6	32	154,376	4,000	52½
7	54	275,978	9,400	53½
8	72	335,020	7,800	53½
9	40	206,000	8,500	54
10	69	344,422	8,700	54½
11	73	345,054	10,300	54
12	90	432,600	14,900	54½
13	78	357,100	15,600	55
14	51	254,700	19,300	53½
15	37	176,500	13,800	54
16	36	173,200	15,600	53½
17	39	180,700	15,000	53½
18	36	168,300	21,500	54
19	36	179,100	24,300	53½
20	35	174,850	20,700	53½
21	20	92,650	19,600	53
22	.....	.....	22,000	53
23	24	120,000	22,300	53
24	.....	.....	20,700	53
25	8	48,250	26,700	52½
26	.....	.....	20,700	52½
27	6	30,250	18,400	52½
28	.....	.....	26,500	52½
29	.....	.....	34,500	52½
30	.....	.....	42,700	52½
Oct. 1	.....	.....	32,000	50½
2	.....	.....	27,600	49½
3	.....	.....	36,000	50
4	.....	.....	73,700	50
5	.....	.....	33,000	49½
6	.....	.....	92,000	49½
7	.....	.....	20,700	50½
8	.....	.....	27,000	51½
9	.....	.....	59,900	50½
10	.....	.....	46,000	49
11	.....	.....	69,000	48½
12	.....	.....	55,000	46
13	.....	.....	16,000	45½
14	.....	.....	8,000	47
15	.....	.....	.....	46½
16	.....	.....	8,800	46½
17	.....	.....	6,600	48½
18	3	.....	4,000	49
19	.....	18,000	.....	52
20	3	.....	.....	50
21	2	17,550	.....	50
22	.....	11,100	4,000	49
23	.....	.....	2,000	48
24	.....	.....	2,400	47
25	.....	.....	.....	47
26	.....	.....	.....	47
27	.....	.....	525	47
28	.....	.....	.....	47
29	1	4,600	.....	46
30	.....	.....	.....	47
31	4	27,200	.....	48
Nov. 1	1	6,800	.....	47
2	.....	.....	.....	46
3	.....	.....	.....	46
4	8	40,800	.....	48
5	.....	.....	.....	48
6	6	28,050	.....	47
7	.....	.....	100	48
8	.....	.....	40	48
9	6	32,700	21	49
10	.....	.....	.....	53
11	.....	.....	101	55
12	.....	.....	.....	55
13	.....	.....	128	56
14	.....	.....	150	53
15	.....	.....	150	54
16	.....	.....	.....	51
17	.....	.....	1,200	50
18	.....	.....	1,350	52
19	.....	.....	380	53
20	.....	.....	600	50
1899.				
Nov. 21	.....	.....	350	52
22	.....	.....	125	53
23	.....	.....	525	49
24	.....	.....	500	50½
25	.....	.....	150	51½
26	.....	.....	250	52
27	.....	.....	150	52
28	.....	.....	100	54½
29	.....	.....	600	53
30	.....	.....	450	52
Dec. 1	.....	.....	350	50
2	.....	.....	.....	51
3	.....	.....	.....	50
4	.....	.....	750	48
5	.....	.....	.....	47½
6	.....	.....	.....	46½
7	.....	.....	225	47½
8	.....	.....	200	49½
9	.....	.....	.....	45½
10	.....	.....	350	47½
11	.....	.....	.....	49
12	.....	.....	300	49
13	.....	.....	.....	45
14	.....	.....	310	43
15	.....	.....	.....	47
16	.....	.....	175	49
17	.....	.....	.....	48½
18	.....	.....	.....	45
19	.....	.....	300	45½
20	.....	.....	.....	46
21	.....	.....	.....	48½
22	.....	.....	200	48½
23	.....	.....	.....	49½
24	.....	.....	470	49
25	.....	.....	.....	47
26	.....	.....	.....	47
27	.....	.....	325	47
28	.....	.....	.....	44½
29	.....	.....	525	44
30	.....	.....	.....	46½
31	.....	.....	.....	49
1900.				
Jan. 1	.....	.....	.....	50
2	.....	.....	.....	51
3	.....	.....	.....	52
4	.....	.....	.....	52
5	.....	.....	.....	51
6	.....	.....	.....	54
7	.....	.....	.....	52
8	.....	.....	.....	48
9	.....	.....	.....	49
10	.....	.....	.....	50
11	.....	.....	.....	50
12	.....	.....	.....	52
13	.....	.....	.....	50
14	.....	.....	.....	50
15	.....	.....	.....	51
16	.....	.....	.....	51
17	.....	.....	.....	52
18	.....	.....	.....	51
19	.....	.....	.....	49
20	.....	.....	.....	49
21	.....	.....	.....	49
22	.....	.....	.....	48
23	.....	.....	.....	49
24	.....	.....	.....	48
25	.....	.....	.....	47
26	.....	.....	.....	47
27	.....	.....	.....	48
28	.....	.....	.....	48
29	.....	.....	.....	50
30	.....	.....	.....	48
31	.....	.....	.....	51
Total ..	1,306	6,415,140	1,120,880	

The total of fry lost during the season was 36,280.

The following is a summary of fishing operations:

Month.	Seine hauls.	Trap hauls.	Males taken.	Females taken.	Total taken.	Ripe females impounded.	Ripe females stripped.	Percentage of females ripe.	Ripe males stripped.
1899.									
August	87	3	3,692	6,474	10,166	224	208	3½	133
September	266	25	4,425	7,736	12,161	1,142	1,064	14	886
October	10	4	45	42	87	13	13	31	11
November	11	4	58	59	117	21	21	35	15
Total	374	36	8,220	14,311	22,531	1,400	1,306		1,045

BATTLE CREEK, CALIFORNIA (G. H. LAMBSON, SUPERINTENDENT).

The station remained in charge of a watchman until September 10, when work was regularly installed by the superintendent, Mr. W. B. Hunt, an employee of the California Commission, being put in charge of the hatchery and Mr. A. P. Smiley in charge of work on racks, ditches, etc. The main rack was commenced at once and was completed so that no salmon could ascend the stream by September 15, when the energies of the men were directed to completing racks 2 and 3, clearing the seining-grounds between the racks, cleaning out the water-supply ditch, and placing the hatchery apparatus in condition for work.

On October 1, when the first salmon appeared, the water in the Sacramento River was so low that very few fish entered Battle Creek. On October 11 a heavy rainfall raised the creek and brought down a large amount of trash, but only a few salmon were brought up by the rise. Rains continued, and on October 19 racks 2 and 3 had been damaged, No. 3 being partially carried away, but the main rack was uninjured. On October 26 the first haul of the seine was made and about 60 fish secured. Of the 18 females included in this catch only 1 was ripe.

Regular seining commenced on October 28 with a crew of 7 men, and continued to November 18, on which date only 24 fish were secured in 6 hauls of the seine. This season the seine was hauled at intervals of 40 to 60 minutes for about 10 hours during the day, though in previous years when fish were plentiful it has been customary to employ two crews and keep the seine going continuously night and day. When working at night two locomotive headlights are used to illuminate the grounds, and fires are maintained on the banks for the comfort of the workmen.

The season proved a total failure. Only 3,258 fish were captured, and of these 255 yielded 1,420,500 eggs, an average of 4,984 per fish. The usual methods were employed in taking eggs. All eggs were transferred to the hatchery, where they were eyed, 1,224,000 being shipped to Baird and 20,000 to France.

On December 18 the remaining temporary employees were discharged and the regular men transferred to Baird, the property being

left in charge of a watchman. As usual, the adult fish were given to residents in the vicinity of the station, who came in large numbers from 50 miles around for them.

CLACKAMAS STATION, OREGON (S. W. DOWNING IN CHARGE).

Mr. W. F. Hubbard, who had been in charge of this station since its acquisition by the Government, was transferred to Nashua on July 1, and the station left in charge of Mr. J. N. Wisner, field superintendent until July 10, when it was turned over to Mr. S. W. Downing, who had been appointed to the vacancy. The construction of the rack across the Clackamas River, a short distance above the station, was undertaken at once and finished July 25. As the water supply had been very unsatisfactory for a number of years a well was sunk to a depth of about 20 feet near the hatchery, 4 feet below the level of the low-water mark of the Clackamas River, and as the land formation at that depth is of coarse gravel, an abundant supply of water was secured. The water was very clear, of even temperature, and proved of excellent quality for hatching purposes. During the summer the seining-grounds below the rack were cleared and a number of other improvements made.

Operations commenced on September 13, but no ripe fish were taken until the 15th. As there were very few fish below the rack, an agreement was entered into with G. H. Oldenburg to furnish eyed eggs at 40 cents per 1,000, and 775,000 were secured in this way. The fishing at the station resulted in the collection of 619,900, and 620,000 were transferred from the Salmon River, which was being operated by the State Fish Commission. In November 2,436,000 more were received from the Little White Salmon, making a total of 4,450,900 handled during the season. The fry resulting from these, 4,371,422, were liberated in the Clackamas River and Clear Creek, over an area of about 10 miles above and below the station, except 250,000, which were held in troughs and fed until they were four months old, when all were liberated except 2,000 retained for further experiment. On February 25 the fingerlings that were being fed were attacked by fungus, the dorsal and pectoral fins turning white and little white spots appearing on different parts of the body. Salt was applied by drawing the water in the trough down low and then adding a pailful of strong brine. The fry were allowed to remain in this until they showed signs of distress, when fresh water was again turned on. After several such treatments the disease disappeared. The well water was used until November 30, when the water from the spring was turned on. The spring water had been tried early in the season when the eggs were received from the Salmon River, but on account of its high temperature they commenced dying within a few hours after being placed in it.

With the view to getting additional data relative to the number of salmon that return to the streams in which they are liberated, efforts

were made in June to tag the fry that had been held, but although the greatest care was exercised, all the fish experimented with died in a few days. Twenty-four of them were tagged through the mouth, but with the same result. The difficulty in marking such small fish lies in the liability of injury to the scales and fins. Every fish, though handled very carefully with a soft linen cloth, showed white spots or finger marks within 5 minutes after being returned to the water, and on the following day they were covered with fungus.

Experiments were also tried to determine how many eggs are left in a salmon after being stripped by the usual process, and as to the practicability of taking these through an opening in the abdomen. The abdomen was opened and all of the eggs found in the ovaries were washed free of blood and milt applied, but the eggs were of no value. At the Rogue River station, however, very good results were secured, 35,800 of the 53,200 eggs taken being successfully eyed. At that point, in order to avoid possible injury to the eggs by washing, Mr. Berrian bled the fish by cutting off their tails before placing them in the spawning-box. The fry hatched from them appeared to be as healthy and strong as the others, and it was decided that from 400 to 500 eggs per fish could in this manner be saved.

Besides the quinnat-salmon eggs handled here, 150,000 eggs of the silver salmon were received from the Rogue River in January, from which 146,000 fry were hatched and liberated in the Clackamas. One hundred thousand lake-trout eggs shipped from Northville produced 88,000 fry, which were held until March, and then planted in suitable lakes in the State of Washington. Two shipments of whitefish eggs, aggregating 1,000,000, were also received from this station. The first proved a total loss, having been 8 days en route; the other yielded 160,000 fry, which were liberated in Lake Washington, King County, Wash. From the 25,000 rainbow-trout eggs received from the California Fish Commission 22,000 fry were distributed in Meachum, Pearson, and McKay creeks, all tributaries of the Columbia River, near Pendleton, Oreg., at the request of the Oregon Fish Protective Association. On the last of May 144,000 steelhead eggs were transferred from the Rogue River and produced 124,000 fry.

From Bozeman 50,000 grayling eggs were received, which produced 41,000 fry.

On May 7 Mr. Downing was transferred to the superintendency of the Put-in Bay station and was succeeded by Mr. E. N. Carter.

Rogue River Station, Oregon.

As the State Fish Commission had decided to operate the Upper Clackamas and Salmon River stations, the superintendent visited Rogue River with Mr. R. D. Hume late in July and arranged to reopen the station there. Large numbers of salmon were to be seen jumping, and to prevent their further ascent a rack was immediately placed across the river. Fishing commenced during the latter part

of August and continued steadily to October 19, when the rack was carried away by high water and all the fish escaped.

The indications are that Rogue River will prove a valuable field for salmon work. There is no doubt but that double as many eggs would have been collected this season had not the rack been carried away. The day it was swept out 264,800 eggs were collected and there were numbers of green fish in the pool. The water of this stream is of the very best quality for hatching operations, the highest temperature recorded being 53°. The following illustrates what may be accomplished in water of this character: A basket containing 8,000 eggs was placed in a trough in the river and left undisturbed for 21 days, when they were found to be perfectly eyed, and only 80 dead ones were picked out; a total loss of 1 per cent.

The take for the season was 4,364,800, of which 1,800,000 were sent to Mr. Hume's hatchery at Wedderburn, Oreg., near the mouth of the Rogue River. The first shipment of 800,000, although two weeks en route and hauled about 100 miles over a wagon road, reached destination with a loss of only about 10 per cent; the second lot carried much better, the loss being only about 1 per cent. They were hatched at Wedderburn and the fry held until they were 3 or 4 inches long, being fed entirely on canned salmon. They were then liberated in the Rogue and its tributaries. The balance of the eggs were hatched at the station, producing 2,156,000 fry, which were liberated in Elk Creek and Rogue River.

Efforts were also made to collect silver-salmon eggs. A rack was placed across Elk Creek on November 19, and on the 27th, when it was carried away by a freshet, 200,000 eggs had been secured. They were of fair quality, and 150,000 of them were eyed, but as the hatchery was overcrowded with quinnat salmon they were shipped to Clackamas.

As numbers of steelhead trout had been observed in Elk Creek it was decided to establish an auxiliary station on that stream, and a point about 10 miles above the station, known as Elk Creek Falls, was selected. Here the stream forks at almost right angles, the falls being in the east branch. By February 1 an effectual barrier to the ascent of the fish up the west branch had been completed in the form of a solid log dam a short distance from the base of the falls, thus compelling the fish to ascend the east branch. A heavy log was then placed across the creek at the upper edge of the falls and pinned to the bed-rock, forming so sudden an ascent that the fish were unable to jump over it. A deep natural channel, with almost level bottom, about halfway up the falls formed an excellent place for a trap, and here the greater portion of the fish were secured. Many fish were also captured on the north side of the falls, where a channel 40 feet long, 2 feet deep, and 4 feet wide was blasted in the solid rock. A small shed 15 by 38 feet, without sides, was erected, and two hatching-troughs set up, the water supply being conveyed to them by means of

a ditch and 100 feet of flume. The first eggs were secured March 7, and the season closed May 11, with a total take of 530,000. Of these 315,000 were shipped to various points in the United States, 70,000 were lost in incubation, and the balance transferred to Clackamas on May 24, when the Elk Creek Falls station was closed.

LITTLE WHITE SALMON STATION, OREGON (J. N. WISNER, SUPERINTENDENT).

The station was opened August 5 and preparations at once commenced for the capture of quinnat salmon. The channel of the river was found blocked by a mass of débris, caused by the lumber company fluming lumber down to the Columbia River. On September 2, after much correspondence and several interviews, the company was induced to discontinue operations, so that in a few days salmon began to appear in the river, and on the 10th fishing was commenced. The daily catch increased steadily until September 25, when the number seemed to have reached its maximum. On that date 1,025,000 eggs were secured, the largest take of the season.

The fish are captured by means of a downstream trap, which consists of a box about 20 feet long by 8 feet wide and 18 inches deep, made of slats placed 2 inches apart, anchored in midstream. The end of the trap pointing upstream is weighted to the bottom of the river and a dam or rack extends from its two sides to within a few feet of either bank. The fish ascending the stream pass around the rack to the spawning-grounds above, and as soon as a sufficient number have collected a seine is drawn downstream at a rapid rate. Although salmon always swim against the current, when frightened they turn and go rapidly downstream, and as a consequence they are brought to a halt high and dry upon the lower end of the trap. They are then quickly assorted and placed in pens near the traps, the males and females being put in separate compartments. Most of the fishing during the season is done at night, the best hauls being usually made about an hour after dark.

Spawning operations commence in the morning and continue until all ripe fish have been stripped. The female is first taken from the pen by the spawn-taker, and if found to be ripe she is killed by striking her upon the back of the head with a club. She is then placed in the spawning-box, which is raised to a vertical position so that the eggs may be stripped into a pan held by an assistant. As soon as the milt is added to the eggs the contents are gently stirred until every egg has come in contact with it. A little water is then added and the pan placed aside for 1½ minutes, when it is handed to a third person, who washes the milt and dirt from the eggs by immersing the pan in water. The eggs are then carried in buckets to the hatchery, measured, and placed in baskets. The buckets hold about 15,000 eggs each, and are carried in pairs by means of yokes, one man carrying two buckets. The baskets to which they are transferred on arriving at the hatchery hold from 25,000 to 40,000 each, depending on the size

of the troughs used. After being placed in the troughs they are covered to exclude the light. On the first, second, and third days the dead eggs are picked off, after which they are not uncovered for at least 30 days, provided the water is clear. At the expiration of this period they are placed in water-buckets and a strong current of water turned on, which causes all of the unimpregnated eggs to turn white, while it does not injure the good ones. After the dead eggs have been removed the remainder are returned to the baskets.

The first eggs were secured September 11 and the last on October 10. During this period 10,385,000 were collected from 2,148 females, making an average of 4,835 per fish; 1,042,125 were lost in incubation; 250,000 were shipped to New Zealand, and 2,436,000 transferred to Clackamas. The eggs retained at the station hatched in November and the fry were liberated in December and January, as soon as the sac was absorbed, in the Little White Salmon, Dog Creek, and the Columbia River, the total loss being only 30,820 during the fry stage. In all 6,626,947 were planted in the streams referred to.

Several experimental forms of hatching and rearing apparatus were tried during the season, but proved unsatisfactory. It is believed, however, that the present forms can be materially improved upon.

Eggs of the blueback salmon were impregnated with milt of the quinnat and, contrary to theory, hatched nicely, the fry resulting being strong and healthy. Eggs of the humpback salmon were also fertilized with milt of the quinnat, giving as good results.

As the result of a number of experiments the conclusion was reached that an average of 825 eggs remain in a salmon after it has been stripped by the usual operation, and of these 48 per cent might be impregnated, or 400 eggs per fish; and, consequently, had all the eggs been removed through an incision made in the abdomen 859,000 more fry could have been hatched. The experiments seemed to demonstrate that where the eggs are removed through an incision and fertilized immediately before the blood is removed the loss would be about 3 per cent, whereas if the blood is quickly rinsed off before the milt is applied the loss is very heavy, sometimes averaging 99 per cent. Of the eggs remaining after the fish has been stripped by the usual method, only 48 per cent could be fertilized when they were removed through an incison.

On one salmon weighing about 40 pounds a lump as large as a man's head was observed immediately under the dorsal fin. The lump was found to consist partly of a gristly growth resembling a tumor and partly of a gelatinous substance, the former being of a light color and the latter of about the same shade as the fish. The eggs from this fish were good, and the lump had apparently not interfered at all with its locomotion. A male was also observed with all the characteristics of a female. Another fish with jaws crossed in such a way as to resemble a pair of shears was noted. The bones seemed not to have been broken.

During the early part of December the force at the station was occupied in building a boom around the premises, cutting down trees near the buildings and flume, and preparing for high water during the following summer. The boom as completed protects all the shore lines from drift. It was made from sticks of timber 40 to 60 feet in length and 12 to 20 inches in diameter. The amount of drift and lumber that settled on the station grounds the previous winter caused very serious inconvenience and necessitated an immense amount of work before the station could be opened.

During the fall the superintendent visited all the streams on both sides of the Columbia River, between Viento and Celilo Falls, Oregon, with the view to establishing auxiliary stations for taking and eying eggs. The only places that offer any possibilities are the falls at Celilo, where by running a fish-wheel during the closed season some ripe fish might be captured. On the Big White Salmon the prospects are better, except that logging operations would prevent the construction of a rack.

In December the station was closed and placed in charge of a watchman, and the superintendent was transferred east for duty in connection with the shad work.

Baker Lake Station, Washington (H. H. Buck, Superintendent).

In July Mr. J. N. Wisner was instructed to proceed to Baker Lake and receive the station from the Washington Fish Commission, from whom it had been purchased, and turn it over to Mr. W. W. Thayer, who had been appointed superintendent. Mr. Thayer, after visiting the station, resigned and was succeeded by Mr. H. H. Buck, but in the interim Mr. Wisner employed a force of men and commenced clearing the seining-grounds and getting the equipment in readiness for the salmon work. By August 1 the permanent personnel, consisting of a superintendent, fish-culturist, and two laborers, had been appointed, and a good working force of temporary assistants taken on.

All supplies for the use of the station were packed in during August and September, as it is very difficult, if not dangerous, to bring in material late in the fall.

Early in September arrangements were completed for fishing for blueback or sockeye salmon, which seek the lake in large numbers to spawn in still water along its rocky shores. Gill nets 300 feet long and 20 feet deep were employed for the work here, as it was impossible to use seines, as the shores of the lake are covered with heavy timber which must have been killed by a rise of water from 50 to 100 years ago. The task of removing this material would be exceedingly expensive, and as it seems to afford shelter for the young fish and serves as a breeding-place for their food, it is questionable whether it would be advisable to do so. The nets are handled from boats, two

men in a boat, the plan being to attach one end to the shore and pay it out quietly in the arc of a circle around a spawning-bed. The inclosed salmon are then driven into the net by movements of the boat and splashing of the oars. The spawners are put into pens provided near the spawning-shed, which stands upon a large float in front of the hatchery, and the same process is repeated upon another part of the shore. As night approaches the nets may often be left set for two hours or more. On the same day or the one following the fish are handled in the usual manner by the spawn-takers.

The season practically closed October 28, though a few eggs were taken as late as November 10, and resulted in the collection of 11,613,000 eggs from 3,218 females. No record was kept of the number of males, but it is believed that at least 5,000 were used.

The hatchery, which is a wooden structure, is fitted with 74 troughs, each 16 feet long and containing 7 baskets. The number of eggs placed to a basket varied from 30,000 to 40,000, and each trough was given a maximum flow of 12 gallons of water per minute. The period of incubation for the first eggs collected was seventy-two days, at a mean temperature of 45° F., corresponding closely to the rule of fifty days at 50°, and five days more or less for each degree of lower or higher temperature, as established by Seth Green. The hatchery is supplied with water from the creek, which drains the hills on the south side of the lake, its normal volume being about 200 miner's inches of water, equal to about 2,000 gallons per minute. It is unfortunately subject to sudden rises, and at such times is muddy, which will necessitate the erection of a settling tank at some time in the future, in order to guard against losses of eggs.

Of the eggs collected, 92 per cent hatched, and 10,683,000 fry were liberated in the lake and in Skagit River. No attempt was made to ship eggs from the station on account of its isolated position. Hamilton, the nearest railroad station, is 36 miles away, and 18 miles of this distance is over a mountain trail. It is hoped that during the next year a trail will be opened up on the south side to Baker, where the railroad is now extending its tracks.

A few silver salmon appeared in the lake after the bluebacks, but as the hatchery was crowded, no attempt was made to handle them.

An effort was made to collect steelheads when the first fish appeared at the foot of the lake on March 9, but between that time and May 8 only 81 were captured in the gill nets. These were placed in the floating-pens to ripen, but most of them died, the 14 surviving females yielding 52,000 eggs, which hatched in about seventy-five days, in a mean temperature of 40½°. The losses aggregated 50 per cent, and occurred largely in the early stages of development. The mortality was supposed to have been due to the parent fish failing to properly mature their eggs on account of confinement in the pens.

Details of distribution.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Shad:			
State Fish Commission Ponds, Deep River, Conn		4,080,000	
Stratford, Conn		2,040,000	
Brandywine Creek, Wilmington, Del		5,175,000	
Blackbird Creek, Middletown, Del		300,000	
Smyrna Creek, Clayton, Del		150,000	
Leipsic Creek, Cheswold, Del		150,000	
St. Johns Creek, Dover, Del		300,000	
Lebanon, Del		450,000	
Murderkill Creek, Felton, Del		600,000	
Frederica, Del		450,000	
Mispillion Creek, Milford, Del		600,000	
Indian River, Millsboro, Del		475,000	
Anacostia River, Bennings Bridge, D. C		1,000,000	
Twining City, D. C		1,095,000	
Potomac River, opposite fish lakes, D. C			2,000,000
St. Lucie River, Fort Pierce, Fla		160,000	
New River, Fort Lauderdale, Fla		140,000	
St. Marys River, Macclenny, Fla		200,000	
Suwanee River, Ellaville, Fla		340,000	
Ocklocknee River, Ocklocknee, Fla		340,000	
Aucilla River, Aucilla, Fla		340,000	
Chattahoochee River, Chattahoochee, Fla		376,000	
Tomoka River, Ormond, Fla		60,000	
Spruce Creek, New Smyrna, Fla		60,000	
Savannah River, Augusta, Ga		537,000	
Flint River, Albany, Ga		500,000	
Ocmulgee River, Macon, Ga		500,000	
Ogeechee River, Millen, Ga		500,000	
Potomac River, off Bryan Point, Md		9,672,000	
Piscataquis Creek, Md		1,897,000	
Accoceek Creek, Md		2,189,000	
Pomonkey Creek, Md		3,943,000	
Bar Landing, Md		1,670,000	
Broad Creek, Md		2,289,000	
Swan Creek, Md		1,237,000	
Point of Rocks, Md		750,000	
Chesapeake Bay, Battery Haul, Md		4,758,000	
Battery Flats, Md	9,222,000	9,106,000	
Eastern Flats, Md		6,638,000	
Battery Channel, Md	2,071,000	10,598,000	
Susquehanna Flats, Md		2,267,000	
Havre de Grace, Md		621,000	
Western Channel, Md		10,823,000	
Spesutia Narrows, Md		2,157,000	
Carpenter Point, Md		650,000	
Narrows, Md		455,000	
Battery Shoals, Md	6,418,000		
State Fish Commission, Baltimore, Md	4,000,000		
Susquehanna River, Port Deposit, Md		9,692,000	
Garrett Island, Md		1,000,000	
Cooley Point, Md		600,000	
Gunpowder River, Gunpowder station, Md		455,000	
Bush River, Bush River station, Md		1,460,000	
Mill Creek, Mill Creek, Md		1,500,000	
Swan Creek, Swan Creek, Md		2,400,000	
Elk River, Elkton, Md		450,000	
Wicomico River, Salisbury, Md		450,000	
Tuckahoe Creek, Queen Anne, Md		450,000	
Chester River, Chestertown, Md		450,000	
Northeast River, Northeast, Md		483,000	
Patuxent River, Laurel, Md		687,000	
Patapsco River, Relay station, Md		750,000	
Wankinco River, Wareham, Mass		300,000	
Furnace Pond, Hanover, Mass		200,000	
Delaware River, off Gloucester, N. J	895,000		
Howell Cove, N. J	4,954,000	12,832,000	
off Bennett's fishery, N. J	2,483,000	4,093,000	
Milford, N. J		8,220,000	
Lambertville, N. J		12,610,000	
Salem Creek, Salem, N. J		700,000	
Hudson River, Catskill, N. Y		4,100,000	
Albany, N. Y		4,120,000	
Glens Falls, N. Y		2,060,000	
Edenton Bay, Edenton, N. C		990,000	
Albemarle Sound, Edenton, N. C		4,142,000	
Chowan River, Colerain, N. C		967,000	
Mouth of Chowan River, Avoca, N. C		200,000	
Roanoke River, Plymouth, N. C		146,000	
Susquehanna River, Peach Bottom, Pa		525,000	
Fites Eddy, Pa		1,050,000	
Columbia, Pa		450,000	

Details of distribution—Continued.

Species and disposition	Eggs.	Fry and fingerlings.	Adults and yearlings.
Shad—Continued.			
Delaware River, Lackawaxen, Pa		450,000	
Delaware Watergap, Pa		450,000	
State Fish Commission, Bristol, Pa	6,006,000		
Palmer and Rulin River, Providence, R. I		500,000	
Point Judith Pond, Wickford, R. I		500,000	
Pedee River, Pedee, S. C		412,000	
Santee River, St. Stephens, S. C		400,000	
Cooper River, Monks Corner, S. C		400,000	
Combahee River, Yemassee, S. C		400,000	
Edisto River, Ponpon, S. C		400,000	
Potomac River, off Craney Island Swash, Va		4,587,000	
Occoquan Bay, Va		3,799,000	
Mount Vernon, Va		2,199,000	
Dogue Creek, Va		5,485,000	
Hunting Creek, Va		2,885,000	
Pohick Creek, Va		7,805,000	
Nansemond River, Suffolk, Va		485,000	
Moreton Frewen, Queenstown, Ireland	700,000		
Total	36,749,000	202,307,000	2,000,000
Quinnat salmon:			
State Fish Commission, Sisson, Cal	1,905,000		
Eel River, Cal	1,000,000		
McCloud River, Baird, Cal		3,533,950	
Shoal Creek, Neosho, Mo			200
Gasconade River, Arlington, Mo			300
Meramec River, Cuba, Mo			300
Hickory Creek, McMahon Spring, Mo			350
W. H. Phelps, Carthage, Mo			200
Clackamas River, Clackamas, Oreg		4,399,422	
Rogue River, Trail, Oreg		2,156,945	
Little White Salmon River, Chenowith, Wash		4,791,323	
Skamania County, Wash		839,624	
Dog Creek, Chenowith, Wash		112,000	
Columbia River, Skamania County, Wash		784,000	
Hatchery Creek, Skamania County, Wash		100,000	
Government of New Zealand, Wellington, New Zealand	250,000		
J. Williamson, Paris, France	20,000		
Total	3,175,000	16,687,264	1,350
Atlantic salmon:			
Sebec River, Milo, Me			33,000
Pleasant River, Brownville, Me			154,692
East Branch Penobscot River, Grindstone, Me		320,000	197,614
East Branch Mattawamkeag River, Oakfield, Me		330,000	90,286
West Branch Mattawamkeag River, Island Falls, Me			45,595
Alamoosook Lake, Orland, Me			20,671
Toddy Pond, East Orland, Me		19,639	
Orland and Surry, Me		78,434	
Penobscot River and tributaries, Brownville, Me		160,000	
State Fish Commission, Laconia, N. H	200,000		
Adirondack League Club, Fulton Chain, N. Y	100,000		
State Fish Commission, Allentown, Pa	250,000		
Total	550,000	908,073	541,858
Landlocked salmon:			
Herbert W. Burdette, Creede, Colo	5,000		
State Fish Commission, Windsor Locks, Conn			3,000
Reservoir, Seymour, Conn			2,000
Zoological Park, D. C		3,850	
Embden Lake, North Anson, Me			2,000
Newfound Meadow Brook, Oakland, Me			1,000
Canaan Lake, Camden, Me			3,000
Wilson Lake, Wilton, Me			3,000
Phillips Lake, Lakehouse, Me			3,000
St. George Lake, Thorndike, Me			2,500
Sysladobsis Lake, Grand Lake Stream, Me			8,000
Grand Lake, Grand Lake Stream, Me			36,000
Grand Lake Stream, Grand Lake Stream, Me			67,787
Weld Pond, Wilton, Me			2,000
City Water Company's reservoir, Belfast, Me			2,000
Moosehead Lake, Greenville, Me			6,000
Morrison Ponds, Amherst, Me			2,000
Long Pond, Mount Desert, Me			2,000
Hayden Lake, Skowhegan, Me			2,000
Meddybemps Lake, Eastport Junction, Me			3,000
Howard Lake, Calais, Me			3,000
Myrick Lake, Hancock, Me			2,000
Round Pond, Shirley, Me			3,000
Molasses Pond, Franklin, Me			2,000

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Landlocked salmon—Continued.			
Donnell Pond, Franklin, Me			2,000
Moulton Pond, Moulton Lake, Me			2,000
Woods Pond, Ellsworth, Me			2,000
Duck and Junior lakes, Duck Lake, Me			3,000
Lake Maranocook, Augusta, Me			3,000
Lake Cobbosseecontee, Augusta, Me			3,000
Spring Lake, Carrebassett, Me			2,000
Varnum Pond, Farmington, Me			4,000
Clearwater Pond, Farmington, Me			2,000
Webb Pond, Ellsworth Falls, Me			4,000
Lake Anasagunticook, Canton, Me			2,000
Green Lake, Otis, Me			152,774
Dedham, Me			3,000
Squaw Pond, Presque Isle, Me			3,000
Toddy Pond, Orland, Me			20,154
Surry, Me		7,000	32,025
Branch Pond, Dedham, Me			25,000
Patten Pond, Ellsworth, Me			12,500
Orland, Me			6,112
Blunt Pond, Ellsworth, Me			1,500
Silver Lake, Great Pond, Me			4,000
Crystal Lake, Waldoboro, Me			500
Lake Moosetocmaguntic, Bemis, Me			2,000
Lunksoo Pond, Grindstone, Me			1,200
Heart Pond, East Orland, Me		1,000	
Craig Pond, East Orland, Me		2,000	
State Fish Commission, Enfield, Me	30,000		
Chain Ponds, Farmington, Me			2,000
Seven Ponds, Whittins Station, Mass			2,000
Lake Quinsigamond, Worcester, Mass			2,000
North Watuppa Lake, Watuppa, Mass			2,000
Long Pond and Lake, Falmouth, Mass			2,000
Lake Pearl, Wrentham, Mass			1,000
State Fish Commission, Wilkinsonville, Mass	20,000		
William H. Drew, Plymouth, Mass	5,000		
G. H. Richards, Wenaumet, Mass	5,000		
State Fish Commission, Paris, Mich	5,000		
Crystal Lake, Enfield, N. H			200
Mascoma Lake, Enfield, N. H			2,000
Penacook Lake, Concord, N. H			4,000
Lake Massabesic, Manchester, N. H			2,000
Dan Hole Pond, Center Ossipee, N. H			1,900
Bradley Pond, Andover, N. H			2,000
Lake Winnepesaukee, Laconia, N. H			2,000
Applicant at Drewsville, N. H			500
State Fish Commission, Colebrook, N. H	10,000		
Adirondack League Club, Fulton Chain, N. Y	10,000		
Tuxedo Club, Tuxedo Park, N. Y	10,000		
Lake George, Caldwell, N. Y			6,000
Lake Champlain, Fort Henry, N. Y			5,000
Paradox Lake, Ticonderoga, N. Y			500
State Fish Commission, Carolina, R. I	10,000		
State Fish Commission, Murray, Utah	10,000		
Derby Pond, Newport, Vt			1,100
Lake St. Catharine, Poultney, Vt			1,000
Caspian Lake, Greensboro, Vt			3,698
Willoughby Lake, Westmore, Vt			5,995
Long Pond, Westmore, Vt			2,992
Little Averill Pond, Averill, Vt			2,990
Lake Dunmore, Salisbury, Vt			1,560
State Fish Commission, St. Johnsbury, Vt	20,000		
Total	140,000	13,850	508,487
Silver salmon:			
Clackamas River and Clear Creek, Clackamas, Oreg		146,824	
Sockeye or blueback salmon:			
Baker Lake and stream, Baker Lake, Washington		10,683,000	
Steelhead trout:			
Cobbosseecontee Lake, Winthrop, Me		2,800	
Billings Pond, Bluehill, Me		3,000	
Canaan Lake, Rockland, Me		2,500	
Rocky Pond, Otis, Me			3,853
Alamoosook Lake, Orland, Me			226
Washington Harbor, Washington Harbor, Mich		5,000	
Grace Harbor, Washington Harbor, Mich		10,000	
Baldwin Creek, Baldwin, Mich			4,835
Pickwick Lake, Pickwick, Minn		13,500	
French River, Duluth, Minn		15,000	
Sucker River, Two Harbors, Minn		5,000	
Baptism River, Beaver Bay, Minn		20,000	

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Steelhead trout—Continued.			
Poplar River, Lutsen, Minn		20,000	
Eagle Lake, St. Louis County, Minn		5,000	
Sucker River, Duluth, Minn		15,000	
Lester River, Duluth, Minn		5,000	
State Fish Commission, St. Paul, Minn		20,000	
Clear Creek and Clackamas River, Clackamas, Oreg		99,000	
State Fish Commission, Murray, Utah	10,000		
Willoughby Lake, Westmore, Vt		10,650	2,200
Baker Lake, Baker Lake, Wash		26,000	
A. J. McNab, Lake Nebagemain, Wis	50,000		
Trout Brook Company, Hudson, Wis	25,000		
Brule River, Winneboujou, Wis		15,000	
State Fish Commission, Laramie, Wyo	25,000		
Bear Tooth Lake, Bighorn County, Wyo			5,000
Brooks and lakes, Bighorn County, Wyo			5,000
Total	110,000	301,450	20,414
Loch Leven trout:			
Hartman Pond, South Bend, Ind		5,000	
Maquoketa River, Forestville, Iowa			1,700
Applicant at Plymouth, Mich		3,000	
State Fish Commission, Laconia, N. H	20,000		
Total	20,000	8,000	1,700
Rainbow trout:			
Spring Lake, Scale, Ala			500
Spring Lake, Springville, Ala			200
Applicants in Alabama			500
Livecak Creek, Flagstaff, Ariz			2,400
Spring Creek, Denieville, Ark			3,800
Custer Creek, Batesville, Ark			1,000
Illinois River, Siloam Springs, Ark			1,300
Buffalo Creek, Cove, Ark			1,100
Spring River, Mammoth Springs, Ark			1,250
Applicants in Arkansas			1,000
Tumbling Rock Creek, Woodland Park, Colo			500
Rox Park Lake, Leadville, Colo			500
North Fork South Platte River, South Platte, Colo			500
Columbine Lake, Rockwood, Colo			650
St. Vrain River, Lyons, Colo			500
Dick Lake, Telluride, Colo			250
Frees Lake, Cimarron, Colo			200
Trout Creek, Como, Colo			500
Lake Lenore, Ouray, Colo			600
Dallas River, Ridgway, Colo			300
Frying Pan River, Thomasville, Colo			500
Ruedi, Colo			1,000
Norrie, Colo			500
Eagle Lake, Thomasville, Colo			300
Lake No. 3, Cimarron, Colo			300
Lake Alicia, Thomasville, Colo			300
Fairview Lake, Thomasville, Colo			300
Spring Creek, Thomasville, Colo			300
Keno Lake, Aspen, Colo			400
Applicants in Colorado			100
State Fish Commission, Hartford, Conn	30,000		
State Fish Commission, Wilmington, Del			1,600
Zoological Park, D. C			330
Chattahoochee River, Clarksville, Ga			800
Ward and Norton creeks, Jasper, Ga			500
Applicants in Georgia			1,000
Spirit Lake, Rathdrum, Idaho			3,000
Applicants in Idaho			3,000
Thomas Turton, Kilgore, Idaho	10,000		
Black River, Sallisaw, Ind. T			1,300
Mill Creek, Bellevue, Iowa			500
Bear Creek, Edgewood, Iowa			400
Spring Branch, Manchester, Iowa			900
Applicants in Kansas			500
Onawa Lake, Greenville, Me		1,000	
Canaan Lake, Rockland, Me		800	
Long Pond, Somesville, Me		1,000	
Alamoosook Lake, Orland, Me			9
Black Run, Deer Park, Md			500
Mountain Stream, Swanton, Md			550
Spring Branch, Texas, Md			208
Lake and stream, Glyndon, Md			200
Applicants in Maryland			919
State Fish Commission, Worcester, Mass	15,000		
Stony Creek, Shelby, Mich			101
Turk Lake, Greenville, Mich			193

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Rainbow trout—Continued.			
Pine River, West Harrisonville, Mich		1,000	
Paint Creek, Ypsilanti, Mich		1,000	
Spring Brook trout hatchery, Kalamazoo, Mich	25,000		
Cowskin River, Lanagan, Mo			1,300
Railroad Pond, Cedargap, Mo			1,250
Railroad Pond, Mountain Grove, Mo			1,250
Piney Creek, Cabool, Mo			1,250
Bennett Mill Spring, Lebanon, Mo			1,700
Baker Lake, Franks, Mo			1,100
Gasconade River, Arlington, Mo			2,300
Meramec River, Cuba, Mo			600
McMahon Spring, Neosho, Mo			500
Hickory Creek, Neosho, Mo			139
Applicants in Missouri			3,200
Elk Springs, Monida, Mont			5,000
Applicant at Red Rock, Mont			2,000
J. F. Comee, Missoula, Mont	10,000		
State Fish Commission, South Bend, Nebr			8,800
State Fish Commission, Laconia, N. H	20,000		
Applicant at Drewsville, N. H			1,550
Musconetcong River, Junction, N. J			1,000
Reeves Pond, Glassboro, N. J			1,000
Randall Pond, Glassboro, N. J			1,000
Pequest Creek, Belvidere, N. J			1,000
Cooper Creek, Haddonfield, N. J			1,000
Applicants in New Jersey			800
Vermejo Creek, Catskill, N. Mex			350
Vermejo Creek, Maxwell City, N. Mex			350
Bayado Creek, Springer, N. Mex			350
Trout Springs, Las Vegas, N. Mex			350
Rio Bonito Creek, Peters, N. Mex			500
Chicorica Creek, Raton, N. Mex			350
Reservoir, Raton, N. Mex			350
Penasco Creek, Toboggan, N. Mex			300
Fresnal Creek, Fresnal, N. Mex			200
Mal Pais Spring, Three Rivers, N. Mex			700
Mescalero Creek, Tularosa, N. Mex			300
Eagle Creek, Gilmore, N. Mex			500
Ruidosa Creek, Ruidosa, N. Mex			500
Spring Lake, Herkimer, N. Y			400
Gip Creek, Andrews, N. C			1,000
Green River, Hendersonville, N. C			1,000
Yadkin River, Lenore, N. C			1,000
South Fork New River, Lenore, N. C			500
Grassy Creek, Marion, N. C			500
Mountain stream, Marion, N. C			1,000
Sam Creek, Marion, N. C			500
Crabtree Creek, Marion, N. C			500
Buck Creek, Marion, N. C			500
Clear Creek, Marion, N. C			500
Beaver Creek, Marion, N. C			1,000
Toe Creek, Marion, N. C			1,000
Pine Branch, Marion, N. C			500
Canoe Branch, Marion, N. C			500
Little Bear Creek, Marion, N. C			500
Rose Creek, Marion, N. C			500
Gorge Creek, Marion, N. C			500
North Fork Creek, Marion, N. C			1,000
Elk River, Elk Park, N. C			1,000
Baker Creek, Fayetteville, N. C			500
French Broad River, Biltmore, N. C			500
Blevin Creek, Cranberry, N. C			1,000
C. A. Schenck, Biltmore, N. C	10,000		
Applicants in North Carolina			2,250
Applicant at Oxford, Ohio		1,000	
Spring Creek, Bridgeport, Okla			1,000
Rock Creek, Shattuc, Okla			350
Silver Lake, Morvin, Okla			500
Applicants in Oklahoma			600
McKay and Pearson Creek, Pendleton, Oreg		22,303	
Stream and pond, Wilkesbarre, Pa			200
Rogue Harbor Creek, Westover, Pa			450
Buckmountain Dam, Ashland, Pa			300
West Fall Creek, Ashland, Pa			300
Bentley Creek Pond, Tioga, Pa			600
Mill Creek, Tioga, Pa			300
Laurel Creek, Redding, Pa			300
Blair River, Altoona, Pa			300
Three-Spring Run, Altoona, Pa			300
Piney Creek, Altoona, Pa			300
Clover Creek, Altoona, Pa			300
Spruce Creek, Altoona, Pa			300
Bell Run, Altoona, Pa			300

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Rainbow trout—Continued.			
Genesee Fork of Pine Creek, Ulysses, Pa			1,000
Dyberry Creek, Honesdale, Pa			600
Butternut Creek, Honesdale, Pa			600
Boyd Brook, Honesdale, Pa			300
Lackawaxen River, Honesdale, Pa			300
East Branch, Honesdale, Pa			300
Barney Creek, Smethport, Pa			200
Robbins Brook, Smethport, Pa			200
Gallup Brook, Smethport, Pa			200
Daly Brook, Smethport, Pa			200
Beaver Run, Smethport, Pa			200
Blacksmith Brook, Smethport, Pa			200
Boyer Brook, Smethport, Pa			200
Lock Run, Ralston, Pa			200
Frozen Run, Ralston, Pa			400
Lycoming Creek, Ralston, Pa			200
Mehoopany Creek, Mehoopany, Pa			300
West Branch Potato Creek, Colegrove, Pa			200
Black Lick Creek, Ebensburg, Pa			450
Zeller Run, Mifflinburg, Pa			450
Raritan Run, Mifflinburg, Pa			450
Spruce Run, Lewisburg, Pa			600
Spruce Creek, Tyrone, Pa			600
Big Fill Run, Tyrone, Pa			300
McAteer Run, Tyrone, Pa			300
Brandywine Creek, Avondale, Pa			600
Spring Brook, Moosic, Pa			300
Trout and Monument creeks, Moosic, Pa			400
Lick Run, Roaring Branch, Pa			300
Roaring Branch, Roaring Branch, Pa			300
Salt Springs Run, Roaring Branch, Pa			200
Mill Creek, Roaring Branch, Pa			1,000
Sugarworks Run, Roaring Branch, Pa			200
Lycoming Creek, Roaring Branch, Pa			400
Falling Springs, Chambersburg, Pa			2,000
Park Creek, Penllyn, Pa			200
Spring Creek, Penllyn, Pa			200
Dodge Brook, Harrison Valley, Pa			400
Marsh Creek, Harrison Valley, Pa			200
Spring Run, Reynoldsville, Pa			200
Lamott Branch, New Freedom, Pa			600
Spring Lake, Frazer, Pa			300
Sulphur Spring Run, Irvine, Pa			300
Quakaka Creek and Pond, Shenandoah, Pa			300
Mill Creek, Coudersport, Pa			400
Allegheny River, Coudersport, Pa			1,400
Gardiner Spring Brook, Coudersport, Pa			700
Mill Creek, Birdsboro, Pa			900
Birdsboro Reservoir, Birdsboro, Pa			700
Sixpenny Creek, Birdsboro, Pa			600
Pine Creek, Birdsboro, Pa			300
Hay Creek, Birdsboro, Pa			300
French Creek, Birdsboro, Pa			300
Powdermill Creek, Birdsboro, Pa			500
Millbach Creek, Sheridan, Pa			300
Antietam Creek, Waynesboro, Pa			200
Stone Creek, Huntingdon, Pa			400
Detwiler Run, Huntingdon, Pa			200
Spruce Creek, Huntingdon, Pa			200
Lake of Herod's Queen, Huntingdon, Pa			200
Middle Fork of Bell Run, Potter County, Pa			1,000
Cedar Run, Lockhaven, Pa			600
McElhattan Run, Lockhaven, Pa			1,200
Fishing Creek, Lockhaven, Pa			400
Cherry Run, Lockhaven, Pa			200
Rattlesnake Run, Lockhaven, Pa			200
Lick Run, Lockhaven, Pa			200
Spring Run, Lockhaven, Pa			400
Hyner Creek, Lockhaven, Pa			200
Spring Meadow Brook, Bedford, Pa			300
Rock Run, Westover, Pa			300
Tucquan Creek, Rawlinsville, Pa			300
Hoover Run, Cresson, Pa			300
Wallace Run, Bellefonte, Pa			400
Spring Creek, Bellefonte, Pa			1,400
Buffalo Creek, Bellefonte, Pa			200
Logan Branch, Bellefonte, Pa			400
Rock Run, Bellefonte, Pa			200
Bens Creek, Johnstown, Pa			300
Mountain Stream, Johnstown, Pa			300
Solomon and Adams creeks, Johnstown, Pa			300
Mosquito Creek, Williamsport, Pa			600
Wolf Run, Williamsport, Pa			200

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Rainbow trout—Continued.			
Mill Creek, Scranton, Pa			200
Pennypack Creek, Willowgrove, Pa			200
Spruce Creek, Pottsville, Pa			300
Bear Run, Bear Run, Pa			1,000
Swamp Run, Bear Run, Pa			500
Silver Spring Run, Bear Run, Pa			500
Beech Creek, Snowshoe, Pa			300
Miller Creek, Hamburg, Pa			300
Beaver Dam Run, Hooversville, Pa			300
Rattlesnake Run, Wetham, Pa			300
Starancea Creek, Lanesboro, Pa			200
Roaring Run, Wilkesbarre, Pa			300
Black Creek, Tremont, Pa			500
Trout Run, Morristown, Pa			500
McGinnis Run, Ligonier, Pa			300
North Branch Wopwallopen Creek, Wopwallopen, Pa			200
Spring Brook, Potterbrook, Pa			300
Applicant at Kasiesville, Pa		6,000	
Applicants in Pennsylvania			3,000
Conneross Creek, Walhalla, S. C			400
Drake Springs, Sioux Falls, S. Dak			1,000
Cedar Creek Pond, Morristown, Tenn			200
Stone River, Murfreesboro, Tenn			300
Spring Lake, Murfreesboro, Tenn			300
Collins Spring Branch, Belmont, Tenn			450
Camp Creek, Greenville, Tenn			400
Richland Creek, Greenville, Tenn			400
Spring Lake, Corryton, Tenn			500
Indian Creek, Agee, Tenn			500
Caney Creek, Rogersville, Tenn			500
Dry Creek, Garbers, Tenn			500
Doe River, Hampton, Tenn			500
Roan Mountain, Tenn			500
Laurel Fork, Hampton, Tenn			500
Elizabethton, Tenn			1,000
Bee and Glade Creeks, Seals, Tenn			450
Nolachucky River, Chestoa, Tenn			1,000
Little River, Maryville, Tenn			450
South Indian Creek, Unicoi County, Tenn			2,000
Rock Creek, Unicoi County, Tenn			1,000
Indian Creek, Unicoi County, Tenn			2,000
Granny Lewis Creek, Unicoi County, Tenn			400
Dick Creek, Unicoi County, Tenn			1,000
Hollow Poplar Creek, Hollow Poplar, Tenn			600
Silver Lake, Johnson County, Tenn			500
Dry Creek, Drycreek, Tenn			500
Big Creek, Jacksboro, Tenn			580
Applicants in Tennessee			470
Colony Fork Lake, Ranger, Tex			500
Beaver Pond, Proctor, Vt			1,500
South Fork Appomattox River, Appomattox, Va			500
Tom Creek, Coeburn, Va			500
Pond and creek, Tazewell, Va			500
Millpond in Falling River, Brookneal, Va			500
Hale Spring and brook, Gate City, Va			500
Millpond, Ocoonita, Va			200
Little River, East Lexington, Va			500
Dry River, Harrisonburg, Va			2,500
Dry Run, Wytheville, Va			500
Tate Run, Wytheville, Va			1,044
Dan River, Stuart, Va			910
Millpond, Glade Spring, Va			300
Big Stoney Creek, Pearisburg, Va			500
Abraham Creek, Winchester, Va			500
Reservoir, Crozet, Va			200
Water Company's reservoir, Roanoke, Va			500
Cowardin Run, Hot Springs, Va			500
Healing Springs Creek, Hot Springs, Va			1,000
Reservoir, Lynchburg, Va			500
Spring Brook, Winchester, Va			500
Van Clure Spring, Winchester, Va			200
Mountain Lake, Mountain Lake, Va			1,000
Walker Little Creek, Pulaski City, Va			1,500
Big Stoney Creek, Pembroke, Va			1,000
Tye River, Vesuvius, Va			500
Mill Creek, Millboro, Va			1,500
Applicant at Round Hill, Va			22
Applicants in Virginia			3,500
Snowy Creek, Terra Alta, W. Va			300
Indian Run, Berkeley Springs, W. Va			500
Meadow Brook, Berkeley Springs, W. Va			500
White Oak Spring Run, Terra Alta, W. Va			500
Ice Pond, Bens Run, W. Va			250

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Rainbow trout—Continued.			
Tug River, Naugatuck, W. Va			998
Tuscarora Creek, Martinsburg, W. Va			500
Spring Lake, Martinsburg, W. Va			1,000
Southwood Spring, Martinsburg, W. Va			500
Glade Creek, Glade, W. Va			475
Laurel Creek, Alderson, W. Va			325
Tygart Valley River, Elkins, W. Va			500
Blackwater River, Davis, W. Va			1,000
Rocky Marsh Run, Shepherdstown, W. Va			500
Black Run, Huttonsville, W. Va			1,000
Cheat Mountain hatchery ponds, Huttonsville, W. Va			500
Browning Dam, Preston County, W. Va			1,000
Indian Creek, Fort Spring, W. Va			800
Trout Run, Romney, W. Va			500
Little Kanawha River, Burnsville, W. Va			500
Elk River, Sutton, W. Va			500
Tributaries of Spruce Run, Harman, W. Va			500
Applicants in West Virginia			1,300
F. A. Degler, Cheat Bridge, W. Va	25,000		
State Fish Commission, Sheridan, Wyo	20,000		
Laramie, Wyo	25,000		
H. M. Phipps, Inverness, Scotland	10,000		
Walter Bailey, Malvern Wells, England	20,000		
John Dinsmore, Ballymena, Ireland	20,000		
Moreton Frewen, Innishannon, Ireland	15,000		
Total	255,000	34,103	203,572
Black-spotted trout:			
Ross Pond, Granite, Colo			10,000
Castlewood Lake, Castlerock, Colo			20,000
Brush Creek, Eagle, Colo			20,000
Spring Lake, Twinlakes, Colo			10,000
South Platte River, Alma, Colo			20,000
South Platte River and tributaries between Grant and Buffalo, Colo.			40,000
Grand Lake, Grandlake, Colo			20,000
State Fish Commission, Denver, Colo			75,000
Prospect Lake, Telluride, Colo			20,000
Mammoth Creek, Mammoth Lake, South Boulder Creek, Jenny Lind Creek, Central City, Colo.			20,000
North and south branches of St. Vrain River, Lyons, Colo			20,000
Los Pinos River, Cumbres, Colo			25,000
South Bear and Marshall creeks, Iola, Colo			25,000
Gypsum Creek, Gypsum, Colo			15,000
Texas Creek, Cotopaxi, Colo			15,000
Frying Pan River, Thomasville, Colo			50,000
Surface Creek, Delta, Colo			20,000
Eagle River, Wolcott, Colo			20,000
R. A. Osborn, Rea, Idaho	10,000		
Twin Lakes, Rathdrum, Idaho			5,000
Spirit Lake, Rathdrum, Idaho			5,000
Anderson millpond, Vollmer, Idaho			5,000
Henry Lake, Fremont County, Idaho		10,000	
Lake Palmer, near Butte, Mont			5,000
Little Blacktail Lake, near Butte, Mont			5,000
Spring Brook, Redrock, Mont			5,000
Bozeman Fork Creek, Leadboro, Mont			10,000
Spring Creek millpond, Lewis, Mont			10,000
Sixteen-mile Creek, between Lombard and Dorsey, Mont			10,000
Little Boulder Creek, Boulder, Mont			10,000
Cottonwood Creek, Bozeman, Mont			10,000
Tributaries of Big Hole River, Browns Station, Mont			10,000
Wisconsin Lake, Twin Bridges, Mont			10,000
Vincent Lake, Anaconda, Mont			10,000
Rock Creek, Browns Station, Mont			10,000
Reservoir, Lewiston, Mont			10,000
Basin Lake Reservoir, Portage, Mont			5,000
Gold Creek, Pioneer, Mont			5,000
Marias Run, Shelby, Mont			20,000
Spring Creek, Salesville, Mont			10,000
Cliff Lake, Monida, Mont		20,000	
Waterdog Lake, Sweetgrass, Mont			10,000
Mill Creek, Salem, Oreg			10,000
South Fork Spearfish Creek, Elmore, S. Dak			2,000
Beaver Creek, Buffalo Gap, S. Dak			2,000
Silver Creek, Sturgis, S. Dak			4,000
Rosebud and Rock creeks, Rosebud Agency, S. Dak			2,000
Applicants in South Dakota			5,000
Camil Lake, Blossburg, Wash			3,000
Lake Creek, Harrington, Wash			4,000

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Black-spotted trout—Continued.			
Little Spokane River, Spokane, Wash			10,000
Plugh Creek, Spokane, Wash			5,000
Natches River, North Yakima, Wash			5,000
Yakima River, Cle Elum, Wash			5,000
Touchet River, Dayton, Wash			5,000
Sequllitchew, Tacoma, Wash			10,000
American Lake, Tacoma, Wash			10,000
Gravelly Lake, Tacoma, Wash			10,000
State Fish Commission, Laramie, Wyo	75,000		
Bear Tooth Lake, Bighorn County, Wyo			10,000
Sunlight Creek, Bighorn County, Wyo			10,000
Total	85,000	120,000	737,000
Brook trout:			
Robert Mathis, Cajon, Cal	10,000		
South Platte River, Florissant, Colo		3,000	10,000
Hartsell, Colo		10,000	
Lake Lenore, Ouray, Colo		5,000	
Mahon Brook, Buenavista, Colo		5,000	
Frying Pan River, Basalt, Colo		10,000	
Norrie, Colo		5,000	
Thomasville, Colo		5,000	
Ruedi, Colo		10,000	
Spring Creek, Montrose, Colo		13,000	
Reservoir, Eastonville, Colo		3,000	
Lake Alicia, Thomasville, Colo		3,000	
Dallas River, Ridgway, Colo		5,000	
Lake Isherwood, Salida, Colo		1,000	
South Arkansas River, Salida, Colo		11,000	
Lake No. 3, Cimarron, Colo		3,000	
Big Cimarron River, Cimarron, Colo		5,000	
Little Cimarron River, Cimarron, Colo		5,000	
Spring Lake, Cimarron, Colo		2,000	
Eagle River, Berrys Station, Colo		10,000	
Wolcott, Colo		15,000	20,000
Chaqauqua Lake, Telluride Colo		5,000	
Lake San Cristobal, Lake City, Colo		10,000	
Lake Fork Gunnison River, Lake City, Colo		10,000	
Bear Creek, Morrison, Colo		3,000	
North Fork Big Thompson River, Loveland, Colo		10,000	
Summit Lake, Sawpit, Colo		5,000	
Tennessee Creek, Leadville, Colo		20,000	
Goose Creek, Wagonwheel Gap, Colo		20,000	
Mount Sopris Lake, Carbondale, Colo		10,000	
Applicants in Colorado		14,000	
State Fish Commission, Hartford, Conn	20,000		
Kettle Brook, Hartford, Conn		14,985	
Norwalk River, South Wilton, Conn		10,000	
Shotgun Creek, Spencer, Idaho			4,000
Blue Lake, Bluelake, Idaho			3,000
Fish Lake, Rathdrum, Idaho			4,000
Thorp Lake, Rathdrum, Idaho			2,000
Elk Creek, Kendrick, Idaho			3,000
R. A. Osborn, Rea, Idaho	15,000		
Galeon River, Hatch Mills, Ind		10,000	
St. Jo Pond and Creek, South Bend, Ind		10,000	
Graveyard Run, Mongo, Ind		5,000	
Spring Lake, Niles, Ind		1,000	
Applicants in Indiana		2,000	
Canoe and Bear creeks, Decorah, Iowa			2,000
Mill Creek, Bellevue, Iowa			2,000
Snymagill Creek, McGregor, Iowa			2,000
Village Creek, Lansing, Iowa			5,000
Clear Creek, Lansing, Iowa			5,000
Bacon Creek, Lansing, Iowa			5,000
Bear Creek, Edgewood, Iowa			2,000
Maquoketa River, Forestville, Iowa			5,250
Manchester, Iowa			5,000
Spring Branch, Manchester, Iowa		25,000	5,800
Applicants in Iowa			1,300
Lake Walking, Millidale, Ky			450
Lake Isham, View, Ky			450
Applicant at Nolin, Ky			180
Canaan Lake, Camden, Me		10,000	
Norton Lake, Camden, Me		10,000	
Otter Pond, Bingham, Me		10,000	
Jewett Pond, Bingham, Me		5,000	
Reno Pond, Bingham, Me		5,000	
Clear Pond, Bingham, Me		5,000	
Rowe Pond, Bingham, Me		5,000	

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Brook trout—Continued.			
Pierce Pond, Bingham, Me		20,000	
Great and Long ponds, Belgrade, Me		10,000	
Webb Pond, Ellsworth, Me		10,000	
Patten Pond, Ellsworth, Me		25,000	
Lake Anasagunticook, Canton, Me		10,000	
Wapskalugan and Moosehorn brooks, Charlotte, Me		5,000	
Varnum Pond, Farmington, Me		5,000	
Clearwater and Worth ponds, Farmington, Me		10,000	
St. George Lake, Thorndike, Me		10,000	
Pennamaquan Creek, Calais, Me		5,000	
Meadow Brook, Calais, Me		5,000	
Wilson Lake, Wilton, Me		10,000	
Parmachene Lake, Bethel, Me		20,000	
Craig Pond, Orland, Me			5,210
Craig Brook, East Orland, Me		4,578	
Water company's reservoir, Belfast, Me		5,000	
Moosehead Lake, Greenville, Me		25,000	
Jordan Pond, Bar Harbor, Me		10,000	
Eagle Lake, Bar Harbor, Me		10,000	
Lake Thompson, Oxford, Me		10,000	
Branch Pond, Dedham, Me		35,000	
Holland Pond, Alton, Me		15,000	
Green Lake, Otis, Me		8,644	
Israel Creek, Walkersville, Md			775
Lake and stream, Oakland, Md			1,000
Pond and spring, Brownsville, Md			400
Turkey Run, Emmitsburg, Md			775
Mountain stream, Swanton, Md			1,000
Henson Branch, Silverhill, Md			365
Spring Branch, Texas, Md			32
Applicants in Maryland			400
Fuller Brook, North Attleboro, Mass		10,000	
North Branch Creek, Springfield, Mass		10,000	
Mistu Pond, Cottage City, Mass		10,000	
Pond and stream, Cottage City, Mass		5,000	
Lake Quinsigamond, Worcester, Mass		10,000	
State Fish Commission, Worcester, Mass	20,000		
State Fish Commission, Wilkinsonville, Mass	25,000		
Samoset Ponds, Fall River, Mass		5,000	
Mill Brook, Medfield, Mass		10,000	
Cold Spring Brook, Lawrence, Mass		5,000	
Applicant at Cambridge, Mass			100
Spring Brook, Milford, Mich		5,000	
Cedar Creek, Pentwater, Mich		5,000	
Boardman River, Traverse City, Mich		2,500	
Silver and Gold creeks, East Tawas, Mich		20,000	
Witch Lake, Marquette County, Mich		5,000	
Red Run, Dorr, Mich		5,000	
Burch Creek, Greenville, Mich		9,000	
Silver Creek, West Harrisonville, Mich		5,000	
Hubbard Lake, West Harrisonville, Mich		5,000	
Vaughn Creek, Emery Junction, Mich		10,000	
Cedar Creek, West Greenbush, Mich		5,000	
Norton Creek, Wixom, Mich		5,000	
Halfway Creek, New Richmond, Mich		10,000	
Branch of Paint Creek, Oxford, Mich		5,000	
Spring Brook, Eau Claire, Mich		5,000	
McEwan Creek, Clare, Mich		5,000	
Silver Creek, Clare, Mich		5,000	
McKinley Creek, Clare, Mich		5,000	
Chippewa lakes and streams, Lake Station, Mich		10,000	
Grand River, Hanover, Mich		10,000	
Nottawasippi Creek, Union City, Mich		5,000	
Coldwater Creek, Freeport, Mich		5,000	
Boardman River, South Boardman, Mich		10,000	
Kalkaska, Mich		10,000	
Boyne River, Elmira, Mich		10,000	
Little Manistee River, Canfields, Mich		22,500	
Washington River, Washington Harbor, Mich		7,000	
Sturgeon River, Trowbridge, Mich			154
Cook Valley Creek, Kellogg, Minn			3,000
Trout Brooks, Northfield, Minn			11,000
Beaver River, Beaverbay, Minn		10,000	
Baptism River, Beaverbay, Minn		7,000	
Shingobe Creek, Walker, Minn		5,000	
Stuart River, Waldo, Minn		10,000	
Poplar River, Lutsen, Minn		5,000	
French River, Duluth, Minn		8,000	
Sucker River, Duluth, Minn		8,000	
Tischer Creek, Duluth, Minn		6,000	
Bear Gulch Creek, Bozeman, Mont			3,000
Beaver Creek, Fort Assiniboine, Mont			3,000

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Brook trout—Continued.			
J. F. Comee, Missoula, Mont.	20,000		
Walnut Creek, Nebraska City, Nebr.			4,000
State Fish Commission, Laconia, N. H.	20,000		
Spring Brooks, Concord, N. H.		20,000	
Wild Meadow Brooks, Grafton, N. H.		10,000	
McQueston Brook, Nashua, N. H.		10,000	
Whitten Pond West Ossipee, N. H.		10,000	
A. M. Bigelow, Branchville, N. J.	20,000		
Paulins Kill River, Washingtonville, N. J.			1,000
J. Minton, Las Vegas, N. Mex.	10,000		
Harrison Brook, Oneonta, N. Y.			400
Oneonta Creek, Oneonta, N. Y.			800
Charlotte Creek, Oneonta, N. Y.			400
Harrison Brook, Oneonta, N. Y.			400
Keyes Brook, Oneonta, N. Y.			400
Otego Creek, Oneonta, N. Y.		18,750	
Elk Creek, Worcester, N. Y.			800
Owego Creek, Owego, N. Y.			800
Nigger Hollow Swamp, Sherburne, N. Y.			750
Tiquin, Limon, and Howard brooks, Sherburne, N. Y.		18,750	
Montfredy Brook, Syracuse, N. Y.			800
Trout Creek, Schenectady, N. Y.			400
Van Epps Brook, Schenectady, N. Y.			400
Cedarvale and Judd brooks, Syracuse, N. Y.		15,000	
Lishas Kill Brook, Niskayuna, N. Y.			400
Tioughnioga River, De Ruyter, N. Y.		44,000	750
Quaker Brook, Patterson, N. Y.			800
Otsdawa Creek, Otego, N. Y.			800
Moyer Brook, Frankfort, N. Y.		12,500	
Richmondville Creek, Richmondville, N. Y.		18,750	
Schenevus Creek, East Worcester, N. Y.		12,500	
Canisteo River, Hornellsville, N. Y.		15,000	
Edwards and Burchard brooks, Waterville, N. Y.		18,750	
Tributaries of Stony Brook, St. Regis Falls, N. Y.		40,000	
State Fish Commission, Watertown, N. Y.		39,000	
Spring Brook, Littleton, N. C.			500
Applicant at Morrisville, N. C.			200
Spring Lake, Sheldon, N. Dak.		5,000	
Silver Lake, Bellefontaine, Ohio		5,000	
Spring Lake, Bellefontaine, Ohio		5,000	
Applicants in Ohio		9,500	
Applicant at Junction City, Oreg.			2,000
Tobyhanna Creek, Tobyhanna Mills, Pa.			300
Butternut Creek, Honesdale, Pa.			300
Swamp Brook, Honesdale, Pa.			300
Middle Creek, Honesdale, Pa.			300
Lackawaxen River, Honesdale, Pa.			600
Goodrich Brook, Honesdale, Pa.			300
Paddy Run, Renovo, Pa.			300
Drury Run, Renovo, Pa.			300
Pond and stream, Berwindale, Pa.			200
Sandy Run, Edgehill, Pa.			300
Mill race and pond, Bedford, Pa.			500
Clover Creek, Altoona, Pa.			300
Valley Creek, Valley Forge, Pa.			500
Bear Run, Bear Run, Pa.			500
Allegheny River and tributaries, Coudersport, Pa.			1,000
Crescent Lake, Cocono Summit, Pa.			300
Painter Creek, Moosic, Pa.			300
Laurel Run, Cresson, Pa.			300
Lick Run, McElhattan, Pa.			500
Rock Run, McElhattan, Pa.			200
Spring Run, McElhattan, Pa.			300
Rhodes Branch, New Freedom, Pa.			300
Solomon and Adams creeks, Johnstown, Pa.			300
Spring Creek, Bellefonte, Pa.			200
Hagerman Run, Williamsport, Pa.			600
Mountain Stream, Wetham, Pa.			500
Rattlesnake Run, Wetham, Pa.			1,100
Plumb Run, Lockhaven, Pa.			300
Beech Creek, Snowshoe, Pa.			200
Cook Creek, Troy, Pa.			300
Ballard Creek, Troy, Pa.			300
Morgan Creek, Troy, Pa.			300
Slannera Creek, Susquehanna, Pa.		12,500	
Starruca Creek, Susquehanna, Pa.		15,000	
Applicants in Pennsylvania			1,100
Bartlett Brook, Providence, R. I.		10,000	
Applicant at Providence, R. I.		3,000	
Queens River and tributaries, Kingston, R. I.		10,000	
Little Spearfish Creek, Deadwood, S. Dak.		5,000	

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Brook trout—Continued.			
South Fork Spearfish Creek, Englewood, S. Dak		5,000	
Whitewood Creek, Englewood, S. Dak		15,000	
Rapid Creek, Rapid City, S. Dak		10,000	
Spring Lake, Fairfax, S. Dak		5,000	
Cascade River, Cascade, S. Dak		5,000	
Pond and stream, Spearfish, S. Dak		5,000	
Crow Creek, Spearfish, S. Dak		5,000	
Horse Creek, Sheridan, S. Dak		5,000	
Beaver Creek, Buffalo Gap, S. Dak		5,000	
Falsebottom Creek, Minnesela, S. Dak		5,000	
Rosebud and Rock creeks, Rosebud Agency, S. Dak		10,000	
Lake Creek, Pine Ridge Agency, S. Dak		8,333	
Wolf Creek, Pine Ridge Agency, S. Dak		8,333	
American Horse Creek, Pine Ridge Agency, S. Dak		8,334	
Box Elder Creek, Nemo, S. Dak		5,000	
Applicants in South Dakota		13,000	
Stone Creek, Murfreesboro, Tenn			90
Spring Lake, Murfreesboro, Tenn			90
Pine and Falling Water creeks, Watertown, Tenn			900
Fall Creek, Hohenwall, Tenn			450
Buffalo River, Linden, Tenn			450
Big Stony Creek, Elizabethton, Tenn			992
Martin Creek, Unicoi County, Tenn			1,568
Mill Creek, Unicoi County, Tenn			1,000
Granny Lewis Creek, Unicoi County, Tenn			1,000
Crow Branch Fishery, Tenn			9,380
Rock Creek, Rock Creek, Tenn			400
Ponds and springs, Erwin, Tenn			921
Applicants in Tennessee			1,728
Pinewood Lake, Clarksville, Tenn			270
State Fish Commission, Murray, Utah	50,000		
Orson Saunders, Salt Lake City, Utah	5,000		
Caspian Lake, Greensboro, Vt		49,985	3,134
Little Leach Pond, Averill, Vt		20,000	2,775
Henderson Brook, Salisbury, Vt			300
Vermont State Fish Commission, Colebrook, N. H	50,000		
F. J. Robinson, North Underhill, Vt	5,000		
S. L. Griffith, Danby, Vt	100,000		
Spring Brook, White River Junction, Vt		10,000	
Frog Pond, Waterford, Vt		5,000	
Mill Brook, Newport, Vt		15,000	
Mason Pond, Randolph, Vt		5,000	
Hatch Brook and pond, Randolph, Vt		5,000	
Ayer and Peth brooks, Randolph, Vt		10,000	
Molly Brook, West Danville, Vt		10,000	
Caledonia Trout Ponds, St. Johnsbury, Vt		20,000	
Hastings Brook, St. Johnsbury, Vt		5,000	
Passumpsic River, St. Johnsbury, Vt		2,500	
Tributaries of Sleiper River, St. Johnsbury, Vt		10,000	
Carr, Scales, and Rousing brooks, East Concord, Vt		10,000	
Hewitt Brook, Bristol, Vt		5,000	
Lake Mitchell, West Norwich, Vt		50,000	
Quinby Mill Pond, Sharon, Vt		5,000	
Joe Brook, Walden, Vt		5,000	
Spring Branch, Brownington, Vt		10,000	
Water Andrick Brook, Passumpsic, Vt		5,000	
Danville, Vt		5,000	
Staunton Brook, North Danville, Vt		5,000	
Craven Brook, North Danville, Vt		10,000	
Rake Factory Brook, East Barnett, Vt		5,000	
Waterford Brook, Passumpsic, Vt		5,000	
Lewis Creek, Vergennes, Vt		10,000	
Branch Brook, South Wallingford, Vt		10,000	
Pico Pond, Rutland, Vt		50,000	
Sherburne, Vt		49,800	
Streams at Stowe, Vt		10,000	
Groves Brook, Kirby, Vt		2,000	
Wheelock Brook, Lyndon, Vt		5,000	
Big Fish Pond, Lyndon Center, Vt		10,000	
Bean Pond, South Barton, Vt		5,000	
Summit Pond, South Barton, Vt		5,000	
Stevens Brook, Barnett, Vt		5,000	
Baldwin Pond, Starksboro, Vt		10,000	
Applicants in Vermont		15,000	
Mountain stream, Linden, Va			400
Darb Creek, Winchester, Va			500
Applicants in Virginia			573
Diamond Lake, Camden, Wash			3,000
Lake Wildwood, New Whatcom, Wash			3,000
Little Spokane River, Spokane, Wash			5,000
Ahtanum River, North Yakima, Wash			1,000

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Brook trout—Continued.			
Touchet River, Dayton, Wash			1,000
Chambers Creek, Tacoma, Wash			250
Lake Steilacoon, Tacoma, Wash			250
F. A. Degler, Cheat Bridge, W. Va	25,000		
Salt Lick Creek, Terra Alta, W. Va			500
Big and Meadow Runs, Huttonsville, W. Va			1,000
Spring Lake, Martinsburg, W. Va			500
Applicants in West Virginia			750
Trout Brook, Woodruff, Wis			1,000
Lake Nebagemain, Lake Nebagemain, Wis		10,000	
Black River, Foxboro, Wis		10,000	
State Fish Commission, Sheridan, Wyo	35,000		
Laramie, Wyo	75,000		
Brooks and lakes, Bighorn County, Wyo			4,000
Bear Tooth Lake, Bighorn County, Wyo			2,000
H. M. Phipps, Inverness, Scotland	20,000		
Total	534,000	1,967,092	195,021
Lake trout:			
State Fish Commission, Windsor Locks, Conn		25,000	
Quonnipaug Lake, New Haven, Conn		25,000	
State Fish Commission, Enfield, Me	350,000		
Donnell Pond, Franklin, Me		55,000	
Long Pond, Great Pond, Me		40,000	
Morrison Lake, Green Lake, Me		20,000	
Rocky Pond, Otis, Me		45,000	
Green Lake, Otis, Me		21,000	
Holbrook Pond, Holden, Me		45,000	
Little Fitz Pond, Holden, Me		45,000	
Phillips Lake, Dedham, Me		45,000	
Tunk Pond, Sullivan, Me		40,000	
Schoodic Lake, Schoodic, Me		150,000	
Belgrade Lake, Belgrade, Me		41,000	
Messalouskee Lake, Belgrade, Me		40,000	
Watuppa Lake, Fall River, Mass		25,000	
Lake Huron, Alpena, Mich		20,000	14,600
East Tawas, Mich			15,000
Cheboygan, Mich			14,900
Lake Huron, off Scarecrow Island, Mich		125,000	
North Point, Mich		125,000	
Middle Island, Mich		125,000	
Thunder Bay Island, Mich		500,000	
Lake Michigan, Charlevoix, Mich		1,992,500	9,600
Manistique, Mich		987,500	
Lake Superior, Bay Mills, Mich		800,000	
Ontonagon, Mich		560,000	
Long Point, Mich		280,000	
Firesteel River, Mich		280,000	
Fourteen-mile Point, Mich		280,000	
Washington Harbor, Mich		280,000	
Keystone, Mich		210,000	
Little Montreal River, Mich		210,000	
Rock Harbor, Mich		280,000	
Fish Island, Mich		140,000	
Tobins Harbor, Mich		140,000	
Todds Harbor, Mich		280,000	
Hamlin Lake, Ludington, Mich			15,000
Straits of Mackinac, Mackinaw City, Mich		2,000,000	14,850
Walnut Lake, North Farmington, Mich			2,700
State Fish Commission, Reed City, Mich	1,500,000		
Sault Ste. Marie, Mich	350,000		
Portage Lake, Ypsilanti, Mich		50,000	
Union Lake, Commerce, Mich		100,000	
Pine Lake, Charlevoix, Mich		500,000	
Round Lake, Hanover, Mich		20,000	
Beaver Lake, Alpena, Mich		100,000	
Turtle Lake, Alpena County, Mich		65,000	
Eagle Lake, Willmar, Minn		28,000	
Bear Lake, Akely, Minn		10,000	
Leech Lake, Walker, Minn		25,000	
Lake Superior, Duluth, Minn		2,000,000	
Grand Portage, Minn		227,500	
Hovland, Minn		280,000	
Beaver Bay, Minn		560,000	
Lutsen, Minn		420,000	
Lake Winnisquam, Laconia, N. H		30,000	
Granite Lake, Hudson Center, N. H		20,000	
Lake Winnepesaukee, Weirs, N. H		112,425	
New Found Lake, Bristol, N. H		45,000	

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearlings.
Lake trout—Continued.			
Lake Asquam, Ashland, N. H		52,500	
Babosic Pond, Amherst, N. H		10,000	
Dublin Lake, Dublin, N. H		5,900	
Lake Masabesic, Hillsboro and Rockingham counties, N. H.		8,730	
Adirondack League Club, Fulton Chain, N. Y	300,000		
State Fish Commission, Caledonia, N. Y	500,000		
Coldspring Harbor, N. Y	1,000,000		
St. Lawrence River, Cape Vincent, N. Y		36,200	
Lake Ontario, off Grenadier Island, N. Y		739,800	
Tibbetts Point Lighthouse, N. Y		1,100,000	
Lower Tumbling Run Lake, Pottsville, Pa		8,368	
State Fish Commission, Murray, Utah	500,000		
State Fish Commission, Roxbury, Vt	300,000		
Lake Dunmore, Salisbury, Vt		50,000	
Willoughby Lake, Westmore, Vt		20,000	
Harvey Pond, Barnett, Vt		15,000	
Great Averill Pond, Averill, Vt		10,000	
Stone Pond, Barton, Vt		10,000	
Newman Lake, Hauser, Wash		14,955	
Loon Lake, Loonlake, Wash		26,936	
Lake Washington, Seattle, Wash		21,985	
Lake Whatcom, New Whatcom, Wash		17,822	
Applicant at Wenatchee, Wash		5,000	
Lake Superior, Bayfield, Wis		280,000	
Sand Island, Wis		700,000	
Madeline Island, Wis		280,000	
Bark Point, Wis		560,000	
Lake Nebagemain, Lake Nebagemain, Wis		400,000	
Crooked Lake, Woodruff, Wis		30,000	
State Fish Commission, Laramie, Wyo	200,000		
Sheridan, Wyo	50,000		
Lake Superior, Port Arthur, Ontario, Canada		304,500	
Total	5,050,000	19,577,415	86,650
Scotch sea trout:			
Heart Pond, Orland, Me			5,266
Toddy Pond, Orland, Me			248
Patten Pond, Orland, Me			18,899
Ellsworth, Me		20,000	27,234
Long Pond, Bar Harbor, Me		7,000	
G. H. Richards, Wenaumet, Mass	10,000		
Big Sandy Pond, Marshfield, Mass		8,000	
Total	10,000	35,000	51,647
Golden trout:			
Harriman Pond, Dedham, Me		6,990	
Hybrid trout:			
Applicant at Cambridge, Mass			100
Caspian Lake, Greensboro, Vt			1,859
Total			1,959
Grayling:			
South Platte River, Florissant, Colo		1,000	
Platte River, Webster, Colo		4,500	
Frying Pan River, Ruedi, Colo		5,000	
Eagle River, Berry Station, Colo		10,000	
East Fork of Big Wood River, Hailey, Idaho			5,000
Spring Branch, Manchester, Iowa		5,000	
Maquoketa River, Forestville, Iowa		15,000	
Village Creek, Lansing, Iowa		15,450	
State Fish Commission, Paris, Mich	200,000		
Spring Brook, Westbranch, Mich		10,000	
Pere Marquette River, Baldwin, Mich		27,000	
Baldwin Creek, Baldwin, Mich		19,000	
Baptism River, Lake County, Minn		14,000	
Lester River, Duluth, Minn		10,000	
Tributaries of Big Hole River, Brown Station, Mont			5,000
Elk Creek, Redrock Lake, Mont		1,628,100	
Elk Lake, Redrock Lake, Mont		150,000	
Picnic Creek, Redrock Lake, Mont		104,000	
Bridger Creek, Bozeman, Mont		300,000	
McKay and Pearson Creeks, Pendleton, Oreg		41,668	
State Fish Commission, Murray, Utah	72,000		
Caspian Lake, Greensboro, Vt		20,000	
Brule River, Winnebojou, Wis		10,000	

Details of distribution—Continued.

Species and disposition.	Eggs.	Fry and fingerlings.	Adults and yearling.
Grayling—Continued.			
State Fish Commission, Sheridan, Wyo	50,000		
Laramie, Wyo	50,000		
Total	372,000	2,449,718	10,000
White-fish:			
Henry A. Mower, Worcester, Mass	300,000		
Lake Erie, *Monroe, Mich*		8,840,000	
Lake Huron, near North Point, Mich		11,000,000	
Scarecrow Island, Mich		9,700,000	
Presque Isle, Mich		7,000,000	
Sturgeon Point, Mich		3,500,000	
off Forester, Mich		3,000,000	
Detour (north shore), Mich		10,000,000	
Lake Michigan, Charlevoix, Mich		16,000,000	
Frankfort, Mich		16,000,000	
St. James, Mich		4,000,000	
Lake Superior, off Sault Ste. Marie (east end), Mich		6,500,000	
Ontonagon, Mich		2,800,000	
Grace Harbor, Isle Royale, Mich		2,200,000	
Detroit River, off Belle Isle, Detroit, Mich		58,000,000	
Lake St. Clair, off Belle Isle, Detroit, Mich		8,000,000	
Thunder Bay, off North Point, Mich		2,300,000	
St. Marys River, off Sault Ste. Marie, Mich		3,500,000	
Whitefish Bay, off Tequamenon Island, Mich		5,000,000	
Lake Superior, *off Sousic Island, Minn*		400,000	
State Fish Commission, Plymouth, N. H	500,000		
St. Lawrence River, Cape Vincent, N. Y		22,000,000	
State Fish Commission, Caledonia, N. Y	10,000,000		
Lake Ontario, off Grenadier Island, N. Y		5,000,000	
Lake Erie, Peach Point Reef, off Put-in Bay, Ohio		6,580,000	
Buckeye Island Reef, off Put-in Bay, Ohio		3,600,000	
West Sister Island Reef, off Put-in Bay, Ohio		5,250,000	
Rattlesnake Island Reef, off Put-in Bay, Ohio		8,360,000	
North Bass Island Reef, off Put-in Bay, Ohio		23,000,000	
Middle Bass Island Reef, off Put-in Bay, Ohio		10,100,000	
Niagara Reef, off Put-in Bay, Ohio		5,600,000	
Starve Island Reef, off Put-in Bay, Ohio		5,600,000	
Ballast Island Reef, off Put-in Bay, Ohio		4,800,000	
Moore Point Reef, off Put-in Bay, Ohio		4,320,000	
Sugar Island Reef, off Put-in Bay, Ohio		2,000,000	
Green Island Reef, off Put-in Bay, Ohio		3,259,000	
Kelly Island Reef, Erie County, Ohio		2,560,000	
Put-in Bay, east side, Ohio		4,130,000	
Port Clinton, Ohio		5,600,000	
Toledo, Ohio		6,300,000	
State Fish Commission, Erie, Pa	5,832,000		
Silver Creek Lake, Pottsville, Pa		256,000	
Lake Champlain, Alburg, Vt		400,000	
Lake Washington, Seattle, Wash		160,000	
Lake Superior, Port Wing, Wis		4,200,000	
Bark Bay, Wis		4,200,000	
Sand Bay, Wis		4,200,000	
Port Arthur, Ontario, Canada		2,000,000	
Total	16,632,000	321,206,000	
Pike perch:			
Lake Maxinkuckee, Culver, Ind		800,000	
Blue River, Rome City, Ind		500,000	
Mississinewa Lake, Ridgeville, Ind		500,000	
State Fish Commission, Boston, Mass		1,000,000	
Detroit, Mich	25,000,000		
Merrimac River, Concord, N. H		1,000,000	
Raquette River, Potsdam, N. Y		900,000	
St. Lawrence River, Cape Vincent, N. Y		19,500,000	
Thompson & Warner's Lake, Altamont, N. Y		900,000	
Spring Lake, Cleveland, Ohio		1,000,000	
Grand River, Eagleville, Ohio		1,000,000	
Western Reservoir, Midland City, Ohio		1,000,000	
Baker Lake, Mechanicsburg, Ohio		500,000	
Tuscarawas River, Zoar, Ohio		1,000,000	
Lake Erie, Peach Point Reef, off Put-in Bay, Ohio		6,600,000	
Rattlesnake Island Reef, off Put-in Bay, Ohio		5,700,000	
Ballast Island Reef, off Put-in Bay, Ohio		5,200,000	
North Bass Island Reef, off Put-in Bay, Ohio		3,000,000	
Susquehanna River, Susquehanna, Pa		2,000,000	
State Fish Commission, St. Johnsbury, Vt		12,600,000	
Total	25,000,000	64,700,000	

Details of distribution—Continued.

Species and disposition.	Adults and yearlings.
Cat-fish:	
Mississippi River, Bellevue, Iowa	4,000
Lake Irvine, Church Ferry, N. Dak	10
Weiremiller Lake, Church Ferry, N. Dak	14
Total	4,024
Pike:	
Mississippi River, Bellevue, Iowa	5,000
Pickerel:	
Devils Lake, Devils Lake, N. Dak	185
Yellow perch:	
Mississippi River, Bellevue, Iowa	8,000
Devils Lake, Devils Lake, N. Dak	100
Lake Irvine, Church Ferry, N. Dak	35
Weiremiller Lake, Church Ferry, N. Dak	35
Total	8,170
Black bass:	
Cahaba River, Birmingham, Ala	400
Savage & Willetts Lake, Anniston, Ala	200
McCarty Millpond, Ethelville, Ala	150
Barren Fork Flint River, Newmarket, Ala	200
Davidson Lake, Uniontown, Ala	300
Biving Lake, Dunham, Ala	200
Alabama River, Montgomery, Ala	250
Gulco Fish Lake, Eufaula, Ala	800
Applicants in Alabama	2,500
Spring Lake, Tucson, Ariz	100
San Juan Lake, Bisbee, Ariz	75
Indian School Lake, Phœnix, Ariz	200
Liveoak Creek, Flagstaff, Ariz	100
Spring Lake, Benton, Ark	400
Grayson Millpond, Barham, Ark	150
Railroad reservoir, Ashdown, Ark	200
Big Lake, Biglake, Ark	200
Upper Blackfish Lake, Earle, Ark	200
Applicants in Arkansas	750
Big Spring Lake, Kiowa, Colo	100
Reservoir, Pueblo, Colo	200
Lake Minnequan, Pueblo, Colo	200
Herrick Lake, Littleton, Colo	100
Marston Lake, Denver, Colo	200
Lake Wauconda, Perry Park, Colo	100
Applicants in Colorado	140
Paper Millpond, Seymour, Conn	600
Little River, Seymour, Conn	350
Lake Wenonscopomus, Lakeville, Conn	500
Applicants in Connecticut	200
Chesapeake and Delaware Canal, Delaware City, Del	300
State Fish Commission, Wilmington, Del	500
Millpond, Rome, Ga	100
Ruby Lake, Fort Valley, Ga	100
Yahoola Creek, Gainesville, Ga	100
Lake Juliette, Cedartown, Ga	100
Turkey Creek, Carrollton, Ga	200
Spring Lake, Tunnel Hill, Ga	400
Ward Creek, Jasper, Ga	100
Wimberley Millpond, Lumpkin, Ga	100
Clamdale Lake, Washington, Ga	100
Swift Creek, Macon, Ga	200
McCall Lakes, Macon, Ga	500
State Fish Commission, Lagrange, Ga	500

Species and disposition.	Adults and yearlings.
Black bass—Continued.	
Warm Springs Branch, Bullochville, Ga	47
Applicants in Georgia	3,330
Rose Lake, Iuka, Ill	100
Electric Light Lake, Cartersville, Ill	100
Millpond, Paris, Ill	150
Horseshoe Lake, Carbondale, Ill	100
Bang Lake, Wauconda, Ill	200
Little Creek, Marshall, Ill	200
Applicants in Illinois	640
Leatherwood Creek, Bedford, Ind	400
Upper Salt Creek, Bedford, Ind	550
Guthrie Creek, Bedford, Ind	200
Indian Creek, Bedford, Ind	400
Williams, Ind	100
Owensburg, Ind	500
White River, Bedford, Ind	350
Castleton, Ind	150
Noblesville, Ind	200
Spring Lake, Evansville, Ind	150
Cook Park Lake, Evansville, Ind	150
Salt Creek, Heltonville, Ind	250
Patoka River, Huntingburg, Ind	200
Stone Quarry Lake, Kokomo, Ind	250
Raccoon Creek, Ladoga, Ind	100
Wabash River, Williamsport, Ind	200
Tippecanoe River, Monticello, Ind	300
Brookville and Metamora Canal, Metamora, Ind	200
Fish Trap Lake, Laporte, Ind	250
Sugar and Young creeks, Franklin, Ind	700
Wabash Pond, Vincennes, Ind	250
Downey Lake, Princeton, Ind	100
Pretty Lake, Plymouth, Ind	250
Spring Lake, Knightstown, Ind	325
Lake Maxinkuckee, Culver, Ind	5,198
Waterworks Lake, Bloomington, Ind	150
Kale Lake, South Bend, Ind	200
Applicants in Indiana	2,200
Pecan Creek, Gwendale, Ind. T	100
Simpson Spring Branch, Pontotoc, Ind. T	200
Applicants in Indian Territory	400
Maquoketa River, Manchester, Iowa	1,800
Forestville, Iowa	500
Monticello, Iowa	300
Lake Edgewood, Corning, Iowa	450
Plum Creek, Earlville, Iowa	300
North River, Winterset, Iowa	500
Middle River, Winterset, Iowa	500
Silver Creek, Dewitt, Iowa	200
Vernon Spring Millpond, Cresco, Iowa	900
Turkey River, West Union, Iowa	300
Frazee and Lefinwell lakes, Wheatland, Iowa	200
Shell Rock River, Northwood, Iowa	500
Lake Okoboji, Spirit Lake, Iowa	10,000
Cedar River, Cedar Rapids, Iowa	5,250
Clear Lake, Clearlake, Iowa	300
Applicant in Iowa	1,740
Mississippi River, Bellevue, Iowa	5,000
Silver Lake, Agra, Kans	140
Beaver Creek, Leoti, Kans	140
Spring Creek Lake, Smith Center, Kans	140
Baldwin Creek, Manhattan, Kans	140
Sevenmile Creek, Manhattan, Kans	140
Eureka Lake, Manhattan, Kans	140
Wildcat Creek, Manhattan, Kans	210

Details of distribution—Continued.

Species and disposition.	Adults and yearlings.
Black bass—Continued.	
Deep Creek, Manhattan, Kans.	140
McDowell Creek, Manhattan, Kans.	210
Willow Lake, Baxter Springs, Kans.	100
Hazeldell Lake, Garnett, Kans.	140
Crooked Creek, Fowler, Kans.	100
Hinchy Creek, Ellsworth, Kans.	140
Little Arkansas River, Wichita, Kans.	200
C., R. I. and P. R. R. reservoir, Herrington, Kans.	140
Spring Creek, Atchison, Kans.	140
Forest Lake, Bonner Springs, Kans.	200
Applicants in Kansas	4,845
Spring Lake, Peewee Valley, Ky.	200
Fennessy Lake, Culberson, Ky.	100
Spring Lake, Anchorage, Ky.	200
Cemetery Lake, Milldale, Ky.	100
Cadle Lake, Somerset, Ky.	200
Elkhorn Creek, Frankfort, Ky.	100
Stoner Creek, Winchester, Ky.	100
Howard Lower Creek, Winchester, Ky	100
Water company's lake, Winchester, Ky	300
Spring Lakes, Winchester, Ky.	300
Clark County Poorhouse lake, Winchester, Ky	100
Spring Lake, Lebanon, Ky	100
Lake Ellerslie, Lexington, Ky.	300
Spring Lake, Nicholasville, Ky.	100
Byars Lake, Guthrie, Ky	200
Spring Lake, Paducah, Ky	200
Cemetery Lake, Newport, Ky.	100
Crystal Lake, Ryland, Ky	150
Applicants in Kentucky	4,900
Sandy Creek, Clinton, La	600
Bayou Macon, Wisner, La	100
St. George Lake, Schriver, La.	200
Black River, New Orleans, La.	200
Cypress Brake Lake, Bastrop, La.	200
Chaplin Lake, Natchitoches, La.	200
Lake Julia, Bermuda, La	200
Applicants in Louisiana	950
Little Youghiogheny River, Oakland, Md	500
Chevy Chase Lake, Montgomery County, Md	100
Potomac River, Woodmont, Md.	500
Applicants in Maryland	425
Horn Pond, Woburn, Mass	300
Connecticut River, Holyoke, Mass	300
Cannon Lake, Sharon, Mass	300
Mabnessett Pond, West Chelmsford, Mass	300
Triangle Pond, Sandwich, Mass.	500
Segreganset River, Segreganset, Mass	300
Applicants in Massachusetts	75
Devils Lake, Devils Lake, Mich.	200
Loon Lake, Wixom, Mich	80
Pleasant Lake, Leslie, Mich	250
Baldwin and Burgess Lakes, Greenville, Mich	135
Lake Como, Greenville, Mich.	135
Turk Lake, Greenville, Mich	135
Fish Lake, Greenville, Mich	135
Woodbeck Lake, Greenville, Mich	135
Twin and Long Lakes, Greenville, Mich	135
Lake Bawbeese, Hillsdale, Mich.	125
Bear Lake, Clarion, Mich	135
Lake Huron, Alpena, Mich	125
Long Lake, Alpena, Mich	200
Fox Lake and Lake Harbor, Muskegon, Mich.	265
Big Platt Lake, Benzonia, Mich.	135
Cheboygan River, Cheboygan, Mich	135
Black bass—Continued.	
Hamlin Lake, Ludington, Mich.	135
Little Big Stone Lake Evart, Mich	135
Clark Lake, Clark Lake, Mich	125
Round Lake, Hanover, Mich	125
Murray Lake, Ypsilanti, Mich.	85
Rawson Lake, Schoolcraft, Mich.	300
Pine River, Alma, Mich	200
Black Lake, Onaway, Mich	125
Stony Lake, Oxford, Mich.	85
Pentwater Lake, Pentwater, Mich	135
Big Lake, Gaylord, Mich	135
Caribou Lake, Duluth, Minn	1,000
Conocia Lake, Duluth, Minn	1,000
Sevenmile Lake, Fulda, Minn	1,000
Big Lake, Barnum, Minn.	1,000
Sexton Lake, Hazlehurst, Miss.	100
Idlewild Lake, Hazlehurst, Miss.	100
Lake Ann, Hazlehurst, Miss	100
Lake Leroy, Hazlehurst, Miss.	100
Chatauqua Lake, Crystal Springs, Miss	250
Trinity Creek, Osyka, Miss	250
Spring Creek, Waterford, Miss.	200
Spring Lake, Canton, Miss	250
Forest Home Lake, Fayette, Miss	100
Millpond, Silver, Miss	200
Cade Lake, Jackson, Miss	150
Spring Lake, Jackson, Miss	200
Factory Pond, Meridian, Miss	250
Park Lake, Tupelo, Miss	100
Horseshoe Lake, Macon, Miss.	400
Rose Lake, Oxford, Miss	250
Applicants in Mississippi	5,746
Big River, Irondale, Mo	200
Springwater Lake, Independence, Mo	140
Dickinson Lake, Independence, Mo.	140
Crisp Lake, Independence, Mo.	100
Chick Lake, Excelsior Springs, Mo.	140
Cutoff Lake, Brunswick, Mo	280
Park Lake, Clinton, Mo	140
Park Lake, Noel, Mo	100
Hampton Spring Lake, Seneca, Mo.	100
Hickory Creek, Neosho, Mo	1,685
Applicants in Missouri	1,050
Oberfelder Lake, Lodgepole, Nebr	500
Spring Lake, Humphreys, Nebr.	550
Van Sickle Lake, McCook, Nebr	100
Applicants in Nebraska	1,150
Dark Pond, Harrisville, N. H.	490
Spring Lake, Spring Lake, N. J.	200
State Fish Commission, Jersey City, N. J	8,400
Sunset Lake, Sewell, N. J	300
Mirror Lake, Browns Mills, N. J.	500
Applicants in New Jersey	600
Spring Lake, Las Vegas, N. Mex.	200
Baker Pond, Fayetteville, N. C.	400
Stewart Pond, Charlotte, N. C.	100
Applicants in North Carolina	100
Gordon Lake, St. John, N. Dak.	300
Sargent Lake, Amenia, N. Dak.	400
Spiritwood Lake, Jamestown, N. Dak	2,900
Blanchard Lake, Blanchard, N. Dak	200
Mayville Reservoir, Mayville, N. Dak.	225
Stump Lake, Lakota, N. Dak	1,000
Devils Lake, Devils Lake, N. Dak	1,630
Harmonson Lake, Devils Lake, N. Dak	200
Sweetwater Lake, Devils Lake, N. Dak	200
Weiremiller Lake, Church Ferry, N. Dak	290

Details of distribution—Continued.

Species and disposition.	Adults and yearlings.
Black bass—Continued.	
Lake Irvine, Church Ferry, N. Dak	200
Hanson Reservoir, Church Ferry, N. Dak	25
Lewis Pond, Church Ferry, N. Dak	25
McKinney Lake, Church Ferry, N. Dak	25
Lake Metigosha, Bottineau, N. Dak	400
Fish Lake, Rolla, N. Dak	300
Willow Lake, Rolla, N. Dak	300
Steel Ranch Spring, Rolla, N. Dak	75
Ueland Lake, Edgely, N. Dak	25
Perkins Lake, Oakes, N. Dak	300
Forman Reservoir, Forman, N. Dak	300
Applicants in North Dakota	100
Stillwater Creek, Pleasant Hill, Ohio	50
Stillwater Creek, Dayton, Ohio	200
Bush and McCulloch creeks, McCulloch, Ohio	200
Lake Anna, Barberton, Ohio	200
Raccoon Creek, Newark, Ohio	100
South Fork Licking River, Newark, Ohio	100
North Fork Licking River, Newark, Ohio	100
Rocky Fork Licking River, Newark, Ohio	100
Twin Lakes, Earleville, Ohio	200
Dohner Lake, Doylestown, Ohio	200
Cliff Lake, Springfield, Ohio	200
Springfield Lake, Akron, Ohio	200
West Branch Mill Creek, Glendale, Ohio	200
Muskingum River, Dresden, Ohio	200
Big Miami River, Franklin, Ohio	200
Little Miami River, Columbia, Ohio	200
Little Miami River, Waynesville, Ohio	200
Hopkins Lake, Willoughby, Ohio	100
Whitewater River, Harrison, Ohio	300
Applicants in Ohio	1,325
Indian Creek, Woodward, Okla	100
Spring Lake, Woodward, Okla	200
Spring Creek, Woodward, Okla	100
Ivanhoe Creek, Shattuck, Okla	300
Crutcho Creek, Oklahoma, Okla	200
Applicants in Oklahoma	1,025
Weidner Millpond, Reading, Pa	425
Reservoir, Phœnixville, Pa	100
Lake Taminent, East Stroudsburg, Pa	150
Mud Run, East Stroudsburg, Pa	150
Hunter Range Lake, East Stroudsburg, Pa	200
Keeney Lake, New Freedom, Pa	100
Hoffmanville Lake, New Freedom, Pa	100
Wissahickon Creek, Penllyn, Pa	100
Ambler, Pa	100
Cloverly Farm Lake, Westchester, Pa	50
French Creek, St. Peters, Pa	100
Juniata River, Everett, Pa	200
Huntingdon, Pa	300
Shade Creek, Shadegap, Pa	100
Schuylkill River, Birdsboro, Pa	150
Conneaut River, Conneautville, Pa	100
Big and Little Conewago Creeks, New Oxford, Pa	100
Oswago Creek, Shinglehouse, Pa	100
Blacklog Creek, Rockhill, Pa	100
Aughwick Creek, Rockhill, Pa	100
Shirleysburg, Pa	100
Perkiomen Creek, Yerkes Station, Pa	100
Conococheague Creek, Marion, Pa	100
Silver Lake, Montrose Pa	150
Rose Lake, Andrews Settlement, Pa	100
Tidall Mill Pond, Rimerton, Pa	35
Ridley Creek, Chester, Pa	100
Folly Farm Lake, Elkins, Pa	100
Spring Creek, Cherrytree, Pa	100
Harney Lake, Shawanese, Pa	300
Susquehanna River, Georgetown, Pa	150
Liverpool, Pa	100
Crystal and Norton lakes, Carbondale, Pa	300
Lake Ariel, Ariel, Pa	200
Applicants in Pennsylvania	100
State Fish Commission, Westerly, R. I	1,000
State Fish Commission, Providence, R. I	1,000
Applicant at Charleston, S. C	100
Big Stone Lake, Wilmot, S. Dak	800
James River, Mitchell, S. Dak	250
Scotland, S. Dak	400
Lake Campbell, Brookings, S. Dak	500
Lake Hendricks, Brookings, S. Dak	1,000
Lake Kampeska, Watertown, S. Dak	1,400
Sylvan Lake, Custer, S. Dak	600
Lake Madison, Madison, S. Dak	700
Applicants in South Dakota	2,950
Buffalo River, Perryville, Tenn	150
Spring Lake, Woodstock, Tenn	250
Blueback Creek, Centerville, Tenn	200
Swan River, Centerville, Tenn	200
Lambs Fork Creek, Del Rio, Tenn	100
Cosby Creek, Del Rio, Tenn	100
Water company's lake, Jackson, Tenn	200
Applicants in Tennessee	1,200
Lake Blanche, Austin, Tex	500
Walnut Springs, Austin, Tex	100
Llano River, Austin, Tex	1,000
Llano and Colorado rivers, Kingsland, Tex	5,000
Quoin Creek, Manchaca, Tex	100
Golden Lake, Manchaca, Tex	5,000
Little Brazos River, Hearne, Tex	2,500
Spring Lake, Hearne, Tex	500
Fin and Feather Club Lake, Hutchins, Tex	2,050
Spring Lake, Holland, Tex	100
Wallace Lake, Moore, Tex	300
Moore Lake, Moore, Tex	50
Spring Lake, Vernon, Tex	100
Elmendorf Lake, San Antonio, Tex	1,000
San Pedro Springs, San Antonio, Tex	350
Spring Lake, Ennis, Tex	300
Guadalupe River, Kerrville, Tex	3,000
Cuero, Tex	4,700
Spring Lake, Valentine, Tex	200
Hondo Creek, Hondo, Tex	2,500
Spring Lake, Spofford, Tex	500
San Gabriel River, Georgetown, Tex	1,000
Spring Lake, Amarillo, Tex	500
Lake McDonough, Phelps, Tex	500
Spring Lake, Waco, Tex	200
Day Lake, Waco, Tex	500
Lake Eloise, Waco, Tex	500
Washita River, Canadian, Tex	3,000
Gageby Creek, Canadian, Tex	1,500
Spring Brook, Canadian, Tex	500

Details of distribution—Continued.

Species and disposition.	Adults and yearlings.
Black bass—Continued.	
Sand Creek, Canadian, Tex	500
Grigsby Creek, Canadian, Tex	1,000
Lambert Creek, Canadian, Tex	500
South Concho River, San Angelo, Tex	150
Little Joshua Creek, Welfare, Tex	300
Colony Fork Reservoir, Ranger, Tex	400
Spring Creek, Marfa, Tex	1,700
Green Creek, Clairette, Tex	2,500
Bosque River, Clairette, Tex	5,000
Fishing Club Lake, Gatesville, Tex	300
Claude Lake, Claude, Tex	1,725
Nueces River, Cotulla, Tex	2,000
Sweetwater Creek, Sweetwater, Tex	725
Iatan Lake, Iatan, Tex	800
Spring Creek, Colorado, Tex	200
Spring Lake, Richland, Tex	350
San Marcos River, San Marcos, Tex	50,000
Applicants in Texas	4,655
Connecticut River, Wells River, Vt	500
Salem and Derby ponds, Newport, Vt	100
Lake Dunmore, Norfolk, Va	100
North Anna River, Mineral City, Va	200
Peak Creek, Pulaski City, Va	100
Millpond, Burkeville, Va	100
Mattapony River, Guineas, Va	200
Baker Millpond, Widewater, Va	100
King Pond, Ashland, Va	100
Great Run, Warrenton, Va	100
Mountain Lake, Mountain Lake, Va	200
Falling River, Brookneal, Va	150
Canterbury Pond, Richmond, Va	100
Difficult Creek Pond, Clover, Va	200
Cowpasture River, Millboro, Va	355
Jackson River, Cedar Creek, Va	200
Millpond, Raphine, Va	100
Black Pond, Vienna, Va	240
Bluestone River, Pauls Mills, Va	100
Millington Pond, Green Springs Depot, Va	100
Artificial Lake, Rapidan, Va	100
Ice Pond, Mount Holly, Va	50
North River, East Lexington, Va	200
James River, Gilmore Mills, Va	100
Abert, Va	50
Hollywood Cemetery Lake, Richmond, Va	150
Silver Spring Lake, Gordonsville, Va	100
Applicants in Virginia	1,350
Decker Creek, Morgantown, W. Va	275
Buffalo Creek, Fairmont, W. Va	275
Bethany, W. Va	200
Tygarts Valley River, Foxhall, W. Va	400
Elkins, W. Va	600
Elk Creek, Clarksburg, W. Va	275
West Fork River, Clarksburg, W. Va	275
Lake Terra Alta, Terra Alta, W. Va	275
Snowy Creek and Lake, Terra Alta, W. Va	275
Shenandoah River, Charlestown, W. Va	275
Back Creek, Martinsburg, W. Va	200
Opequan Creek, Martinsburg, W. Va	400
Potomac River, Martinsburg, W. Va	275
Elk River, Charleston, W. Va	1,750
South Branch Potomac River, Romney, W. Va	275
Little Kanawha and Elk rivers, Sutton, W. Va	700
Applicants in West Virginia	250
Wanby Lake, Lakewood, Wis	600
Elbow and Newton lakes, Wausaukee, Wis	600
Bearskull Lake, Lac du Flambeau, Wis	600
Elk Lake, Phillips, Wis	2,300
Butternut Lake, Butternut, Wis	2,300
Applicants in Wisconsin	100
Total	282,127

Species and disposition.	Adults and yearlings.
Small-mouth black bass:	
State Fish Commission, Westerly, R. I	200
Crappie:	
State Fish Commission, Wilmington, Del	500
Murray Hill Lake, Augusta, Ga	100
Horseshoe Lake, Wynwood, Ind. T	200
Applicants in Indian Territory	200
Lake Okoboji, Spirit Lake, Iowa	1,375
Upper Iowa River, Limesprings, Iowa	500
Maquoketa River, Manchester, Iowa	1,500
Clear Lake, Clearlake, Iowa	10,500
Clear River, Orchard, Iowa	300
Cedar Rapids, Iowa	7,300
Middle River, Winterset, Iowa	500
North River, Winterset, Iowa	200
Silver Creek, Dewitt, Iowa	250
Frazee and Lefinwell lakes, Wheatland, Iowa	250
Mississippi River, Bellevue, Iowa	100,000
Applicants in Iowa	200
Lakeside Lake, Olathe, Kans	200
Eureka Lake, Manhattan, Kans	200
McDowell Creek, Manhattan, Kans	100
Little Arkansas River, Wichita, Kans	200
Prairie Dog Dam, Dresden, Kans	75
Pelican Creek, Oberlin, Kans	75
Northwest Fork Kiowa Creek, Bucklin, Kans	100
Forest Lake, Bonner Springs, Kans	230
Applicants in Kansas	1,775
Spring Lake, Paducah, Ky	600
Stoner Creek, Winchester, Ky	100
Howard Lower Creek, Winchester, Ky	100
Water company's lake, Winchester, Ky	100
Clark County Poorhouse lake, Winchester, Ky	100
Lake Ellerslie, Lexington, Ky	100
Ritter Lake, Falmouth, Ky	200
Applicants in Kentucky	2,300
Little Youghioghony River, Oakland, Md	1,500
Potomac River, Woodmont, Md	200
Applicants in Maryland	100
Sturgeon Lake, Sturgeon Lake, Minn	375
Cutoff Lake, Brunswick, Mo	300
Springwater Lake, Independence, Mo	100
Crisp Lake, Independence, Mo	3,100
Lake McDonald, Independence, Mo	1,270
Hickory Creek, Neosho, Mo	320
Park Lake, Clinton, Mo	100
Applicants in Missouri	300
McPherson Pond, Fayetteville, N. C	20
Johnston Mill Pond, Littleton, N. C	20
Little Alamance River, Burlington, N. C	100
Lake Rhett, Flatrock, N. C	50
Toe River, Marion, N. C	200
Applicants in North Carolina	410
Devils Lake, Devils Lake, N. Dak	150
Weiremiller Lake, Church Ferry, N. Dak	50
Lake Irvine, Church Ferry, N. Dak	25
Lewis Pond, Church Ferry, N. Dak	75
Whitewater River, Harrison, Ohio	200
Glendale Lake, Glendale, Ohio	200
Burger Fish Pond Lake, Pondcreek, Okla	100
Spring Lake, Enid, Okla	100
Applicants in Oklahoma	200
Mud Run, Penllyn, Pa	100
Lake Melinlie, Ebensburg, Pa	300
Conococheague Creek, Marion, Pa	500
Lake Hopatcong, Bethlehem, Pa	200
Juniata River, Huntingdon, Pa	400

Details of distribution—Continued.

Species and disposition.	Adults and yearlings.
Crappie—Continued.	
Ingleside Fish Lake, Summerville, S. C	50
Clifton Millpond, Clifton, S. C	50
Sycamore, S. C	50
Saluda River, Pelzer, S. C	100
Fair Forest Creek, Spartanburg, S. C	50
Broad River, Blacksburg, S. C	130
Applicants in South Carolina	275
Sylvan Lake, Custer, S. Dak	30
Buffalo River, Perryville, Tenn	800
South Fork Holston River, Bluff City, Tenn	125
Watauga River, Watauga, Tenn	125
French Broad River, Leadvale, Tenn	228
Alamosa Lake, Wichita Falls, Tex	50
Spring Lake, Wichita Falls, Tex	50
Millpond, Amarillo, Tex	75
Spring Lake, Brownwood, Tex	50
Barton Creek, Clarendon, Tex	200
Myers Pond, San Angelo, Tex	125
South Concho River, San Angelo, Tex	25
Flag Springs Lake, Taylor, Tex	25
Lake Olmos, Taylor, Tex	30
Burns Lake, Taylor, Tex	20
Turner Lake, Taylor, Tex	25
Moore Lake, Taylor, Tex	20
Reservoir, Brownwood, Tex	30
Fairland Lake, Brownwood, Tex	60
Lake Thorne, Longview, Tex	150
Hill Lake, Longview, Tex	150
Lovelace Lake, Hillsboro, Tex	50
Lake Gibbons, Paris, Tex	100
Oak Lake, Waco, Tex	50
Bold Springs Lake, West, Tex	30
Quion Creek, Manchaca, Tex	50
Crystal Lake, Pittsburg, Tex	40
Artificial Lake, Austin, Tex	25
Walnut Stream, Austin, Tex	50
Running Stream, Llano, Tex	100
Marcado Creek, Victoria, Tex	30
Reservoir, Victoria, Tex	20
Spring Creek, Victoria, Tex	25
Quitague Creek, Canyon City, Tex	30
Guadalupe River, Kerrville, Tex	245
Cuero, Tex	50
Millpond, Kerrville, Tex	25
San Pedro Springs, San Antonio, Tex	75
Applicants in Texas	1,035
Jackson River, Cedar Creek, Va	720
Cowpasture River, Millboro, Va	360
James River, Gilmore Mills, Va	120
Abert, Va	60
Applicants in Virginia	240
Decker Creek, Morgantown, W. Va	100
Tygart Valley River, Foxhall, W. Va	300
Elk Creek, Clarksburg, W. Va	100
Lake Terra Alta, Terra Alta, W. Va	150
Snowy Creek and Lake, Terra Alta, W. Va	150
Back Creek, Martinsburg, W. Va	300
Opequan Creek, Martinsburg, W. Va	300
Potomac River, Martinsburg, W. Va	400
Elk River, Charleston, W. Va	500
Buffalo Creek, Bethany, W. Va	600
Applicants in West Virginia	600
Total	151,653
Rock bass:	
Oxford Lake, Oxford, Ala	200
Spring Branch, Birmingham, Ala	58
Applicants in Alabama	716
Liveoak Creek, Flagstaff, Ariz	200
Applicants in Arizona	300
Applicants in Arkansas	900
Horseshoe Lake, Wynwood, Ind. T	100
Applicants in Indian Territory	200
Applicants in Kansas	1,250

Species and disposition.	Adults and yearlings.
Rock bass—Continued.	
Howard Lower Creek, Winchester, Ky	100
Stoner Creek, Winchester, Ky	100
Strode Creek, Winchester, Ky	100
Water Company's Lake, Winchester, Ky	100
Spring Lake, Winchester, Ky	300
Lake Ellerslie, Lexington, Ky	200
Applicants in Kentucky	600
Moose Lake, Hancock, Minn	300
Spring Creek, Marionville, Mo	200
Hickory Creek, Neosho, Mo	500
Rogers Lake, Frederickstown, Ohio	300
Odell Lake, Lakeville, Ohio	300
Dohner Lake, Doylestown, Ohio	300
Applicants in Ohio	800
Sportsman Creek, Bridgeport, Okla	200
Gageby Creek, Amarillo, Tex	100
Gabe Creek, Amarillo, Tex	100
Amarillo Creek, Amarillo, Tex	425
Chicken River, Amarillo, Tex	800
Buffalo Springs Creek, Tascosa, Tex	50
Barton Creek, Clarendon, Tex	200
Spring Lake, Tyler, Tex	400
Lake View, Brownwood, Tex	100
Sabine River, Greenville, Tex	300
Willow Lake, Pittsburg, Tex	100
Long Branch, Kingsbury, Tex	50
Artificial Lake, Austin, Tex	50
Aughtaugh Lake, Richmond, Tex	100
Dry Creek, Richmond, Tex	100
Fairchild Creek, Richmond, Tex	50
Gibbons Lake, Paris, Tex	75
Cottonwood Creek Lake, Goodwin, Tex	50
Applicants in Texas	2,590
Spring Branch, Mosleys Junction, Va	100
Lake Raymond, Petersburg, Va	300
Millpond, Roxbury, Va	300
Little River and Goose Creek, Plains Station, Va	600
Glen Allen Lake, Glen Allen, Va	100
Applicants in Virginia	2,800
Total	18,164
Strawberry bass:	
Liveoak Creek, Jerome, Ariz	100
Flagstaff, Ariz	100
Big Lake, Biglake, Ark	200
Cypress Brake Lake, Bastrop, La	100
Chaplin Lake, Natchitoches, La	100
Applicants in Louisiana	70
Gasconade River, Arlington, Mo	4,000
Hickory Creek, Neosho, Mo	574
Applicants in Missouri	300
Colony Fork Lake, Ranger, Tex	2,000
Total	7,544
Warmouth bass:	
Maquoketa River, Manchester, Iowa	1,600
Lake McDonald, Independence, Mo	250
Total	1,850
Sun-fish:	
Lake McDonald, Independence, Mo	2,100
Bream:	
Millpond, Pittsboro, Ala	200
Clamdale Lake, Washington, Ga	100
Spring Branch, Utopia, Ga	100
East Lake, Atlanta, Ga	200
McCall Lake, Macon, Ga	200
Applicants in Georgia	200
Mississippi River, Bellevue, Iowa	50,000
Crystal Lake, Palestine, Tex	300
Total	51,300

Details of distribution—Continued.

Species and disposition.	Fry.
Cod:	
Tangier Sound, Crisfield, Md.	3,000,000
Vineyard Sound:	
Near Tarpaulin Cove Light, Mass.	37,593,000
Robinson Hole, Mass.	11,807,000
Off Jobs Neck, Mass.	24,625,000
Quicks Hole, Mass.	11,064,000
Gay Head Light, Mass.	5,046,000
Noboska Light, Mass.	17,095,000
Can Buoy, Mass.	6,327,000
Bow Bells, Mass.	419,000
Atlantic Ocean:	
Off Gay Head, Mass.	3,047,000
Gloucester, Mass.	97,392,000
Rockport, Mass.	26,500,000
Ipswich Bay, Rockport, Mass.	11,511,000
Eel Pond, Woods Hole, Mass.	4,935,000
Woods Hole Harbor, Woods Hole, Mass.	4,963,000
Total	265,324,000
Flat-fish:	
Woods Hole Harbor, Woods Hole, Mass.	66,317,000
Eel Pond, Woods Hole, Mass.	548,000
Waquoit Bay, Waquoit, Mass.	17,590,000
Buzzards Bay, off Weepecket Island, Mass.	2,660,000
Total	87,115,000
Lobster:	
Fisher Island Sound, off—	
Fisher Island, Conn.	745,000
Noank, Conn.	1,123,000
Seal Harbor, between Whitehead and Sprucehead, Me.	500,000
Owls Head Bay, near western shore of Owls Head, Me.	500,000
Rockland Harbor (southwestern side), Rockland, Me.	1,000,000
Atlantic Ocean:	
Kittery Point, Me.	1,500,000
York Harbor, Me.	4,750,000
Portsmouth Harbor, Me.	1,625,000
Newcastle, N. H.	1,625,000
Gloucester, Mass.	15,720,000
Rockport, Mass.	2,270,000

Species and disposition.	Fry.
Lobster—Continued.	
Atlantic Ocean—Continued.	
Scituate, Mass.	1,933,000
Cohasset, Mass.	2,530,000
Lanesville, Mass.	1,800,000
Beverly, Mass.	3,950,000
Woods Hole Harbor, off Grass Ledge Island, Mass.	1,150,000
Eel Pond, Waquoit, Mass.	1,258,000
Katama Bay, off Edgartown, Mass.	1,274,000
Wellfleet Harbor, off Mayo Beach, Mass.	875,000
Casco Bay, off—	
Diamond Island, Me.	1,200,000
Long Island, Me.	1,500,000
Cow Island, Me.	1,500,000
Small Point, Me.	500,000
Penobscot Bay, off Isle au Haut, Me.	500,000
Gulf of Maine, off—	
Boothbay Bay, Me.	1,500,000
Port Clyde, Me.	500,000
Cape Meddick, Me.	1,000,000
Kennebunkport, Me.	1,000,000
Cape Porpoise Me.	2,000,000
Wood Island, Me.	1,000,000
Richmond Island, Me.	1,000,000
Matinicus Island, Me.	500,000
Gulf of Maine, near Halfway Rock, Me.	3,000,000
Indian Harbor, Indian Harbor, Me.	200,000
Moose River (mouth of), Somerset County, Me.	300,000
Harpswell Harbor, Harpswell Harbor, Me.	2,500,000
Orr Island Harbor, Orr Island, Me.	1,000,000
Hadley Harbor, Gosnold, Mass.	8,036,000
Vineyard Sound:	
Off Cedartree Neck, Mass.	589,000
Menemsha Bight, Mass.	243,000
Cuttyhunk Channel, Cuttyhunk, Mass.	467,000
Buzzards Bay, off Penikese Island, Mass.	353,000
Total	*77,166,000

* In addition to the above, 3,767,000 lobster fry were produced, which were delivered to Dr. H. C. Bumpus for scientific purposes.

REPORT ON THE INQUIRY RESPECTING FOOD-FISHES AND THE FISHING-GROUNDS.

By Hugh M. Smith, *Assistant in Charge.*

OYSTER INVESTIGATIONS.

LYNNHAVEN RIVER, VIRGINIA.

During this year the oyster-fattening experiments at Lynnhaven River, Virginia, have been continued with encouraging results. The special objects have been to secure by artificial means a more abundant growth of the minute plants on which the oyster feeds in order that the oysters may more readily and surely attain a marketable condition. The use of commercial fertilizer as a pabulum for the diatoms was continued with increasing success. The claire, wholly shut off from the influence of the tides, was refilled in August with water having a density of 1.012, and a good quality of fertilizer was applied at the rate of 400 pounds to the acre, the claire having a mean depth of 2½ feet. The oysters, introduced at intervals between October and January, ultimately became as fat as any market requires, and some sent to Washington in March were exceptionally fat. It was found, however, that the time required for oysters to attain the desired condition was too long for practical purposes, probably because the processes of respiration, feeding, etc., are not sufficiently active on account of the absence of tidal motion. The next step in the experiments will be the artificial production of currents throughout the claire, so that the water will be aerated and the vital processes in the oysters stimulated at the same time that the food organisms are being regularly supplied.

NORTH CAROLINA.

In pursuance of the general policy of the Commission to assist the States in the development of their fishery resources, the steamer *Fish Hawk* was detailed for a thorough survey of certain oyster-grounds of North Carolina, the special object in view being the devising of methods for promoting the oyster industry and the determination of the factors which underlie the failure of oyster-culture in the State during the past ten or twelve years. A consideration of these points involved a complete study of the biological and physical characters of the oyster-grounds. The extent of the North Carolina waters adapted to the existence of oysters prevented an examination of more than a small part of the grounds in one season, and the work was therefore restricted to certain areas of special interest.

In September, 1899, the investigations were begun in the vicinity of Beaufort and Morehead, and included Newport and North rivers, the Straits, Jarrett Bay, and Back Sound, which waters were completed in December; then the *Fish Hawk* moved into Pamlico Sound, where it was engaged until March, 1900, in work on several important areas, including Swan Quarter Bay, the most productive oyster section in the State.

The general examination of the oyster-beds was under the immediate charge of Mr. James A. Smith, the commanding officer of the vessel, who was assisted by Mr. W. F. Hill and Mr. O. F. Bellows, who were detailed from the office at Washington as surveyors and draftsmen, and by Dr. Caswell Grave, of Johns Hopkins University, who gave particular attention to the biological features of the inquiry. Prof. J. A. Holmes, director of the North Carolina geological and natural-history survey, took great interest in the work and his suggestions as to the especial regions to be examined were followed. The State Oyster Commission, at the request of Professor Holmes, detailed their steam launch to assist in the survey in Pamlico Sound. Special reports on the work have been submitted by the commander of the vessel and Dr. Grave, and large detailed charts delineating the natural and planted oyster-beds have been prepared in the office by Mr. Hill from data obtained in the field.

EASTERN OYSTERS ON THE PACIFIC COAST.

Although the eastern oyster has been acclimatized in the Pacific States for a number of years, it is only in California that natural reproduction is known to have taken place. If the oysters in Oregon and Washington have reproduced, the young have not survived the free-swimming stage. This matter is naturally engaging the attention of the State fishery authorities. References to the studies of the eastern oysters planted in Yaquina Bay, Oregon, have been made in previous reports of the division. In 1899 the condition of the oysters in Willapa Bay, Washington, received attention. The Commission had planted 80 barrels of eastern oysters in this place in 1894, with the understanding that they would be properly guarded and left to multiply. The absence of recent reports from this lot, together with requests from the State that the physical conditions in the bay be considered with reference to oyster propagation, led the Commission to undertake a preliminary examination in the present fiscal year. Dr. H. F. Moore, naturalist on the *Albatross* and an oyster expert, having been detailed to visit the bay in August, 1899, while en route to join the vessel, made the following report:

Pursuant to orders, I have visited Willapa Bay for the purpose of examining the eastern oysters planted there by the Commission and "to determine whether natural spawning has taken place, and if not, whether there are physical conditions which prevent it." I have found that the oysters planted there by the Commission have been almost exterminated, a somewhat lengthy search resulting in finding

but five. The reasons for this are not to be defined from the brief examination which it was possible for me to make. They may have become buried by shifting of the bottom or by the deposit of silt, but from the condition of the shells found I am inclined to think that neither explanation is adequate, and I suspect that some, at least, of the transplanted oysters have found their way to market. I understand that these oysters were bedded rather thickly, and if they and the dead shells have not become buried they have certainly been carried off through some agency. I have learned from the oystermen that at the end of the first year a large proportion of those planted had survived and were on the beds, but after that they became gradually fewer. It would appear, therefore, that they had withstood the vicissitudes of transportation with a fair degree of success.

During the last two or three years several private beds of eastern oysters have been established in different parts of Willapa Bay and they are reported to be doing well, possibly because it is somebody's interest to protect them from depredations of unprincipled persons.

In this connection I should counsel against further plantings of oysters on this coast by the Commission unless satisfactory guarantee can be offered that they will be protected from theft. A general assurance from the oystermen of a given locality is not sufficient, as then no one feels the responsibility and no one wishes to assume the onus of prosecuting the offenders even if they be detected.

In two of the five oysters found the ovaries were well developed and apparently ripe eggs could be squeezed from the oviduct. The other three were not sexually mature, and as no males were found the possibility of fertilizing the eggs could not be tested. I understand, however, that Professor Doan, of the State Agricultural College, succeeded in fertilizing some eggs earlier in the summer. He is said to be carrying on experiments on the line of artificial fecundation as a solution of the difficulties in establishing self-sustaining beds.

So far as I could learn, there is no evidence that the eastern oyster has ever naturally spawned here, or, rather, that there has ever been a set of spat. I think that the cold water here will prevent that under ordinary conditions, but I believe that in shallow ponds suitably constructed, and with proper precautions against the deposit of silt on the cultch, spat may be raised for subsequent planting in the open bay. If the Commission is to attempt oyster-culture on this coast, it seems to me that this line of research is the one indicated as most reasonable and most likely to yield results of value. The water during my stay was about 61° F., 8 or 9 degrees lower than usually suffices for the development of oyster fry.

We have no series of temperature and density observations extending throughout the year on this coast, and I have left a set of salinometers with Mr. Bush, who will make and record observations.

Concerning the native oyster, I made the interesting observation that, like its European relative, the eggs undergo a very considerable development in the gill chamber of the mother. When discharged they are, in fact, about at the stage of fixation. The eggs and embryos are very much larger than the eggs of the eastern oyster. I do not remember to have seen this fact mentioned by those who have called attention to the hermaphroditism of the species.

The failure of the eastern oyster to reproduce in the colder waters of Oregon and Washington has suggested the desirability of transplanting to our west coast some of the fine large oysters found in northern Japan, notably in Akishi Bay, on the eastern side of Hokushu Island. This step has been recommended by the Commission to some of the oyster-planters of Washington, and it is understood that negotiations are now under way for the shipment of a cargo for transplanting in Willapa Bay and other waters of Washington.

WORK AT THE BIOLOGICAL LABORATORIES.

WOODS HOLE, MASSACHUSETTS.

From the report of Dr. H. C. Bumpus, the director of the biological laboratory of the Commission at this place, the following outline of the work there carried on has been taken:

The year has been characterized by general improvements in the equipment of the laboratory, increased facilities for collecting material, enlarged library accommodations, and a gratifying increase in the amount of scientific work accomplished. The Commissioner was at the station during the greater portion of the summer, and through his advice many needed changes were made in and about the laboratory.

The steamer *Fish Hawk* was at the station at the beginning of the fiscal year and remained until September 6. During the summer the trawl was lowered 71 times, and Mr. J. D. Milligan kept a careful record of all the animals taken. The efficiency of the *Fish Hawk* as an instrument of biological research was largely due to the skill, interest, and experience of the commanding officer, James A. Smith, mate, U. S. Navy.

The *Grampus* made three trips to the Gulf Stream, and Captain Hahn secured valuable data respecting the distribution of the tile-fish. The steam launches *Blue Wing*, *Cygnet*, and *Merganser* were in daily use during July and August.

At the close of the summer of 1899 Commissioner Bowers recommended that a large room, heretofore used as a museum, be repaired and made into a library. Nothing during the year has occasioned more general approval from men of science than the furnishing of this room for the growing library and as a resort for those who wish to study. The card catalogue shows a gratifying increase in the number of contributions to the library, and already the list of acquisitions numbers over 3,000 volumes and pamphlets. The librarian of Brown University has kindly loaned sets of the more important scientific journals, and the authorities of the Marine Biological Laboratory have extended the use of their library to those working at the Commission.

The number of those who pursued investigations at the laboratory is somewhat larger than in the previous year, and while it includes many who worked on problems solely of economic importance, the director did not hesitate to call upon any or all for advice or assistance when the interests of the Commission could be thereby subserved. Indeed, the following list represents a body of able and willing volunteers: Warren E. Babcock, M. D., Ogdensburg, N. Y.; Barton A. Bean, U. S. National Museum; James E. Benedict, Ph. D., U. S. National Museum; R. P. Bigelow, Ph. D., Massachusetts Institute of Technology; Maurice A. Bigelow, M. S., Harvard University; R. E. Blount, A. B., Chicago, Ill.; H. C. Bumpus, Ph. D., Brown University; R. S. Breed, M. S., Harvard University; T. J. Burrage, A. B., Brown University; H. L. Clark, Ph. D., Amherst College; H. A.

Childs, B. S., University of Iowa; F. P. Downe, Brown University; W. H. Dudley, Wisconsin State Normal School; G. W. Field, Ph. D., Rhode Island Agricultural College; W. W. Francis, Johns Hopkins University; Peter Frandsen, A. B., Harvard University; Erik H. Green, A. M., Massachusetts Institute of Technology; C. W. Hargitt, Ph. D., Syracuse University; Harold Heath, Ph. D., Leland Stanford University; C. J. Herrick, M. S., Denison University; S. J. Holmes, Ph. D., University of Michigan; Freeland Howe, jr., A. B., Harvard University; J. M. Johnson, Harvard University; R. H. Johnson, Harvard University; J. L. Kellogg, Ph. D., Olivet College; C. R. Knight, American Museum of Natural History; T. G. Lee, M. D., University of Minnesota; A. B. Lewis, A. M., University of Nebraska; Edwin Linton, Ph. D., Washington and Jefferson College; C. G. Maywood, A. B., Albion College; A. D. Mead, Ph. D., Brown University; P. Calvin Mensch, M. D., Ursinus College; E. C. McKibben, Denison University; W. J. Moenkhaus, Ph. D., Harvard University; C. C. Nutting, A. M., University of Iowa; G. H. Parker, D. S., Harvard University; H. F. Perkins, A. B., Johns Hopkins University; Charles W. Prentiss, A. M., Harvard University; Herbert W. Rand, A. M., Harvard University; Jonathan Risser, Grinnell College; Porter E. Sargent, A. M., Harvard University; H. Sherwood, A. M., Brown University; Arthur J. Stewartson, Washington and Jefferson College; Myron W. Stickney, A. M., Worcester Academy; R. M. Strong, A. B., Harvard University; Oliver S. Strong, Ph. D., Columbia University; C. F. Sylvester, Princeton College; G. W. Sylvester, Princeton College; Millett T. Thompson, A. M., Brown University; Edward L. Thorndike, Ph. D., Columbia University; R. W. Tower, A. M., Brown University; E. E. Tyzzer, A. M., Harvard Medical School; Ira Van Gieson, M. D., Pathological Institute of the New York State Hospitals; H. E. Walter, A. M., North Division High School, Chicago; L. B. Walton, A. M., Brown University; F. E. Watson, A. M., Brown University; W. A. Willard, A. M., Harvard University; W. M. Wheeler, Ph. D., University of Texas; S. R. Williams, A. M., Harvard University; G. M. Winslow, Ph. D., Auburndale, Mass.; R. M. Yerkes, A. B., Harvard University.

Dr. James L. Kellogg, assisted by Mr. George H. Sherwood, has conducted a series of experiments to test the rate of growth of the clam and the feasibility of clam cultivation. The results of these experiments will be published in a special report.

Mr. George H. Sherwood has carried on a series of observations for the purpose of determining the cause of the migrations of fish. Mr. Vinal N. Edwards's valuable records of the times of arrival and departure of various species of fish visiting the Woods Hole region have proved of great service in this work.

In 1898 Professor McClure, assisted by Mr. C. F. Sylvester, began a comparative study of the circulatory system of fishes, which has been continued during the present year. The nets and traps of the Commission have provided him with material for this work.

Mr. E. H. Green has made a chemical examination of the connective tissue of the ocean sun-fish to determine its value as a glue-producing material; and has begun an analysis of the chitin of the lobster for the purpose of finding for it some commercial use.

Mr. E. E. Tyzzer, of Harvard Medical School, and Dr. Cushing, of Jefferson Medical College, have begun investigations on the diseases of fishes, in which they have had the assistance of Dr. Edwin Linton, who for many years has confined his studies to the entozoa of fishes.

During July and August, 1899, Dr. J. E. Benedict was given opportunity to collect material for the U. S. National Museum, and in August and September Mr. Barton A. Bean collected fishes for the same institution. In August Mr. Freeland Howe, jr., accompanied the *Fish Hawk* on a dredging excursion to the Gulf Stream. His account of the biological results will appear in an early paper of the Bulletin.

For many years workers at Woods Hole have needed papers of general reference in which they might find descriptions of the numerous animals which occur in this region. The publications of Professor Verrill on the invertebrates of Vineyard Sound have been for a long time out of print, and it has been decided to issue a series of faunistic papers which will ultimately embrace all of the invertebrate groups. The copepods and hydroids, two groups of invertebrates contributing largely to the general food supply of fishes, have been given special attention during the past year. Prof. W. M. Wheeler, of the University of Texas, has already prepared a paper on the former group, which will appear in the Bulletin for 1899, and Prof. C. C. Nutting, of the University of Iowa, has a paper on the latter group, which will be ready for the printer at an early date.

Prof. Hubert L. Clark, of Olivet College, Michigan, has in preparation a paper on the general anatomy of the star-fish, and Thomas J. Burrage, of the Harvard Medical School, has contributed an anatomical paper on the alimentary tract of the flounder.

Excellent photographs of living fish have been taken by Mr. M. W. Stickney, and sketches of living marine animals have been made by Mr. Charles R. Knight, of the American Museum.

Much interest has been manifested in recent years in the photography of living fishes and other animals in the water. While considerable difficulties are encountered, they are more than counterbalanced by the satisfaction in securing illustrations that actually represent the form and attitude of the live animals. In the United States great success in this line has been attained by Dr. R. W. Shufeldt, to whom the Commission extended facilities at the aquaria in Washington, and whose paper entitled "Experiments in Photography of Living Fishes" was printed in 1899 as a part of the Bulletin for that year. The plates in this paper, and also the text, have been extensively reprinted, both here and abroad. Working along independent lines, Mr. M. W. Stickney has achieved some creditable results in the photography of marine fishes at the Woods Hole laboratory.

BEAUFORT, NORTH CAROLINA.

The opening of a laboratory at Beaufort, N. C., on June 1, 1899, was noticed in the last report, which contained an outline of the operations during the last month of the fiscal year. The laboratory remained open until September 15, and was occupied by Prof. W. K. Brooks, Dr. Caswell Grave, and Mr. A. M. Reese, all of Johns Hopkins University; Prof. E. W. Berger, of Baldwin University; Prof. J. I. Hamaker, of Trinity College (N. C.); Prof. T. G. Pearson, of Guilford College; Prof. J. Y. Graham, of the University of Alabama; and Mr. C. A. Shore, of the University of North Carolina, in addition to Prof. H. V. Wilson, of the same institution, who was in charge. The laboratory reopened under the same direction on June 1, 1900, during which month tables were taken by Prof. E. B. Wilson, Dr. H. E. Crampton, Mr. H. B. Torrey, and Mr. J. C. Torrey, of Columbia University; Dr. Grave; Professor Hamaker; Prof. R. E. Coker, of the Goldsboro (N. C.) public schools; and Mr. J. W. Turrentine, of the University of North Carolina.

Among the numerous special inquiries conducted by the laboratory corps, the following may be mentioned: Prof. H. V. Wilson, assisted by Mr. Shore, gave attention to the breeding conditions of certain fishes, sponges, and crustacean parasites, among the last being a small barnacle (*Dichelaspis*) on the gills of the common edible crab (*Callinectes*). Professor Coker and Mr. Turrentine, under Professor Wilson's supervision, investigated the spawning habits of various fishes, including the following edible forms, from all of which eggs were artificially taken and fertilized: Weak-fish (*Cynoscion regale*), spotted squeteague (*Cynoscion maculatum*), hog-fish (*Orthopristis*), porgy (*Chætodipterus*), and king-fish (*Menticirrus*). The eggs of the silverside (*Menidia notata*), important as an article of food for the other fish, were also obtained, and some interesting and valuable observations on another small species, a blenny (*Hypleurochilus*), were made. The character of the food of the hog-fish and croaker (*Micropogon*) was studied. The former species is regarded by many persons as having a distinctly unpleasant flavor and hence much less valuable as food than the same fish taken in the vicinity of Norfolk; one cause for the inferiority in flavor has been found to be a large species of the peculiar worm-like animal (*Balanoglossus*), which is very abundant on the flats in Beaufort Harbor and is freely eaten by the hog-fish. Dr. Grave studied the life-history of the brittle-stars (*Ophiurans*), and during the spring of 1900, while attached to the *Fish Hawk*, used the facilities of the station in connection with his examination of the oyster-grounds of the region. Dr. Crampton was occupied in investigating the effects of abnormal conditions on the development of the eggs of the oyster and other mollusks. Mr. Torrey considered the early development of one of the most abundant annelid worms (*Axiothea*), an important article of diet for some of the bottom-feeding fishes.

In the course of an extended article on "Marine Biology at Beau-

fort" in the American Naturalist for May, 1900, Professor Wilson, director of the laboratory, makes the following statements concerning the studies of the various animal forms of the region:

It is planned that the record of each species shall include mention of the localities in which it is fairly abundant, most convenient collecting methods, time of year during which breeding goes on, brief natural-history notes on habits of adult (food, enemies, parasites, rate of growth, time and extent of migration, etc.), and on the life-history (character of eggs, where and how deposited, possibility of artificial fertilization, period of embryonic development, character of larva and period of larval development, habitat, food, and enemies of larva). The economic value of such a knowledge of the natural history of the region will be readily understood, and it is equally obvious to what an extent it will aid naturalists engaged in the study of abstruse problems of morphological and physiological embryology, of comparative anatomy and physiology. Its value in connection with similar results of the work at other coast stations, to the study of the variability of organisms, may be here alluded to.

To carry out such a scheme of work for a rich fauna like that of Beaufort will require years. An excellent basis has, however, been built up, and profitable lines of study marked out by the members of the Johns Hopkins marine laboratory and by other naturalists. At the Fish Commission laboratory many of the previously known facts, some recorded, some unrecorded (in the possession of former workers at Beaufort), have been brought together and confirmed, and important additions have been made. The forms actually collected during the season of 1899 include 238 species of marine invertebrates, some 70 fishes, 50 birds, a number of reptiles, amphibia, insects, and arachnoids, and a very considerable number of land plants and algæ. In the case of a good number of species, notes along the lines indicated above were made. In another season's work doubtless all the recorded forms will have been taken and identified. Further progress can only be made by a formal division of labor among the members of the laboratory. With the great awakening of interest, which is so apparent to-day in the phenomena exhibited by animals and plants regarded as living units, it should not be difficult to find naturalists who will gladly work up the local natural history of the groups embracing the particular forms on which they may be investigating problems of a morphological or physiological character.

The variety of fishes that may be taken in a short time in Beaufort Harbor and adjoining waters is so great as to make it evident that the number recorded (Jenkins gives 134) for the region will be greatly increased when systematic collecting has been carried on for a few years. Some 9 miles from Beaufort inlet the coast line makes a sharp right-angled bend, with Cape Lookout at the angle. From the end of the cape a narrow line of shoals extends much farther out. The cape and its submerged continuation form a wall, as it were, reaching seaward for 15 miles. Cape Lookout itself is so shaped as to embrace a bay, a quiet and beautiful sheet of water, Lookout Bight. The coast configuration thus forms a remarkable natural trap into which fish migrating northward fall. It is doubtful whether a better place can be found anywhere on our coast for the carrying out of observations on oceanic species and on bay and river species during the oceanic period of their life. The seining at Cape Lookout has been extremely interesting and successful, both as regards the variety of forms and the number of individuals taken.

It is a source of great satisfaction to the Commission and to biologists that at the last session of Congress an act was passed providing for the establishment of a permanent station on the coast of North Carolina, at which the biological problems connected with the marine-fishery interests of the South Atlantic region may be investigated.

MISCELLANEOUS MARINE AND FRESH-WATER INQUIRIES.

SPECIAL LOBSTER AND CLAM INVESTIGATIONS.

In the urgent deficiency bill approved February 9, 1900, provision was made for special investigations having for their object the institution of measures for the arrest of the serious decline in the lobster and clam fisheries, which has been referred to in previous reports of the Commission. The intelligent consideration of the condition of these important fisheries and the steps needed to reverse the present downward tendency involve a comprehensive study of their history, methods, regulation, etc., but it has been apparent that the chief aid which can be rendered by the General Government lies in the direction of increased production through artificial means.

The hatching of lobsters on a large scale is a comparatively simple matter; but the rearing of the young to a point where they leave their defenseless free-swimming stage and assume the habits of the adult is a difficult problem which has heretofore not been successfully solved. With regard to the clams—more especially the soft-shell species (*Mya arenaria*)—it has seemed clear that the future of the industry depended largely on the inauguration of planting methods similar to those so successfully adopted with the oyster. This procedure presents few difficulties and gives promise of large returns in a short time, at a very small cost.

In April, 1900, the following special commission was created by the Commissioner for the prosecution of the investigations authorized by Congress: Dr. H. C. Bumpus, chairman; Mr. W. de C. Ravenel, Capt. E. E. Hahn, and Dr. H. M. Smith, secretary. It is chiefly to the biological and cultural problems involved in the development of practicable rearing methods that the commission will give attention. Already some important and significant results have been attained.

MACKEREL.

The question of the existence of different races of mackerel (*Scomber scombrus*) on the east coast of North America was studied by Mr. M. C. Marsh in continuation of inquiries begun in the preceding year. For the purpose of securing ample material, Mr. Marsh in July and August visited several places in New England, and in Boston was able to examine large series of specimens from the Canadian provinces. Special facilities were extended by Mr. J. R. Neal and Messrs. Potter and Wrightington, of Boston, and Capt. A. W. Rich, of Provincetown. In May Hon. E. G. Blackford, of New York, forwarded 200 mackerel caught off New Jersey. About 2,000 specimens have now been examined, and their detailed study justifies the following conclusions:

(1) The existence of a marked racial distinction between American and British mackerel, as indicated by the studies of Mr. Walter Garstang, is strongly confirmed.

(2) The evidence thus far accumulated fails to disclose the existence on the American coasts of distinct bodies of mackerel, charac-

terized by color or structural features, such as are found on the shores of the British Isles. The examination of further material from extreme southern and northern localities is desirable, however, before the question can be considered settled.

Certain minor points in the relations of the characters have been determined. Thus a decrease in the number of dorsal spines with the growth of the fish, as shown by Garstang's material, holds good for American fish, as does a correlation between the dorso-lateral spots and the size of the fish, not exhibited by British mackerel. A preponderance of male fish, in the ratio of 2 to 1, is shown. No selective process, so far as known, would account for this disparity in the material examined.

COBBOSSEECONTEE AND SEBAGO LAKES, MAINE.

The study of the fish fauna of Sebago Lake by Dr. W. C. Kendall, referred to in the last report, was continued during July and part of August, 1899. Hon. L. T. Carleton, chairman of the State board of fish commissioners, having expressed a desire that the character of the fish life of Lake Cobbosseecontee be determined, Dr. Kendall devoted the last two weeks of August to this investigation.

Cobbosseecontee is the largest of a connected group of lakes in Kennebec County, the other important ones being Amabessacook and Maranacook. It is irregular in shape, about 9 miles long, 0.5 to 2.8 miles wide, and consists of two wide areas connected by a narrow portion. The shores are mostly rocky, with a few sandy beaches and a swamp at the southern end, through which several inlets pass. The lake discharges into Kennebec River through a small stream.

The fishes of the lake are not numerous as to species, but are as to individuals. Among the most abundant are the small-mouthed black bass (*Micropterus dolomieu*) and the white perch (*Morone americana*). The latter are protected by law and reach a large size, some weighing 3 pounds having been caught. Schools containing thousands of the season's young, from 3 to 6 inches long, were noticed along the sandy shores, where the black bass were feeding on them. Trout (*Salvelinus fontinalis*) are fairly common, reach a weight of 8 pounds, and afford good fishing in spring. Salmon (*Salmo sebago*) have been planted in the lake, but not with much success, as but few have been caught. The character of the lake water seems to be well suited to the salmon, whose apparent inability to maintain itself naturally may be due to restricted spawning-grounds and the abundance of predaceous fishes. An interesting ichthyological discovery is the existence in the lake of the brook stickleback (*Eucalia inconstans*), which has not heretofore been known from Maine waters. Other fishes found in the lake are the hornpout (*Ameiurus nebulosus*), sucker (*Catostomus commersonii*), chubs (*Semotilus corporalis* and *S. atromaculatus*), roach, locally called herring (*Abramis chrysoleucas*), eel (*Anguilla chrysypa*), smelt (*Osmerus abbotti*), pickerel (*Lucius reticulatus*), long-eared sunfish (*Lepomis*

auritus), common sun-fish (*Eupomotis gibbosus*), yellow perch (*Perca flavescens*), and five other minor species, which raise to twenty-one the list of forms known from the lake.

SENECA LAKE, NEW YORK.

This is one of the largest of the interior lakes of New York. No critical examination of its fish fauna appears to have been made, although it is extensively resorted to by anglers, has certain ichthyological features of special interest, and at one time or another has supported commercial fisheries of some importance. It also appears to be a field in which fish-cultural work may profitably be conducted. In August, 1899, a brief visit to the lake was made by Dr. H. M. Smith for the purpose of determining the nature and abundance of the fish life, and arrangements were made by which the fishes were collected throughout the year. When the extent of the fauna has been fully determined, a special report on the fishes of the lake will be issued. Meanwhile, a few notes on the principal species will here be given.

Seneca Lake is about 36 miles long and 1 to 4 miles wide, with a maximum depth of 500 to 600 feet. The lake, whose surface is about 450 feet above sea level, occupies an eroded valley flanked by bold hills. It is fed by small streams and discharges into Lake Ontario by means of Seneca River, Cayuga Lake, and Oswego River.

Various forms of commercial fishing are permitted in the lake, as shown by the following extract from the fishery law of New York:

> It shall be lawful to fish in waters of Seneca Lake with nets or seines, the meshes of which shall not be less than a 2-inch bar, from the 15th day of April to the 15th day of August, both inclusive. It shall also be lawful to fish with spears in the waters of Seneca Lake for all fish except black bass from the 15th day of April to the 15th day of June, both inclusive.

The number of species of fishes known to inhabit Seneca Lake is small in comparison with the number recorded from the neighboring Cayuga Lake by Dr. Meek,* although further inquiry will doubtless show the existence of a considerable number of other species. The occurrence in the lake of about 50 species has thus far been determined by the writer, of which about a third are food-fishes.

The alewife (*Pomolobus pseudoharengus*) is one of the most abundant fishes of the lake. The presence of this anadromous species has given rise to much speculation, such as has been indulged in with regard to the alewife in Lake Ontario and other New York lakes. It is generally believed that this species was introduced into Seneca Lake by Seth Green about 1872, but there is evidence to prove that as early as 1868 it had, probably unassisted, reached the lake. The chief interest now attached to the species is the annual mortality to

*Notes on the Fishes of the Cayuga Lake Basin, Annals N. Y. Academy of Sciences, 1889.

which it is subject, as in Lake Ontario, large numbers dying each summer and causing much annoyance by decaying on the lake shores.

The lake trout (*Salvelinus namaycush*) is rather common, reaches a large size, and is caught with lines and spears. Several species of white-fish exist here. The common white-fish (*Coregonus clupeiformis*) was formerly numerous, but for about 15 years has been comparatively scarce. Another species, locally known as the "greenback," is rather abundant. A rare species is the "smelt" (*Argyrosomus osmeriformis*), known only from this lake and Skaneateles Lake.

The small-mouthed black bass (*Micropterus dolomieu*) is very abundant, as are also the rock bass (*Ambloplites rupestris*) and the sun-fish (*Eupomotis gibbosus*). The yellow perch (*Perca flavescens*) is numerous and reaches a large size, examples from deep water weighing 2 pounds. The wall-eyed pike was formerly abundant, but disappeared about the time the common white-fish became scarce, and is now practically absent. The remaining species include pickerel (*Lucius*), eel (*Anguilla chrysypa*), two or three suckers, about eight kinds of minnows, all of which are abundant, two species of cat-fish, and several darters. A very destructive species is the lamprey (*Petromyzon marinus unicolor*), which attacks cat-fish, pickerel, black bass, and other species, and kills many of them.

WEST VIRGINIA.

Investigations begun in West Virginia in 1899 had for their object the determination of the character of the fish life of the several large river basins draining into the Atlantic Ocean and into the Mississippi River. A party in charge of Mr. W. P. Hay entered the State in July and remained for a little more than two months, during which time numerous streams were examined in the basins of the Monongahela, Potomac, Greenbrier, and Elk rivers. Special attention was given to the Monongahela, of which about sixty tributaries were visited, chiefly by team, including the Cheat, Blackwater, Buckhannon, and other rivers. Large collections of the fishes of each stream were made, and extensive notes on the nature of the fish fauna were taken.

As a rule the streams of the Monongahela basin are swift, cool, with rocky beds and numerous falls, and naturally well adapted to sustain fish life. It appears that within comparatively recent years they have been able to sustain large numbers of the finest kinds of food-fishes, but at present the fishes are far from abundant and are becoming scarcer each year. The agencies which have cooperated to destroy the fishes are clearing of forests, reduction of food supply by changes in the character of the banks, pollution of the water in various ways, logging operations, dynamiting and damming to fit the streams for log "running," and several others, mostly incident to the industrial development of the country.

It is the purpose to continue the exploration of the streams of this State, giving special attention to those of the southwestern part tributary to the Ohio.

LAKE ERIE.

The systematic study of the biological features of Lake Erie was resumed on July 1 and actively prosecuted for two months under the direction of Prof. Jacob Reighard, of the University of Michigan. Those assisting in the work were Prof. H. B. Ward, of the University of Nebraska; Dr. H. S. Jennings, of Dartmouth College; Dr. Julia Snow, of the University of Michigan; Mr. R. H. Pond, of the University of Michigan; Mrs. H. S. Jennings, Mr. J. H. McClellan, Dr. Charles Hill, and Mr. A. B. Lewis. The hatching station of the Commission at Put-in Bay was used as a laboratory as heretofore, and was the headquarters of the party. Those who pursued studies at Put-in Bay were Dr. Jennings, Dr. Snow, and Mr. Pond.

Dr. Jennings resumed the studies in which he was engaged in the previous year, namely, experimental investigations of the reactions of the protozoa of the lake to stimuli. The principles underlying the movements of these small organisms are probably applicable to the higher animals, including young fishes. Three papers of Dr. Jennings, based on this work, have appeared in the American Journal of Physiology for January and April, 1900, and the American Naturalist for the latter month.

Dr. Snow continued the investigations of the previous season, identifying numerous species of algæ and determining the life-histories of several, especially those occurring in the plankton. The nature of Dr. Snow's investigations are thus stated by Professor Reighard:

> In order to have any permanent knowledge of the plankton algæ it is necessary that they be cultivated in the same manner as bacteria in culture media of different sorts. When so cultivated, it is found that algæ assume different forms. The different forms of the same algæ also occur in nature, and have been in many cases described as distinct species. We can not know what species are present in the lake until the life-history of each has been worked out so that we may know the various forms that it assumes.

Mr. Pond considered the question of the nutrition of the larger aquatic plants, conducting some work at the University of Michigan after the close of the Lake Erie work. The nature and importance of the subject studied by Mr. Pond are thus stated by the director:

> It is the purpose of this investigation to find out whether the rooted aquatic plants use their roots chiefly as anchors, as has been hitherto supposed, and draw their nutrition wholly from the water, or whether they are nourished like other plants largely through the roots. In order to determine this point Mr. Pond cultivated one of the species of plants common at Put-in Bay under two sets of conditions—i. e., so that the roots were in the soil and so that the roots were unable to reach the soil. Some of the plants were grown in aquaria in the laboratory, while others were grown in the lake. The results in both cases were very striking, and showed that in a comparatively short time plants that were rooted in the soil made a gain of about 30 per cent over those that were not thus rooted. If this rule holds for other species of plants it is a matter of considerable practical importance. If rooted plants draw their nourishment only from the water they add nothing to the sum total of the primary food supply of the water. They take certain materials from the water for their growth and return these materials to

the water again when they decay. If on the other hand the rooted plants draw nourishment from the soil, when they decay this material or a part of it passes into solution in the water. Thus the plants would serve as a continual go-between between the soil and the water, extracting from the soil and adding to the water plant food materials. These food materials would then serve for the nutrition of the aquatic algæ, upon which all of the animals of the water depend either directly or indirectly for their food.

During August a 90-foot steam yacht was hired and used in transporting from point to point a camping party in charge of Dr. Hill, engaged in collecting animal forms along the shores of the lake. Mr. Lewis gave special attention to the parasites of the lake fishes. All the organs of each fish examined were systematically searched for parasites, the results recorded, and the parasites preserved. Mr. McClellan collected bryozoa, flatworms, and leeches, and Dr. Hill and Dr. Jennings the remaining invertebrates. The material preserved, which is without doubt the most complete invertebrate collection from the region, has been distributed to well-known specialists for identification, including Prof. E. A. Birge, of the University of Wisconsin; Dr. J. P. Moore, of the University of Pennsylvania; Dr. C. M. Child and Dr. C. B. Davenport, of the University of Chicago, and Mr. Raymond Pearl, of the University of Michigan.

The hired vessel was also employed in work on the plankton, under the immediate charge of Professor Reighard and Dr. Ward, and many deep-water hauls were made. The steamer *Shearwater*, belonging to the Commission, was likewise used to a limited extent.

Mrs. Jennings was engaged as artist and gave her time to making pen-and-ink and water-color drawings of algæ and living animals, especially those which do not retain their colors in the ordinary preserving fluids. Mrs. Jennings's work, which is of a high grade, has been placed in the hands of those who are studying the various groups.

WABASH BASIN, INDIANA.

In the summer of 1899 the Commission entered on a systematic study of the physical and biological features of the Wabash River and its tributary lakes and streams, under the direction of Prof. B. W. Evermann. Some inquiries were made in behalf of the Commission by members of the biological station of the Indiana University at Winona Lake, at Bass Lake in Starke County, and Bruce Lake and Tippecanoe River in Fulton County, and several other waters were also examined; but the principal work of the season was addressed to Lake Maxinkuckee, in Marshall County. In view of the intimate relations which exist between the fishes, other animals, and plants of a lake, it seemed desirable for the Commission to make a comprehensive survey of some small body of water representative of the numerous lakes of glacial origin in the Upper Mississippi Valley. Maxinkuckee was selected as being typical of that class, and, in addition, is conveniently located, is a popular resort for fishermen, and has a rich fauna and flora.

Investigations were begun July 1 and continued until the latter part of October. Professor Evermann was assisted by Dr. J. T. Scovell, Prof. C. H. Eigenmann, Messrs. T. B. Evermann, R. S. Gillum, C. Juday, Leonard Young, and T. Large. Both the biological and physical conditions of the lake were carefully studied, and much useful information was collected for the period mentioned. Many lines of soundings, with conjoint temperature observations, were run across the lake, and the location and extent of the bars and deep holes were determined. A sounding machine adapted for use from a rowboat was especially designed and constructed for this work. Material for cataloguing most of the groups of animals of the lake was collected, and many data were obtained regarding the habits, distribution, food, growth, abundance, etc., of the various animals, the fishes naturally receiving most attention. The species of plants in the lake were determined, together with the maximum and minimum depth at which each is found; many of the patches of vegetation on the bottom were mapped out, and the animals associated with each kind of plant were noted. It is proposed to continue the investigations and provide for observations at other seasons of the year.

LAKE MATTAMUSKEET, NORTH CAROLINA.

In the winter of 1899–1900, while the *Fish Hawk* was engaged in surveying the oyster-grounds of Pamlico Sound, Dr. John D. Milligan, of the vessel, was detailed to visit Lake Mattamuskeet and determine the nature of its fish fauna and the fisheries therein prosecuted. A number of trips were made, specimens were collected by means of a fine-meshed seine, and information was obtained by personal observation and from the people living near the shores. Although the winter is an unfavorable time for examining the lake, much information was gathered and a good idea of the character of the fish life was obtained.

The following account is taken from Dr. Milligan's report:

This, the largest lake in North Carolina, is situated in Hyde County; its length is 14 miles and its greatest width 7 miles. The water is very shallow, being only 2½ feet deep over a large part and having a maximum depth of 7 feet in the middle of the western end. In winter and early spring the lake is muddy and roily, owing to strong winds stirring the bottom and to the suspension of light soil and vegetable matter brought from the swamps and farm lands; but in summer the water is generally clear, with a brownish color, and is what is known as "juniper water." The bottom is mostly of fine sand mixed with mud, and is fairly hard.

This section was at one time inhabited by a tribe of Indians, and the lake has received the tribal name of Mattamuskeet. The Indian tradition as to the origin of the lake—which is the popular one to-day—is that it was due to a fire which burned many months, affecting a far larger area than is now covered by the lake. In support of this theory the people point out the blackened and water-worn cypress stumps everywhere abundant near the shores, and argue that the surrounding territory, being swampy and peaty and covered with cypress trees, is even now liable to have just such another fire. Prof. J. A. Holmes, of the North Carolina Geological Survey, states that this tradition is untenable and that Mattamuskeet, like others with the same story of origin—Lake Drummond, in the Dismal Swamp, for instance—is a natural lake.

The lake is fed by draining from swamps and farm lands and discharges through a canal which begins near Lake Landing on the southeast shore and ends in Yeosocking Bay, Pamlico Sound. The northern and western shores are swampy and marshy, while on the south and east there are extensive farms, generally dry and very fertile. Cypress and willow trees form an almost continuous border around the lake and grow far out into it.

The lake supports but little sport fishing and no market fishing, although considerable quantities of fish are taken for local consumption with rod and line and gill net. The turbid and brown water renders the nets less conspicuous and this increases their effectiveness.

While the variety of food-fishes found in the lake is rather small, it embraces a number of first-class species. The most highly prized and the most important from a local standpoint is the white perch (*Morone americana*), which is exceedingly abundant, reaches a large size, and occurs everywhere in the lake and drainage ditches. The yellow perch (*Perca flavescens*), locally called "redfin," is also abundant, but less so than formerly. The blue bream (*Lepomis pallidus*) is very common and ranks next to the white perch in popular estimation. The large-mouth black bass (*Micropterus salmoides*), having the local names of "chub" and "welshman," is present in considerable numbers. The pike (*Lucius reticulatus*) attains a large size and is numerous, and the pickerel (*Lucius americanus*), called "jack," also occurs. Cat-fish (*Ameiurus catus*, and doubtless other species) and eels are abundant. The latter are not much used, although at one time a religious sect called "The Sanctified" made a business of catching eels in the lake and shipping them north.

The only effort to stock the lake seems to have been with carp, about 10 years ago, and was fairly successful, although the fish is not highly regarded in the community. After the West Indian hurricane in August, 1899, a cartload of large carp was found in a hole near the south shore of the lake.

Other species found in the lake are the little sun-fish (*Enneacanthus gloriosus*), the common sun-fish or pumpkin-seed (*Eupomotis gibbosus*), the darter (*Boleichthys fusiformis*), the roach or shiner (*Abramis chrysoleucas*), the stone cat (*Noturus gyrinus*), the dog-fish (*Amia calva*), the hog-choker (*Achirus fasciatus*), the silverside (*Menidia beryllina*), and minnow (*Notropis*).

Besides fishes, shrimp (*Palæmonetes*) and crayfish (*Cambarus*) are abundant, and the blue crab (*Callinectes*) has been found in the canal and in the lake near the outlet. Turtles and terrapin abound, and water snakes are numerous, the "moccasin" (*Tropidonotus*) being most plentiful. Alligators are present, but are not common.

CALIFORNIA, OREGON, AND ARIZONA.

During the first half of the fiscal year Mr. Cloudsley Rutter resumed his special study of the chinook salmon of the Sacramento Basin, and at the same time carried on an investigation of the general fish fauna of the region. He also visited the headwaters of many of the eastern tributaries of the Sacramento River, where no salmon run, and made interesting observations on the fishes and large collections. Between December and July Mr. Rutter was engaged in laboratory work, studying the collections, preparing his reports, and compiling data for an article on the embryology of the salmon as a part of the monograph on the life-history of the species now in course of preparation.

In continuation of the ichthyological examinations of the Pacific coast, referred to in previous reports, a party under charge of Prof. Charles H. Gilbert, of Stanford University, visited the streams between

the northern boundary of California and the Columbia River. The field work began on July 1 and continued until September 27. The results of this season's investigations will be combined with those of 1897, when a similar party explored the coastal streams between San Francisco and the Oregon line. A report on this work is shortly expected from Dr. Gilbert.

Dr. P. H. Kirsch continued his volunteer services in determining the fish fauna of the San Pedro River, devoting a few weeks to the work in the summer of 1899. Only a short stretch of the river now remains to be canvassed, and on its completion a report on the fishes of this interesting tributary of the Colorado will be issued.

AQUATIC FAUNA OF PORTO RICO.

The extensive collections made by the *Fish Hawk* in Porto Rico in the winter of 1898–99 have been distributed among specialists for study and report, with a view to the publication of a comprehensive work on the animals found in the fresh and salt waters of the island. The absence of information regarding the water fauna, the influx of new people, and the inevitable development of the fishing industry, appeared to the Commission to warrant the publication of a work containing descriptions of the animals and illustrations of many of the most important, so that it might be possible for those persons not experts to identify them. The specimens representing the following groups were assigned to the specialists named:

Fishes and other vertebrates, Prof. B. W. Evermann and Mr. M. C. Marsh, U. S. Fish Commission; tunicates, Dr. George Lefevre, Baltimore; mollusks, Dr. W. H. Dall and Mr. Charles T. Simpson, U. S. National Museum; stomatopods, Dr. Robert P. Bigelow, Massachusetts Institute of Technology, Boston; macrurans and brachyurans, Miss M. J. Rathbun, U. S. National Museum; anomurans, Mr. James E. Benedict, U. S. National Museum; isopods, Dr. H. F. Moore, U. S. Fish Commission; leeches, Dr. J. Percy Moore, University of Pennsylvania; polychætes, Dr. A. L. Treadwell, Miami University, Oxford, Ohio; oligochætes, Dr. H. F. Moore; nemertean and planarian worms, Dr. Wesley R. Coe, Yale University; sipunculids and echiurids, Prof. Henry B. Ward, University of Nebraska; holothurians, echini, star-fishes, and ophiurans, Prof. Hubert L. Clark, Olivet College, Olivet, Mich.; crinoids, Prof. W. M. Wheeler, University of Texas; alcyonarians and gorgonians, Prof. C. W. Hargitt, University of Syracuse; corals, Dr. T. Wayland Vaughan, U. S. Geological Survey; sea anemones, Mr. J. E. Duerden, Kingston, Jamaica; sponges, Prof. H. V. Wilson, University of North Carolina; foraminifera, Dr. James M. Flint, U. S. N.; marine algæ, Prof. O. F. Cook, U. S. National Museum.

The study of many of the groups has been completed, and the publication of the reports thereon has begun. It is thought that reports on all the groups will be published during the fiscal year 1901.

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THE ALBATROSS SOUTH SEA EXPEDITION.

By H. F. MOORE, *Naturalist of the Albatross.*

In advance of the complete reports of the scientific expedition to the South Seas of the U. S. Fish Commission steamer *Albatross*, which will be published in the Bulletin of this Commission, the following outline of the cruise is submitted:

The vessel, under the command of Commander Jefferson F. Moser, U. S. N., sailed from San Francisco on August 23, 1899. The scientific work was under the direction of Mr. Alexander Agassiz, assisted by a civilian staff composed of Messrs. A. G. Mayer and W. McM. Woodworth, of the Museum of Comparative Zoology; Mr. Maximilian Agassiz, of Newport, and Messrs. C. H. Townsend, H. F. Moore, A. B. Alexander, and H. C. Fassett, of the Fish Commission. The naval officers attached to the ship at all times showed great interest in the work of the expedition and furthered it by all means in their power. They were Lieuts. Hugh Rodman and B. K. McMorris, Ensigns A. J Hepburn, C. R. Miller, and C. S. Kempff, Surgeon J. C. Pryor, and Paymaster Grey Skipwith.

Between San Francisco and Nukahiva, in the Marquesas Archipelago, the first objective point, 26 soundings were made, resulting in the development of a basin from 2,500 to 3,100 fathoms deep, lying between latitudes 24° 30′ N. and 6° 25′ N., and probably extending at least between longitudes 120° W. and 140° W. For this great oceanic depression Mr. Agassiz has proposed the name of Moser Basin. The floor of the Pacific over this depression, as, indeed, in a larger part of the deep waters explored by the *Albatross*, appears to be pretty completely covered with a deposit of red clay and manganese. The character of the deposit varies at different stations, being sometimes in the form of slabs, but more often composed of rounded nodules of various sizes up to 6 inches in diameter, sometimes smooth and sometimes mammilated, and often inclosing or partially inclosing the teeth of sharks and the hard ear-bones of cetaceans. In the deep waters where the manganese is not found the bottom consists usually of globigerina ooze, gradually changing to pteropod ooze as the depths decrease, then to fine and finally to coarse coral sand as the coral islands are approached, or to volcanic mud and volcanic sand in the vicinity of volcanic groups like the Marquesas and Society islands.

On the morning of September 14, 22 days out of San Francisco, the high island of Ua-Huka, in the Marquesas Group, was sighted, and

the afternoon of that day and the early hours of the following morning were spent in sounding and using the beam trawl and tow nets in the channel between that island and Nukahiva. Between the islands a depth of 830 fathoms was found and the trawl hauls developed an apparently rich bottom, but the nets were so badly damaged by the rocks that comparatively few specimens were obtained.

At 9.30 a. m. on September 15 the anchor was let go in the harbor of Tai-o-hae, Nukahiva Island. This harbor, with a comparatively narrow entrance, is surrounded by high hills sloping almost from the water's edge, and has the appearance of an ancient crater, the seaward walls of which have broken down and admitted the waters of the Pacific. Tai-o-hae is the seat of the French government in the Marquesas Islands, and the members of the expedition were received with great kindness by the government officials and residents. Two days were spent in coaling and the members of the scientific staff utilized the time in making collections on shore. The natives in the vicinity of Tai-o-hae have adopted many of the outward forms of civilization, and many of them live in houses of European architecture of a simple type. In the interior, however, more of the ancient life is to be seen and houses of pure native construction, invariably built on stone platforms, are common, in fact, almost universal. In the forests are found the sites of many old villages, now overgrown with large trees and in some cases almost hidden by vegetation.

The population of the island is decreasing, probably as a result of changes in their mode of life and the introduction of diseases unknown before the advent of the whites, and as a rule the people are subdued in demeanor and apparently convinced that their race is doomed to extinction. The Marquesas Islanders are among the few South Sea Islanders (of whom the ancient dwellers on Easter Island are the most notable) possessing the art of stone carving. Several specimens of rude idols were seen, and the members of the party who had the best opportunity for observing are of the opinion that they are still objects of some veneration, if not of worship.

About noon on September 17 anchor was weighed and the *Albatross* stood out of the harbor for the northwestern end of the Paumotu Archipelago, en route to Tahiti. Soundings were made on this line which, when considered in connection with those obtained before reaching Nukahiva, appear to indicate that the submarine plateau from which the Marquesas Islands arise has a depth of about 2,000 fathoms and a width of 50 miles.

On September 20 Ahii, the first of the low islands, was sighted and before noon of the following day the ship, under the pilotage of a native, entered the lagoon of Rairoa, through Avatoru Pass, and came to anchor. Three days were spent in examining the atoll and making collections. A line of soundings was run across the lagoon, which is the largest in the Paumotus, developing the fact that it has a practically level floor with a depth not exceeding 20 fathoms. This line

was subsequently extended seaward at each end for a distance of several miles, in order to develop the submarine insular slope.

After leaving Rairoa the atolls of Mataiwa and Tikehau were examined from the ship and a landing for a few hours was made at Makatea, an elevated coral island of considerable interest. The cruise was then continued to Tahiti, in the Society Islands, where coal and supplies were to be obtained for the cruise through the Paumotus.

Tahiti was sighted at daylight on September 27 and the anchor dropped in Papeete Harbor on the afternoon of the same day. A week was spent at this port in coaling, laying in supplies, and making minor repairs and overhauling the engine. The naturalists of the party utilized the time in collecting on shore and on the reefs. The harbor is protected from the sea by a barrier reef, part of a long stretch which practically encircles the island, changing from fringing reef to barrier reef, and conversely, as it establishes or loses its connection with the main island. Opposite Papeete the reef is interrupted by a pass, one of many which occur at intervals, through which shipping gains access to the harbor. Papeete is the seat of the French colonial government in the South Sea Islands. It has a garrison of about 200 men, and a cruiser is usually lying in the harbor. The United States and several European governments are represented here by consuls, who are accredited to the French South Sea possessions as a whole. The population is said to be about 5,000, of whom a large number are whites engaged in trade or connected with the government of the island.

On October 5 the *Albatross* sailed from Papeete for a cruise through the Paumotu Archipelago, during the course of which Makatea was revisited and about twenty-five other islands, of which Pinaki was the easternmost, were examined. During this cruise much information was gathered concerning the formation of the islands of the Paumotus, which furnish a fairly complete series, from the typical atolls like Rairoa to the elevated coral plateau of Makatea.

A landing was made at Makatea and a party crossed the island to a village on the east side. The top of the coral table-land exhibited a slight depression in the interior, and the rocks are eroded by subaerial agencies into a picturesque diversity of caverns, small canyons, and pinnacles, unlike anything seen elsewhere on the cruise. The precipitous walls, which in places rise sheer from the sea, and elsewhere are fringed with narrow beaches and reef flats, by their terraces and lines of caverns eroded by the waves, indicate that the island has passed through four periods of elevation. The cliffs are most precipitous on the weather side, and the terraces best developed on the more sheltered shores. The vegetation is richer and more varied than on the low islands of the Paumotus subsequently visited.

Stops varying in length from six days to an hour or two were made at a number of the islands, and wherever opportunities occurred collections were made by the naturalists of the expedition. The trawl and dredge hauls, which were in depths of from 725 to 2,440

fathoms, yielded but meager results, and the surface and intermediate tow nets also took but little. The collecting on the reefs and in the shallow water was unproductive, as compared with similar collections in the West Indies, although some interesting forms occurred in considerable abundance. About 100 soundings were made in this part of the cruise, and the contour of the bottom and the extent of the main Paumotu plateau west of Pinaki were fairly delineated.

In that part of the Paumotu Archipelago visited by the *Albatross* the natives showed, in their habitations, boats, utensils, and mode of life, the influence of somewhat intimate contact with the whites. On some of the larger islands are stationed gens d'armes, the local representatives of the French colonial government, and traders and missionaries are found almost everywhere. Nukatavake was the only island where the expedition noted any approach to primitive conditions, and the stop there was too short to enable the members of the party to make more than the most casual observations. It is probable that in the eastern islands more of the old life obtains than in those parts of the archipelago in more immediate communication with Tahiti. The people are much under the influence of missionaries, mostly Tahitians, although some are whites, and while their morality is perhaps not all that could be desired, they exhibit considerable zeal in their religious observances and some rivalry between the various sects. At Pakaka, on Apataki, with a population of perhaps 200, the members of the expedition observed four churches, and were informed that there was one more, a representation which it would be difficult to duplicate in a village of the same size in the United States.

Three days were spent at anchor in the lagoon off Rotoava on Fakarava, where is located the French residency for the Paumotu Archipelago. Like most of the larger villages of the eastern Paumotus, Rotoava is well kept, with a broad main road shaded by cocoanut trees stretching along the lagoon front, the coral soil compacted to a smoothness resembling concrete. The usual collections and observations were made and the ship sailed on October 14. A stop of very short duration was made at Anaa, an island rich in cocoanut trees and supporting the densest population in the archipelago. A curious fish trap or weir, constructed of coral rocks, was observed on the reefs at this place, the fish being removed from it at low water with dip nets. The lagoon of Anaa is one of great beauty, and its brilliant colors reflected on the clouds were visible many miles away, long before the island itself was sighted.

After leaving Anaa the islands of Tahanea, Tuanaka, Raroia, Takume, and Taenga were visited, but the first stop, six days, was made at Makemo, where bad weather delayed the arrival of a coal supply ordered from Papeete. The naval officers utilized the enforced stay in making a survey of Northeast Pass and its anchorage, which have been inadequately charted, and in carrying on magnetic and astronomical observations of value to mariners. The reef flat in the

sea face of Makemo is narrower than at Rairoa, and its outer edge is extremely rugged, with gnarled tongues of nullipore-covered rock thrust seaward, leaving between them gullies in which the water wells with the surf. In places where the end walls of the gullies are abrupt the heavy swells, which roll almost unceasingly in this region of the trades, dash vertically aloft in spouts sometimes 20 feet or more in height. The nullipores grow most luxuriantly in those parts of the reef which are reached by the spray, and consequently the sea verge of the reef is raised above the level of the flats behind, and around the blowholes there is usually a partial rim, which slopes away like the flanks of a crater. At Makemo and nearly all islands where the outer edge of the reef has a nullipore ridge with a comparatively narrow reef flat behind there is a channel about a foot in depth, through which the water dashed over the rim flows in rather swift currents parallel with the shore, until it finds a lateral channel permitting it to flow back to the sea. In some places at Makemo, Fakarava, and elsewhere this canal is incompletely eroded, and consists of a network of small channels from 6 to 18 inches in depth, where the sand and fragments of coral rock washed back and forth by the currents show clearly the mechanical agents by which the scouring out of the ledge rock has been effected. At Makemo there is also a narrow cut, as yet but 2 to 4 feet deep, through which the tide rushes into the lagoon at high water and which is doubtless a pass in embryo. A contemplation of this and various other cuts in different stages of formation was convincing that passages through the rims of atolls are, at least sometimes, formed by erosion rather than by discontinuity in the growth of corals. After the cut has once reached a depth where the sea has access to it at or near low water the cutting away of the rocks must proceed more rapidly, as swift currents are continually discharging through the gaps on the lee side of the atolls the vast quantities of water which the waves wash over the low rims of reef on the weather side. In some of the passes of the Paumotus there is a current of 7 or 8 knots flowing from the lagoon seaward which is sometimes merely checked and not reversed, even at high water.

Hikueru was visited principally for the purpose of examining the pearl fishery in the lagoon, which has no entrance sufficiently deep to float even a large boat, the small sloops and catboats used in the fishery being dragged and carried over low places in the reefs. The lagoon is opened to fishing one year out of three, when the small resident population is augmented by a heavy influx from most of the Paumotu Islands and some of the Society group—at the time of the visit of the *Albatross* it being estimated that over 3,000 persons were on the island. The fishery is carried on entirely by naked native divers—men, women, and the larger children. The men frequently go to a depth of 15 fathoms, staying under water from two to three minutes, and the best divers are said to sometimes reach a depth of 20 fathoms. The members of the party saw a man bring up several

shells from water 14 fathoms deep, after an immersion of two minutes and forty seconds. The yield of mother-of-pearl is large, but apparently decreasing. Pearls are not so frequently found here as in other islands of the archipelago where the shells are less abundant.

After leaving Hikueru a stop was made at Nukatavake, as before mentioned, and a landing was also made at Pinaki, where the lagoon was found almost inclosed, shoal, with over 100 small islets of Tridacna shells, and apparently in process of filling up.

From Pinaki the *Albatross* went to the Gloucester Islands, where valuable observations were made, and then via Mehetia to Tahiti.

On November 6 the expedition again arrived at Papeete, where it remained until November 15, coaling and refitting. During both this and the first visit the expedition was received with much courtesy by the people of Papeete, who, in addition to the extension of hospitality, in a number of cases provided facilities and rendered assistance to the members of the party in carrying on their work. In addition to the shore and reef collection, several members of the party examined most of the valleys in the vicinity of Papeete, and made soundings and observations in Lake Vaihiria. The population of the island is restricted to a narrow fringe around the coast, the interior, with its high peaks and narrow spurs, separating equally narrow valleys, being ill adapted to the temperament and necessities of an ease-loving people like the Polynesians. A road, mostly in good condition, encircles the island, and, with the sea, affords the sole means of communication. The reef skirting Tahiti is principally of the barrier type, sheltering a channel from the sea and affording a smooth passage for small craft navigating the coast. In some places the channel is of sufficient depth to afford passage and harbor to vessels drawing 15 feet, and the steamers, which come several times a year to load fruits for the Australasian colonies, are able to take berths near the plantations from which they draw their supplies.

The soil of Tahiti, as is usual in volcanic islands, is fertile and the vegetation luxuriant. Cotton and sugar are produced, but appear to be less important than formerly. Coffee grows almost within reach of the sea. There is an increasing production of vanilla, which is said to be of excellent quality; and the oranges grown on the island are unsurpassed. The plantations are all on the strip of lowland along the coast and in the lower and broader portions of the numerous valleys which furrow the island radially from the high interior. Papeete, the capital, has a trade of some importance, being the distributing point for the entire French South Sea Establishments and the port of transhipment of their products of copra and pearl shell.

The beauty of the island is unsurpassed by anything seen on the cruise. Its high, rugged mountains, one exceeding and several others almost equaling 7,000 feet in height, the many cascades and waterfalls plunging over precipitous valley walls or leaping from ledge to ledge on the flanks of the ridges, its dales and valleys, with rapid

coursing streams and wealth of tropical verdure, form the elements of a picture as rich in detail as it is bold in ensemble.

The shore line is fringed with cocoanut palms, and the small sandy islands on the reef are given up to the culture of the same tree. Much of the uncultivated land along the coast and in the lower parts of the valleys is given up to dense thickets of guavas, which, since their introduction some years ago, have, together with the lantanas, spread with such amazing rapidity that they have become a nuisance. In the upper parts of the valleys the wild plantain, or "fei," with its great upright bunches of fruit, as distinguished from the drooping bunches of the banana, grows in abundance and is an important item in the dietary of the natives, who carry it to their homes along the coast. Wild oranges, limes, and shaddocks are common and excellent in quality; calladiums grow in the marshy spots; tradescantias in places almost choke the streams; and along their damp margins, where level tracts free of rocks occur, a species of wild ginger, the rhizomes of which are used in making a native curry, grows in dense thickets, and in November exhales a delicious aromatic odor from its flowers, just peeping a few inches above the ground. Higher up the valleys dracænas and tree ferns occur, tillandsias and the bird's-nest fern depend from the larger trees; clambering vines, creeping pandanus, and the giant fern abound among the rocks; a variety of trees, including an occasional sandalwood, clothe the hillsides, and a host of small and delicate plants cling to the precipitous rock faces, where dripping waters keep them perennially moist.

In the streams the gamy little perch-like *Dula* lies in the pools, shrimps of the genus *Atya* court the shelter of stones and aquatic vegetation, and a crab of the family *Thelphusidæ* scales the vertical faces of the overhanging rocks with astonishing celerity and always out of reach. A little kingfisher is always found along the streams and their dry beds, apparently depending more upon insects, which it catches on the wing, than upon the usual food of its kind, and in the woods are at least two species of pigeons and other smaller species. A large hawk was also several times observed attempting to catch the ducks which make Lake Vaihiria their home, but it is said to be an imported species. High up the valleys the frigate bird is always to be seen sailing about the almost inaccessible crags where it makes its nest; and a little white tern is commonly seen in Tahiti, as at Nukahiva, far inland, and occasionally resting upon the trees.

On the reefs the fauna is hardly more rich than in the Paumotus. The living corals are in most places neither abundant nor varied. The solitary fungia is scattered over the reef flats, in shoal water, and there are patches of reef-forming corals about the edges of the dead rock, and more or less impoverished-looking clusters on its submerged top, but nowhere apparently are there flourishing masses such as were seen in the pass at Rairoa. Gorgonians and Alcyonaria generally are poorly represented in both the Society and Paumotu archipelagoes;

several species of starfish are common, but not abundant, and there are 4 or 5 species of sea-urchins and several holothurians. A species of *Grapsidæ* is common about the rocks along the shore and exposed on the reefs, and by raising the coral fragments and breaking them in pieces several small crabs were found, together with stomatopods and shrimps and prawns and other species of crustacea, and a number of worms were collected in the same manner, although less extensively than in the Paumotus.

Tahiti proved interesting and attractive, especially on the second visit, after the monotony of the atolls of the Paumotus, and it was left with some regret on the morning of November 15.

Some of the Leeward Islands of the Society group were visited, with anchorages overnight at Tahaa and Bora Bora, and a short stop was made at Aitutake, in the Cook group. The Leeward Islands, like the rest of the Society group, consist of bold and picturesque volcanic peaks skirted by coral reefs and reef islets on a broad shore platform, and Aitutaki resembles them, but its peaks are low and its structural features in general on a smaller scale.

The next place visited was Niue, an isolated, elevated, coral island, with bold precipitous terraced walls, rising to a height of from 150 to 200 feet above the sea. The surface of the island is comparatively level and less elaborately sculptured by erosion than is Makatea, which it resembles in a general way. The vegetation is far inferior in luxuriance and variety to that of the Society Islands, but excels that of the atolls of the Paumotus. Some attempt has been made to raise sugar, but the fields did not look promising.

From Niue the *Albatross* steamed to latitude 21° 18′ S., longitude 173° 31′ W., where a sounding and Blake trawl haul were made in 4,173 fathoms, the greatest depth at which a trawl has ever been used. A species of sponge, allied to a form before known only from comparatively shallow water, was taken. In latitude 21° 18′ S., longitude 173° 51′ W., a sounding of 4,540 fathoms was obtained.

Early in the morning of November 28 the magnificent cliffs of Eua were sighted, and just before noon, after coasting the east, south, and part of the west shores of the island, anchor was dropped in English Roads, off Ohonua village. The east side of Eua presents the highest and finest coralliferous limestone cliffs seen during the cruise, and they excited the admiration of all on board. Eua was left on the following morning after an examination of its general features, and a short run was made to Nukalofa, the capital of the Tonga Islands, where the members of the expedition were kindly received by King George, the officers of his government, and the people. The government of the Tonga group is a limited monarchy under the control of the natives, and the islands appear to be well conducted and orderly. Tongatabu, on which the capital is situated, is somewhat elevated in its southern part, but slopes gradually away to the northward, where it is continued over the plateau as a number of small islets and reefs.

The interior of the island is level and the soil apparently fertile and cultivated more or less by the natives, who ship their fruits to the English colonies in Australasia. A large proportion of the people are owners of a horse or two, which they use in their agricultural operations and for the transportation of their products to the coast.

The collections here were not extensive, as the reef and waters in the neighborhood of the anchorage exhibited an unusual paucity of life. A trip was made to the village of Hihifa, where there is a remarkable rookery of fruit bats, occupying about fifteen adjoining trees and estimated to contain upward of 6,000 individuals. Although these animals destroy considerable quantities of fruit, they are "tapu" and under the immediate protection of the chief of Hihifa. They are not permitted to be shot or molested in any manner, and it was only after considerable negotiation that the members of the expedition were allowed to catch three specimens, which were taken back to the ship alive. Nowhere else on the cruise were fruit bats of this or any other species found in colonies of more than a score.

After leaving Nukalofa, the Namuka and Vavau groups of the Tonga Archipelago were visited and examined with relation to their exposed and submarine structure. At Namuka Iki there is a small area of stratified volcanic rock, soft and friable, and said to resemble somewhat the so-called soapstone of the Fiji Islands. Namuka Iki is the convict settlement of the Tonga Islands. A number of rude huts were seen on the island, some of them showing indications of quite recent habitation, and several recently cultivated yam plantations were observed, but the inhabitants, who are few in number, kept out of sight. Namuka Island, from Namuka Iki but a few miles distant, is composed of uplifted coralliferous limestone, the weather shore being extremely rugged and much eroded by the seas. In the interior are several rounded eminences of moderate height, but upon examination these were also found to be composed of limestone.

Residents of Namuka stated that some of the islands of the group are volcanic, and those seen from the ship appeared to be. The Namuka Group is, therefore, of mixed formation, partially volcanic and partially of elevated coral limestone.

From Namuka the course lay between the western chain of volcanic islands and the plateaus of the Namuka, Hapai, and Vavau groups. Lette, of the volcanic chain, is still active and some of the others have been the scene of recent activity. Falcon Island, which appeared above the sea in 1885 as a low volcano, with a cone of loosely compacted ash and scoriæ, had been entirely washed away by 1898 and reduced to the condition of a breaking reef, much as it appeared when first discovered in 1865.

No landings were made on the islands of the Hapai plateau, but some of the westernmost were seen to be limestone islands of considerable height. The Vavau Group, comprising the most northern islands of the Tonga Archipelago, is one of picturesque beauty. The northern

part of the principal island, Vavau, is high and bold, with precipitous shores, but it slopes away to the southward where it breaks up into an intricate maze of headlands and islands, gradually decreasing in size and height until they are lost beneath the sea as breaking reefs on the southern edge of the plateau. This archipelago of islets is evidently the eroded remnant of a single high coral island, of which Vavau is the largest fragment, which formerly covered the entire plateau and was, perhaps, connected with the Hapai Group.

The *Albatross* anchored at Neiafu, Vavau, on the morning of December 4 and left in the afternoon of the following day. The harbor is well protected, but the water is rather deep. It is approached through a fine fiord with precipitous coralliferous limestone walls, from which a number of flat-topped rocks and islets have been cut off by the erosive action of the sea. At Neiafu the rocky walls of the fiord are interrupted and a broad slope extending into the interior gives room for the village and an ample cultivated acreage behind it. Several trading stations are situated along the cove, one on the starboard side in entering being in a situation of almost idyllic beauty.

The island is generally well wooded and produces a variety of fruits and vegetables. The natives are of the Maori race, like those of Hawaii, Samoa, and the islands which the *Albatross* visited to the eastward. Here, as in the other islands of the group, tapa, the bark cloth of the South Seas, is produced in considerable quantities, and the rap rap of the tapa club is heard everywhere and all day long. A few corals were collected at Neiafu, but the other collections were poor.

From Vavau the vessel ran to the Fiji Islands, making a short stop at Kambara in the Lau Group, and then proceeding to Suva, where nine days were spent in refitting and coaling. A number of cases of specimens were packed up and shipped from this port, previous shipments having been made from Papeete.

Suva is the seat of the British Government in the Fiji islands, and the expedition was kindly received by the colonial officials, who, among other courtesies, provided an excellent guide and carriers for a party which visited the interior. The town has a population of less than 2,000, of whom a large proportion are whites. The harbor is good, protected from the prevailing easterly winds by a high point and from the swell of the open sea by a coral reef traversed by a deep pass which forms the entrance. The anchorage is good, and vessels of considerable draft can lie alongside the wharf. Extensive collections having been made by Mr. Agassiz on a former expedition to the Fijis, but little collecting was done along the coast, and three members of the party made an excursion into the interior of Viti Levu, the principal island of the archipelago.

This island is the largest and most populous visited by the *Albatross*. Its interior is mountainous, but the peaks are neither so high nor steep as those of Tahiti, about 4,000 feet being the greatest altitude, and the valleys are broader. The principal river, the Rewa, entering the

sea a few miles east of Suva through an extensive delta, is a broad stream navigable for light-draft steamers for a distance of 30 miles or more from its mouth. Launches make daily trips from plantations up the river to Suva, and it is important as an avenue for the transportation of cane to the mills, substantial steel barges towed by launches being used for the purpose. The natives also carry their fruit and produce on bamboo rafts, which are floated downstream to the delta and thence to Suva. The valley of the Rewa is populous and fertile, and a number of plantations are located on its banks. Oranges and related fruits, which in a feral state abound in the Society Islands, were rarely seen growing wild in Viti Levu, and the fei, although it probably occurs, does not hold an important place in the diet of the natives, who subsist largely on fish, yams, taro, and breadfruit. As in all the volcanic islands visited, as contrasted with the atolls, the meat of the cocoanut is not much eaten, though its oil is used in preparing certain dishes and its water is used as a beverage. A sort of glutinous pudding, prepared by pounding up cooked taro with cocoanut oil, is highly regarded as a delicacy, and the stone pestles used in its preparation are found in every household. The Fijians, like the Samoans, Tongans, and other Polynesians, drink kava, which is an infusion of the comminuted roots of a species of pepper (*Micropiper*). Formerly the green roots were reduced to a pulp by mastication, but for hygienic reasons this has been prohibited, and the dried roots are now pounded in a mortar or grated. The beverage is not fermented, and intoxicating properties are denied to it by recent investigators.

The weather side of the island is well wooded and fertile, the vegetation is luxuriant and in general more massive in character than in Tahiti, and the filmy growths of tropical forests are less conspicuous.

The Fijians are a sturdy, independent race with dark skins and fine physiques. The women have less beauty than those of the Maori race, but many of the men are fine specimens of vigorous, athletic manhood. As a rule they are not given to toil, and to supply labor for the plantations there have been large importations of Indian coolies, whose physical inferiority to the natives is striking.

In the coastal regions of Viti Levu there is more or less admixture of Tongan blood, and the color, especially of the chiefs, is lighter than among the mountain people of purer Papuan descent. For the most part the natives live in houses of pure Fijian architecture, those of the chiefs, especially, being well constructed and often neatly kept. Some of them have the beams and pillars neatly and ingeniously ornamented with wrappings of cocoanut fiber sennit in various designs and colors, and in the house of the chief at Rewa the woodwork is hardly to be seen for the closeness of its ornamentation.

As chiefs of districts and villages the old native ruling classes have been given a certain amount of authority under the British colonial government, and the natives are well satisfied and contented without having lost their natural independence of character. As a race they

are intelligent, and some of the chiefs have been well educated in the schools of the Australasian colonies, speaking English with fluency and being well informed of the events of the world.

The common people and some of the chiefs live much as they did before the advent of the whites, excepting that they have, of course, long given up their tribal wars and some of the practices arising therefrom. Most of them are professed Christians and in form, at least, are more devout than some of their white neighbors. In the vicinity of Suva white influence is seen in the dress of the women, a cotton gown reaching to the ankles, and the men wear cotton loin cloths, or sulus, and shirts, the chiefs dressing in white. In the interior of Viti Levu, however, and at Kambara, the dress of many of the women is a skirt of fiber reaching to about the knees, and the men wear the sulu without covering to the upper part of body. Except in a few places, practically all of their household utensils are of home manufacture after their ancient models, and their villages are innocent of corrugated iron. A few large, double-sailing canoes are still to be seen, but there are none approaching in size the great war crafts of former times, and in the neighborhood of Suva, at least, they are fast giving place to sloops and cutters, whose general superiority the native appreciates.

Before reaching Suva four soundings, ranging between 324 and 600 fathoms, were made among the southern islands of the Lau Group, and another of 990 fathoms was made about 13 miles west of Kambara. After leaving Suva no soundings were made until in latitude 12° 43′ S., longitude 179° 50′ W., a depth of 1,445 fathoms was found about midway between Fiji and the Ellice Islands. The trawl and tow nets were used at this station with rather meager results and this constitutes practically the only work of the kind between Suva and Yokohama, although the surface net was used on several occasions. The following day a sounding of 245 fathoms was found at a point about half a mile south of Nurakita Island. This island, usually known as Sophia Island, is owned by a white man who has erected an apparently substantial building, and is inhabited by Samoans in his service.

From Nurakita the *Albatross* proceeded to Funafuti, when anchor was dropped in the lagoon off the village of Fongafale on the afternoon of December 23. Funafuti is one of the few atolls which have been well surveyed. It is almost 15 miles long and about 10 miles wide, its greatest length being nearly due north and south, and its width east and west, magnetic. The depth of the lagoon will average 24 fathoms, but it is considerably shoaler on the west side, and there are many reefs and coral patches scattered everywhere over the lagoon, these being readily recognized in the sunlight by the light-green color in contrast with the blue of the deeper water. Outside of the atoll the water is deep, soundings of 1,000 fathoms being obtainable within 2 or 3 miles of the shores and still deeper water being found beyond. Funafuti is, in fact, the summit of a steep submarine peak. The land lies on the eastern and southeastern rim of the

atoll and consists of a number of long and extremely narrow islands on the reef flats. It is widest, about 600 yards, at the easternmost point, where the village is situated, but elsewhere it is rarely a third as wide. A large part of the land consists of coarse coral shingle and rubble overgrown by an almost impenetrable scrub, but near the village it has a more sandy soil, supporting a growth of cocoanut trees. There is also in the vicinity of the village a slightly brackish sink or shallow pool where taro is grown and whose verge supports a few banana and breadfruit trees, the first that the expedition found growing on an atoll. In 1897 a boring 1,100 feet deep was made at Fongafale to determine the depth of the coral formation and the character of the underlying structure of the atoll.

The population of Fongafale, which is the only inhabited island on the atoll, is stated to be about 250, with a native government under the protection of the British flag. The natives are all Christian and extremely devout, Sunday being entirely devoted to religious observances and services at other times being frequent. On Sundays the men dress in shirts and trousers and some wear coats, and the women appear in loose flowing wrappers of cotton stuff and hats of a style never seen elsewhere, but which are the pride of their owners and the glory of Fongafale. On ordinary occasions the women wear nothing but a short skirt of pandanus-leaf strips sewed to a waistband.

The chief and one or two others have houses built of coral rock and plaster upon European models, but the majority of the dwellings are of native design, but of several types, as if extraneous influences had been at work. The most common type, and the one probably indigenous to the island, has a floor or platform over the whole or a large part of the space occupied by the house, raised about 2 feet above the ground, a sort of picket fence preventing the encroachment of pigs and dogs beneath. Another type is without a platform, but the ground is covered with a neat layer of white coral shingle and pebbles, over which mats are spread when one wishes to sit or lie down. Houses of this character, probably of Samoan origin, usually have no permanent walls, but a sort of native "venetian blind," made of broad mats of cocoanut leaves, is arranged so that it may be raised or lowered as occasion requires.

The natives of Funafuti are quite different in appearance from those of the Fiji Islands, belonging to the Maori race, which inhabits the islands to the eastward. During recent years, at least, they have had considerable intercourse with the Samoans, whom they resemble in appearance, and it is not improbable that the Ellice Islands were populated by emigration from the Samoan Archipelago, which is distant between 500 and 600 miles. A Samoan teacher was present on the island at the time of the visit of the *Albatross*, and so far as could be judged his influence was paramount to that of the chief. The natives were hospitable and kindly disposed, and exerted themselves for the pleasure and entertainment of the members of the expedition. With the exception of two Roman Catholic missionaries, who contem-

plated leaving on account of the coldness of their reception by the already Christianized natives, there were no white men resident on the island. The white trader had died several months before and no one had taken his place. The supply of tobacco, soap, and some other necessaries was exhausted, and the members of the party availed themselves of an active demand for these articles in making collections of ethnological specimens, a fairly complete collection of fishing appliances being secured.

During the two days spent at Fongafale the naturalists of the party made collections of corals and other specimens on the reefs. Great difficulty was encountered in getting specimens of fish, not only at this island, but everywhere in the South Seas. It was rarely that fish could be taken on a line, and the few captured generally belonged to species of which specimens were easily obtainable. Places presenting opportunities for hauling the seines were comparatively few, owing to the coral growths on the bottoms of the lagoons, and on the outside of the atolls there were usually no places whatever where a net could be set. Gill nets were tried in a number of places and in several ways, and traps of various types were set where strange and gorgeously beautiful fish were swarming, but only the most meager results were obtained. Fishes in considerable numbers and variety could always be seen about the corals, but on the slightest alarm they would withdraw into the numerous holes and crannies, where they were secure against all attempts to catch them.

Attempts to secure specimens and fish for the officers' mess from the natives were no less abortive. The South Sea Islanders everywhere pay more or less attention to fishing, but in a desultory way and upon a small scale and, except when they go out to sea after flying-fish and bonito, rarely make catches of considerable size. In lagoon fishing they usually catch barely enough for a meal for themselves. They use a large variety of apparatus—traps differing in type in every group, but all made upon the principle of our own lobster pots, seines, dip nets, scoop nets, hooks and lines, and spears. The nets are nearly all made by the natives of twine composed of fibers indigenous to the islands, and many of the lines are also of home manufacture, although the cotton line of the whites is used more or less in many places. The natives generally exhibit considerable skill in making twine and cordage, and examples were seen which in strength and workmanship were not inferior to the products of machinery. Iron hooks obtained from traders are now extensively used in most of the islands, but in some cases barbless ones are preferred to the ordinary type, and for some kinds of fishing the native hooks of pearl shell and bone are found more effective. For catching the bonito and kindred species the natives and white residents of the islands claim that nothing equals a sort of native "fly," which, with slight modifications, was found everywhere from the Paumotus to the Marshalls. It consists of a pearl-shell shank to which a slightly curved and retrorse point

of bone or shell is firmly lashed and furnished with a tuft of stiff fiber to serve as a lure. For lagoon fishing a hook made of a single piece of lamellibranch or gasteropod shell is sometimes used, and for shark fishing recourse is still occasionally had to the ancient hard-wood hook; but both of these types have been largely displaced by iron and steel, in some cases the natives adapting the new materials to the old familiar models.

Iron wire has also almost displaced hard wood for the armament of the fish spears, although the old model, with its crown of six or eight points, is still adhered to from the Paumotus to the Carolines. Spearing fish is practiced on the reefs at night when the flaring lights of cocoanut-leaf torches are used to lure the fishes from their hiding-places among the corals.

The *Albatross* left Funafuti on December 26, and sailed for the Gilbert Islands, coasting the island of Nukufetau en route. Between the Ellice and Gilbert islands she encountered much bad weather, with wind and rain, and it was found impossible to make soundings. In the Gilberts the islands of Arorai, Onoatoa, Taputeuea, Apamama, Maiana, Tarawa, Apaiang, Maraki, and Taritari were coasted and examined. Landings for a few hours were made at most of them, excepting Taritari, where the ship entered the lagoon and lay at anchor for a day and a half off the village of Butaritari.

Eleven soundings were made in the Gilberts, and the indications are that these islands, like the Ellices, are the summits of rather steep submarine peaks rising from a depth of about 2,200 fathoms. No landing was made at Arorai, but natives who came off in a boat stated that there was a small sink or pond, but no lagoon. Maraki has a lagoon of considerable relative size, but, with the exception of two small, shallow passes, practicable for boats only, it is entirely inclosed. With the exception of Arorai and Maraki, all of the Gilbert Islands visited by the *Albatross* have lagoons, which are only imperfectly inclosed by land, the western part of the atolls, as a rule, consisting of reefs, without the sandy linear islets which characterize the weather side. Some of the atolls have a double fringe of islets, a peculiarity which was nowhere seen in the Paumotus, but which was afterwards noticed in certain of the atolls of the Marshall Archipelago.

On the morning of January 5 the ship entered the southern passage of Taritari atoll, under the guidance of a white pilot, and early in the afternoon came to anchor off the village of Butaritari, where she remained until the morning of January 7. The lagoon is full of coral patches of all sizes, from a few feet in diameter up to reefs of considerable size, and a collection of the characteristic species was obtained. The shore and reef collecting proved poor in those portions of the atoll within reach of the ship, and circumstances did not permit this branch of the work at any considerable distance from the anchorage. In company with some of the white residents and natives a trip was made to the reefs near the entrance for the purpose of making a collec-

tion of the reef-dwelling fishes by means of explosives, but the attempt was attended with but poor success, owing, the natives stated, to the fish having been scared away by previous operations. Explosives for catching the fishes on the reefs and poisons for taking them in the small tidewater pools, where, from their shy and secretive habits, it is difficult to secure them with nets, are perhaps the only feasible means of making extensive ichthyological collections under the conditions prevailing in the South Seas, and the expedition was handicapped by not possessing the means for working along these lines. On the whole, the biological collections on the coral islands were disappointing, and far less than similar effort would have yielded in the waters of the West Indies or on the coast of Japan.

At the various islands where stops were made a few ethnological specimens, principally fishing and canoe implements and articles of adornment, were gathered, but as a rule the time was too short for collecting of any sort. The houses differ somewhat in different islands, but typically consist of rather high cocoanut-thatch roofs supported on blocks of coral rock or posts about 3 feet high. Many of them, but not all, have floors on a level with the eaves, a scuttle or hatch giving access to the compartment above, which is used for sleeping purposes and as a storehouse. On some of the islands where no landing was made, e. g., Taputeuea, the corner stones, which are usually about 10 or 12 inches square in cross sections, were seen in places along the beach, sometimes quite in the open, on bare sand flats, the rest of the house having disappeared.

On all of the islands visited more or less attention is given to the cultivation of a large rank-growing species of taro, which has probably been introduced from some of the volcanic islands of other groups where it is indigenous. The taro patches are artificially constructed trenches dug in the sandy soil and usually for some distance into the underlying coral rock and filled with an accumulation of vegetable mold, which lying, as it were, in a more or less impervious basin, is kept constantly moist by the rains. These beds are carefully cultivated and fertilized by household refuse and other materials, the soil from time to time being loosened up and added to by materials sifted through a sieve of cocoanut fiber. At Apamama a spade made of a pearl shell lashed in a cleft stick is used in agricultural operations. Bread fruit grows sparingly, and in general the fauna is more varied than in the Paumotus.

The natives are smaller and of slighter build than those of the Ellice Islands, and their color is somewhat darker and the hair generally straighter and coarser. The men wear a pandanus-leaf mat reaching to below the knees, and the women are clothed in skirts of stripped leaves, which form a very scant covering. As a rule, they are a wild-eyed people, especially the women, and formerly they were fierce and warlike, completely clothing themselves for battle in armor made of closely woven cocoanut-fiber sennet. They are still under the

government of native chiefs, but under the protection of Great Britain. There are white and Chinese traders on a number of the islands, and at Butaritari there is a little colony of whites, mostly Germans.

Between Taritari and Jaluit soundings were made at intervals of about 50 miles, which indicated a remarkable uniformity of depth of between 2,411 and 2,505 fathoms, and at a point 5 miles off the south point of Jaluit atoll 1,937 fathoms was found. Jaluit was reached on January 9, and after a stay of five days, spent in coaling, the expedition left for a cruise through the Marshall Archipelago, the course being through the Ralick chain as far as Rongelab and thence back to Jaluit via the Ratack chain. The following atolls were visited in order: Jaluit, Elmore, Namu, Kwajalong, Rongelab, Likieb, Wotje, and Arhno, stops being made at the last four and at Jaluit.

Twenty-six soundings were made during the exploration of the Marshalls, which indicate that the islands rise rather abruptly from a depth of 2,000 to 2,600 fathoms. A depth somewhat less is found between some of the atolls, but in general the soundings do not indicate the existence of the two extended ridges from which the Ratack and Ralick chains have been supposed to arise. The Marshall Islands are nearly all atolls of considerable size, Kwajalong having a length of about 65 miles, and all of the others visited except Arhno being 30 miles or more on their longest diameter. With hardly an exception their rims are composed principally of reefs awash or but slightly submerged, making them dangerous objects to approach at night or in heavy rains. The islets on the reefs are almost invariably small and in some cases are ranged in a double series, one near the outer and the other near the inner edges of the reef. The studies of the Marshalls, Gilberts, and Ellice islands on the one hand and of the Paumotus on the other supplemented one another in a very satisfactory manner, the former furnishing data concerning the action of the formative agencies producing the several varieties of land masses and the latter exhibiting the characters of the substructure upon which the islets rest. The dynamic studies in the Marshalls and Gilberts are doubtless of general application, but the character of the underlying formations in these groups can not be predicated from the knowledge gained in the Paumotus. The Carolines may in a measure serve as a guide, but the differences between the Society and Paumotus islands, which are even more intimately associated geographically than are the Carolines and Marshalls, induce caution in drawing conclusions based on relations of propinquity.

There are ship passes and anchorages in most of the lagoons, but as they are more or less studded with coral patches it is dangerous to enter them except in bright weather. The *Albatross* was detained over three days at Arhno Atoll on account of heavy rains and overcast skies, which made crossing the lagoon hazardous. Considerable rain was met with in the Marshalls, which appear to have a moister climate than most of the low islands.

The vessel returned to Jaluit on January 29, and a week was spent in coaling and overhauling the machinery. During this and the previous visit the naval officers of the expedition were engaged in making magnetic and astronomical observations and in a survey of that part of the atoll in the vicinity of the anchorage and Southeast Pass. Opportunities for doing such work were few during the cruise, but whenever a chance presented itself it was embraced with enthusiasm. A collection of corals and other biological materials was made at Jaluit and Arhno, but as usual the reef collecting was not prolific, and neither trawl hauls nor tow-net collections were made in this part of the cruise nor afterwards. From the time the ship entered the Paumotus until she left the Carolines specimens were taken by means of the submerged electric light and scoop net whenever she came to anchor in the lagoons or lay to off the islands at night. In the aggregate a good many specimens were taken in this way, and they represent practically the entire pelagic catch after leaving Suva, but being almost invariably taken in the lagoons or close to shore, the proportion of larvæ and immature individuals of reef-dwelling animals is very large. Judging from the appearance of the water and the specimens taken in the scoop net, the pelagic life of the waters west of the Marshalls is richer than among the eastern islands of the Pacific, where more pelagic work was done.

The flora of the Marshall Islands, like that of all atolls, is limited, about equal in richness to that of the Gilberts, but excelling the Paumotus. At Jaluit the white residents have imported several species from the Carolines, but most of them can be made to grow only with difficulty. There are a few bananas, pineapples, limes, and other plants, some of them set out in soil imported for the purpose from the volcanic islands to the westward, and one or two small gardens of European vegetables have been painfully established in the same way. It is almost pathetic to see the struggles of some of the Europeans to surround themselves with the familiar things of their far-away homes and to supply a few vegetables to break the monotony of the diet to which they are necessarily restricted by residence on an atoll.

The breadfruit flourishes better in the Marshalls than in the low islands of the southern groups, and the jack fruit is also common. The natives subsist principally on the cocoanut, the fruit of the pandanus, and fish, although the breadfruit and jack fruit are used to some extent where they have been introduced and taro is grown on some of the islands. Arrowroot starch in cocoanut shells was seen at one or two of the islands, but the pia plant, from which it is obtained, was not observed, and the product may have been imported. During the season when the pandanus is ripe it appears to be almost the sole vegetable food, and piles of the woody portion of the fruit are seen in the refuse heaps of every domicile. It is eaten raw, when it has a sweet taste something like sugar cane, and is also scraped and made into large sheets or cakes, which are smoked and dried for

preservation. As in all of the low islands, the kernel of the cocoanut is eaten, and the oil expressed from the grated meat is used in the compounding of the few "made dishes" affected by the natives.

The Marshall islanders exhibit much skill in canoe building and navigation. The canoes were formerly made of driftwood, as most of the islands did not furnish trees of sufficient size or suitable structure, but material derived from the whites is now used to some extent. The sailing canoes are often of considerable size, and are made of a number of pieces sewed together with cocoanut fiber sennit and calked with pandanus leaves, cocoanut fiber, and the gum of the breadfruit or jack trees. The hull is skillfully designed, and with the large triangular mat sails trimmed close they point up well and are quite speedy. Like all South Sea canoes, they are provided with outriggers, always kept to windward. These islanders also used a chart made of sticks and small shells, indicating the positions of the islands and the currents. They are said to be quite expert in navigating their canoes from island to island by means of these charts, but are sometimes not as successful with the white man's sloop, which is coming more and more into use by the natives, especially the chiefs.

The women are adepts at mat making and often show considerable taste in the border designs, which are worked in black, brown, and yellow, in contrast to the white body color. The material used is prepared pandanus leaves, with another fiber for some of the stitching, and the dyestuffs are of native production. These mats are worn as clothing, the women using two, held at the waist by a girdle to form a sort of skirt, and the men wearing one as a breechcloth. The men also, with ludicrous effect, occasionally wear a pair of garments made of strips of pandanus leaves, one being thrust beneath the girdle in front and the other behind, so that they hang over like a pair of horsetails, reaching to about the knees.

At Jaluit and some other islands the natives, especially the chiefs and their families, dress in clothing fashioned after that of the whites, and at one island the men wear calico petticoats in lieu of trousers.

The Marshall islanders appear to be slightly larger in stature than the Gilbert islanders and with somewhat heavier frames. Their color is also darker, although in this respect our observations do not agree with some of the published statements concerning them. They are less hospitable than the Fijians and Maoris, but everywhere exhibited a friendly disposition. There is much sickness among the islands, usually of a type introduced by the whites, and the German Government has established a hospital at Jaluit, where the natives receive excellent treatment.

During both visits of the *Albatross* to Jaluit, which is the seat of the German government of the Marshall Islands and the headquarters of the several trading companies, the members of the expedition met with the kindest and most hospitable treatment from the Herr Landeshauptmann, his officers, and the white residents.

Jaluit was left on February 5 by way of the Southwest Pass, which has deep water, but is skirted on the lagoon side by a long fringe of reefs. Namorik was passed in the night, and on the afternoon of February 7 the *Albatross* reached Kusaie, the first of the Caroline Islands. A boisterous sea was encountered in this part of the cruise which not only prevented sounding, but made it inexpedient to enter Chabral Harbor, as contemplated, its mouth being open to the full force of the trade winds, and it was nightfall when the ship came to anchor in Port Lottin, the approaches to which were in smoother water. The room in this harbor is circumscribed and the published plan is inaccurate, and a hurried survey was made by the officers of the vessel during the day and a half spent there.

Kusaie, which is 10 or 12 miles in diameter, is a high volcanic island, with its central peak, Mount Crozer, rising to a height of 2,155 feet, and several others almost equaling it in altitude. The shores are largely formed of mangrove swamps traversed by a network of confluent channels and bayous, in which respect it resembles the delta regions of Viti Levu and some of the other large islands of the Fijis, and differs from the Society Islands, where the mangrove was not seen anywhere. Many of the streams of Kusaie have no definite mouths, but in their lower courses become lost in the mangrove swamps. The entire coast of the island is fringed by reefs lying outside of the mangrove swamps and interrupted in but three places by harbor mouths, and, by using the bayous and the shallow channels back of the reefs, canoes can travel around considerable parts of the coast in smooth water, even when a heavy sea is running outside.

The vegetation of Kusaie is dense and varied. Here the vegetable ivory tree, the most majestic of the South Sea palms, was first met with by the expedition. Its fruit is an article of commerce, being utilized in the production of articles for which ivory was formerly used. Fruits and vegetables and some excellent beef were obtained here for the use of the ship.

On February 10, the day following her departure from Kusaie, the *Albatross* reached Pingelap, where she lay to without sending a party ashore. Pingelap is an atoll of irregular shape and hardly 3 miles in diameter. There are three islands on the reef, between which fierce war was formerly waged until one gained the ascendency and brought all under its rule, since which the population has increased so rapidly that the people can barely support themselves upon the scanty yield of the soil and the fisheries, their only resources. A party of natives, including the chief, who came off to the ship, stated that although the people are all professed Christians, the missionary vessel never calls there, and they are left to the religious ministrations of a native.

Ponape, the capital island of the former Spanish administration of the Carolines, was reached on February 11, and a stop of less than a day was made at Kiti Harbor, on the south side, Jakoits, the northern port and seat of government, not being visited. The inner harbor has

good water and bottom, but the approach through the narrows is much restricted by coral reefs on each side, and as the stay of the *Albatross* was to be brief she anchored in the outer harbor, the entrance to which is easy. Ponape closely resembles Kusaie in its general characters, but is somewhat larger, having a diameter of about 15 miles, with a central peak rising to an altitude approaching 2,900 feet. The reef platform surrounding the island is, however, much broader than at Kusaie, being upward of 2 miles across at Kiti Harbor and much wider on the north shore. There are a number of islands on the reef, some of them of volcanic origin, probably detached portions of the main island, while others, for example those near Kiti Harbor, are, like the islets of typical atolls, composed of reworked coral sand and fragments from the reefs. Behind the sandy islets, which are mostly on the edge of the reef and near the harbor mouths, there is, at least to the eastward of Kiti Harbor, a channel with some depth.

A small river, about 100 feet wide at its mouth and several feet deep, flows into the head of Kiti Harbor, but the entrance to it is so obstructed by a bar that the boats could only enter it with ease near high water. It contains many small fish, though apparently of but few species, and its banks support a rich vegetation. There are several white men at Kiti Harbor and some small plantations of bananas and other fruit trees. The breadfruit, jacktree, and vegetable ivory palm all attain a large size, and the royal poinciana, with its scarlet blossoms on otherwise almost naked branches, was found in abundance.

The last stop made by the *Albatross* in the Caroline Archipelago was at Moen or Uala Island, in the Truk group, which was reached on February 14 and left on February 17. The Truk group consists of about a score of volcanic islands and islets surrounded by a barrier reef, with a diameter of about 70 miles, and supporting numerous low, sandy islets having the appearance, as viewed from the ship, of the islands usually found on atoll rims. The northern part of the reef is said to be much broader than the southern, where it varies from about one-third to one-half mile in width, with many interruptions. The high islands, which are volcanic in formation, vary from 12 miles in length to inconsiderable islets, several of them possessing peaks 1,200 or 1,300 feet high. Each of these islands is surrounded by a narrow fringe of reef, and in fact the group as a whole looks like an exaggeration of the conditions observed at Kusaie and Ponape, the lagoon being merely the reef channel of those islands enormously widened and considerably deepened and surrounding a group of smaller islands instead of one large one.

In addition to the islands at which stops were made, the islands of Andema, Namu, Losap, the Royalist group, and Namonuito were coasted, and their general characters observed from the ship.

The land fauna of the Carolines is much richer in proportion to the land area than in any of the other islands visited by the *Albatross*. In the Ellice, Gilbert, and Marshall islands land birds are extremely

uncommon and of but few species, the avi-fauna being poorer than in the Paumotus. The Society and Fiji islands are progressively richer, but it was not until the Carolines were reached that the woods and thickets seemed full of birds and resounded with their songs and cries. Parrots and pigeons of several species, white-eyes, flycatchers, kingfishers, and many other species were observed at Kusaie, Ponape, and Truk, and the collections, which, in spite of effort, had languished for lack of material after leaving Suva, began to offer some returns to the shooters notwithstanding the brevity of the opportunities, which made it impossible to secure a really representative collection. Two species of herons, seen nowhere else, resembling one another more or less in color, but differing greatly in size, were taken at Ponape.

Four species of bats, three of which are represented in the collections, were observed in the Carolines. Three of them belong to the Frugivora, while the fourth is insectivorous, the only species of its kind observed except at Viti Levu. The fruit bats appear to subsist mainly on the flowers of the poinciana, and especially on the island of Ponape must exist in large numbers, as from one to twenty were seen in almost every tree of that species. Several species of lizards were collected, and it is probable that careful collecting in all parts of the islands would show a much more extensive reptilian fauna than that observed in the eastern islands of the Pacific.

The natives of the several Caroline islands visited differ more or less in appearance and present customs and social conditions. In Kusaie and Ponape they have been brought into more intimate contact with the whites, from whom they have copied their clothing and in a measure their houses. The women wear long loose gowns or "mother hubbards," and the men usually dress in the shirts and trousers—the former, in regulation tropical style, worn outside—and most of them have hats. In Truk, however, this dress, although occasionally seen, is rare, the men wearing a breechcloth reduced to the utmost limit and the women a cincture or loin cloth of cocoanut fiber reaching to the knees. The upper part of the body is usually naked, but is covered on occasion by a sort of poncho, a straight strip of cloth about 6 feet long, with a slit in the middle through which the head is thrust.

The people of Truk, especially the men, are much given to personal adornment. The face is heavily powdered with turmeric, the hair is worn in a high knot on the crown of the head and bound with strips of bright cloth, necklaces of various materials are worn in profusion, and from the pierced and extravagantly stretched lobes of the ears depend looped chains of cocoanut-shell rings, which are often 4 or 5 feet long and form a bunch 6 inches long and 2 inches in diameter.

The natives of Truk are taller and more slender than the people of Kusaie and Ponape. The men are well formed and athletic looking, but with somewhat effeminate faces, owing in a measure to their lavish adornment and the manner of wearing the hair. The younger women are often comely and both sexes are more yellow than the Kusaie

and Ponape people, an effect which is heightened by the profuse application of turmeric to their complexions.

At Kusaie the houses which appear to represent most nearly the native type are built of half-round sticks lashed horizontally to a framework and are thatched with cocoanut leaves. Some of them are elevated on platforms, provided with porches, and divided into rooms, but there is reason to believe that all of these features, excepting perhaps the first, are copied from the whites. At Moen Island in the Truk group the houses are larger, with the ends open or closed by a sort of shed leaning against the main structure. Several families, or the married members of the same family, reside under the one roof, a row of small compartments for their occupancy stretching along each side of the house, leaving a broad central aisle, or hall, which is used as a general living room, workshop, and storehouse. Canoes are housed and sometimes built in the main hall, and the various household utensils and fishing appliances are stored there.

The women of some of the Carolines—e. g., Kusaie and Truk—weave a coarse cloth from the fibers of the banana, which is spun into a thread by rolling several fibers together upon the naked thigh and knotting the lengths into a continuous piece. In Kusaie the warp is laid up on small ornamented benches with pins, and at Truk the same purpose is attained by laying the thread around pins driven into the ground in proper relationships of distance and position. The hand looms are of simple type, alike at the two islands mentioned, but much larger at Truk. The cloth is still extensively used for clothing at Truk, but not so much at Kusaie.

The people of Kusaie and Ponape are mild, peaceable, and friendly, but those at Truk still engage in tribal wars and are said to be warlike and treacherous, a reputation which the members of the expedition believe to be justified. They still fight with spears, but many of them are provided with good firearms.

Six soundings were made, one near Namu Island, where 525 fathoms was found; another about three-quarters of a mile south of Port Lotton, Kusaie, where the depth was 371 fathoms, and four others at places removed from insular influence, which show apparently that the islands of the archipelago rise rather abruptly from a depth of upward of 2,000 fathoms, the extremes being 2,162 and 2,533 fathoms. After leaving the Carolines the soundings gradually deepened until, in latitude 12° 51′ N., longitude 145° 46′ E., about 100 miles southeast of Guam, 4,813 fathoms was found, but in latitude 13° 08′ N., longitude 145° 25′ E., approaching the Ladrones, the depth had decreased to 2,337. A few months before, as was learned at Guam, the U. S. S. *Nero*, while sounding out a cable route, had found over 5,000 fathoms somewhere near the same place, and the *Challenger*, during her famous cruise around the world, made a sounding of 4,475 fathoms farther to the westward, but evidently in the same basin, which is established as one of the deepest holes in the world, almost equaling in depth the great Tonga Deep.

Guam was sighted the morning of the 21st of February, and after coasting the eastern, northern, and part of the western shores the ship came to anchor in the harbor of San Luis d'Apra. The coast of the northern part of the island resembles that of Makatea and Niue, with limestone cliffs in places several hundred feet in height, but the southern part is volcanic, and near Agaña contacts were found which indicated that the igneous rocks had burst through the preexisting limestone, though there is reason to believe that some of the elevated calcareous rocks farther south are more recent than the igneous rocks with which they are in contact. The northern part of the island is flat-topped, although considerably eroded, while the southern half is rolling and hilly.

The harbor of San Luis d'Apra is well sheltered, in part by high land and in part by a long stretch of reef with a narrow opening, and since the occupation of the island by the United States it has been thoroughly surveyed by the naval officers stationed there. There is only a small village at the harbor, but a good road leads to the populous town of Agaña, the capital, several miles distant, and a telephone line now connects the two places. Agaña lies on the seacoast, but a reef with but very shallow passes makes it useless as a harbor, except for very small craft. It is built partly in the Spanish style, partly native, and partly a mixture of the two, and under the energetic administration of Governor Leary many of its unsanitary features have been corrected and it presents a clean and orderly appearance. Its principal buildings are the palace and the offices of administration, the barracks, and the hospital, all built by the Spaniards, and which either face or immediately adjoin the parade or plaza in the center of the town. The population is said to number over 6,000.

The island is about 27 miles long and 7 or 8 miles wide, and its general topography has already been indicated. It has a moist climate, not excessively hot, and is fairly well watered; the streams, however, are small and are said to be shrinking as a result of cultivation and the clearing of the forests. Oranges, shaddocks, limes, bananas, breadfruit, and all the tropical fruits are found, and corn, rice, sugar, tobacco, sweet-potatoes, and other imported plants are cultivated.

The population is a mixed one, consisting of the natives or Chamorros, with a few Filipinos and Caroline Islanders, and a mixture of the first two with Spanish blood. The Americans complain of the extreme indolence of the native population, a characteristic which their Spanish predecessors appear to have recognized, as they imported natives of the Carolines for labor on some of the public works. A small village of Caroline Islanders near Agaña, left stranded by a contractor who had imported them, still maintains in a measure the Caroline manner of living. Most of the people speak Spanish, but some are endeavoring to learn English since the cession of the island to the United States.

The *Albatross* left Guam on February 25, and after coasting Rota,

a high limestone island, laid a course for Yokohama, Japan. The only other island of the long Ladrone chain sighted was the northernmost, Farallon de Pajaros, an active volcano, with an elevation of over 1,000 feet, which, from a distance of 25 miles to the westward, appeared to have steam and smoke issuing from several vents. At its southern end there is a smaller, less lofty portion, either detached or with a low connection with the main island.

On March 4 the *Albatross* came to anchor outside of the breakwater at Yokohama, but she afterwards moved into the inner harbor. Until May she was refitting, repairing engines, and in dry dock at Uraga, but early in that month she proceeded on a dredging expedition in the direction of the Inland Sea. About 70 dredge, trawl, and tangle hauls were made in Sagami and Suruga bays, and the Sea of Ise and adjoining parts of the coast. The work was practically all inside of the 100-fathom line and on the edge of the Kurosiwa or Black Current, the great warm stream which flows from the south along the east coast of Japan and sweeps northward along the Kurils and the Aleutian Chain, where it becomes the great North Pacific Drift. This great stream bears much the same relation to the shores of Asia that the Gulf Stream bears to the east coast of North America, and in the same manner its warm waters bear a rich pelagic fauna, furnishing food and a congenial environment to the host of animals which live on the bottom. The trawling was very good, and rich collections of fish, crustaceans, worms, echinoderms, and mollusca were obtained. Two large tanks were filled with specimens of *Metacrinus*, a "stone lily," formerly rare, and stalkless crinoids of several species were obtained in large numbers. The Alcyonarian fauna is rich and varied and a considerable collection of these beautiful organisms was obtained, and a number of siliceous sponges, including half a score of the beautiful glass-like Venus' flower basket (*Euplectella*), were taken in the trawls. For taking these delicate organisms in an uninjured condition the apparatus used by the *Albatross* is not so good as the long lines used by the Japanese fishermen, which have adventitiously yielded to science the fine collection of sponges in the Imperial University of Tokyo.

The crustacean fauna of the edge of the Black Current and the coastal slopes of Japan is especially rich in the suborders Macrura and Brachyura, to which the shrimps and the hermit crabs, spider crabs, etc., respectively, belong.

After finishing the dredging operations the *Albatross* returned to Yokohama, where she coaled and sailed for Hakodate on June 1. Several trawl hauls were made en route to the latter port and a short and unsuccessful search was made for a reported dangerous rock off Kinkwazan. The ship was much delayed by fogs and reached Hakodate on June 8. After coaling she sailed June 12 for Alaska, where she was at the end of the fiscal year.

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REPORT OF THE DIVISION OF STATISTICS AND METHODS OF THE FISHERIES.

By C. H. Townsend, *Assistant in Charge.*

At the commencement of the present fiscal year, most of the statistical field agents of the division were engaged in canvassing the fisheries of the New England States. Maine was canvassed by Mr. John N. Cobb; New Hampshire by Messrs. W. A. Wilcox and T. M. Cogswell; Massachusetts by Messrs. Wilcox, Cogswell, and Ansley Hall; Rhode Island by Mr. E. S. King, and New York and Connecticut by Mr. C. H. Stevenson. At the same time Mr. W. A. Roberts was engaged in statistical work in New Jersey, and Mr. John B. Wilson was temporarily engaged in canvassing the wholesale fishery trade of Boston. Upon the completion of the work in the fall, all of these persons were employed in the arrangement of the data collected and in other necessary office work.

Mr. C. H. Townsend, assistant in charge, after a brief visit early in July to certain fishery centers of the New England States in company with the statistical agents, returned to the office. In August he was, on account of previous experience in deep-sea investigations, detailed as a member of the scientific staff to assist Prof. Alexander Agassiz on board the steamer *Albatross*, then starting upon a voyage of deep-sea exploration through the South Pacific Ocean. Mr. Townsend accompanied the expedition as far as the Fiji Islands, from which point he returned to Washington. Arriving there in January, he remained in charge of the office until near the close of the fiscal year.

In October Mr. Stevenson began work in North Carolina in connection with the steamer *Fish Hawk*, then engaged in investigations respecting the oyster-grounds of that State. His inquiries were in large part prosecuted on shore, and were continued, with some interruptions, until March.

In December Mr. Cobb commenced a canvass of the fisheries of Lake Erie, the work being completed in February.

Mr. Wilcox left in May for the Columbia River to commence a canvass of the fisheries of the Pacific coast. The fisheries of Oregon and Washington were taken up first, in order that the extensive salmon fisheries of the Northwest coast might be studied while the canneries were in operation. The work is still in progress.

Capt. S. J. Martin and Mr. F. F. Dimick, local statistical agents of the division stationed at Gloucester and Boston, continue to submit monthly reports on the fisheries at those places. The information is tabulated in the office and distributed regularly to the fishery trade in the New England States.

The results of the work of this division are presented elsewhere from year to year in the publications of the Commission as detailed statistical reports on the commercial fisheries of different sections of the country, or special papers on the methods of conducting the fisheries.

Single-sheet bulletins containing advance statistics in condensed form are distributed for the information of the fishery trade in the regions to which they refer. The following have been issued during the year:

No. 13. Fisheries of New York and New Jersey, 1898.
No. 14. Statement of quantities and values of certain fishery products landed at Boston and Gloucester by American vessels during the year 1899.
No. 15. Fisheries of the New England States, 1898.
No. 16. Fisheries of Lake Erie, 1899.

FISHERIES OF LAKE ERIE.

An inquiry respecting the commercial fisheries of Lake Erie in 1899 shows an important increase in the yield of these fisheries since they were last canvassed. This applies not only to the quantity of products, but also to their value, the amount of capital invested, and the number of persons employed. Decided increases are shown in the yield of white-fish and lake herring. The yield of pike perch continues to be large, although it has not increased over that of former years. These species are extensively propagated artificially, and it is believed that their cultivation is producing excellent results. In 1899 the fisheries of this lake yielded 58,393,364 pounds of products, valued at $1,150,890. The total number of persons engaged was 3,728, and the investment amounted to $2,719,654.

The vessels employed numbered 104 and were valued, with their outfits, at $439,077. The apparatus of capture which represented the greatest value was pound nets, of which 1,298 were in use, valued at $313,125. Gill nets are next in importance, 41,678 being in use, and valued at $229,182.

Among the products herring are preeminent, 33,470,633 pounds having been taken, worth $431,894. The catch of pike and pike perch was 9,325,991 pounds, valued at $302,296. White-fish was taken to the amount of 2,066,314 pounds, worth $152,009. It is interesting to note that carp, now abundant in this lake, are extensively utilized, the catch amounting to 3,633,697 pounds, worth $51,456.

The two following tables show the persons, apparatus, and capital employed in the fisheries of Lake Erie in 1899, and the quantities and values of the different species obtained in the fisheries of the lake in that year.

Table showing the persons, apparatus, and capital employed in the fisheries of Lake Erie in 1899.

Items.	New York.		Pennsylvania.		Ohio.		Michigan.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Persons employed:										
Vessel fishermen	55		156		363				574	
Transporters and shoresmen	104		102		537		10		753	
Boat fishermen	817		206		1,208		110		2,401	
Vessels, apparatus, etc.:										
Steamers fishing	10	$34,000	25	$60,200	50	$187,200			85	$281,400
Tonnage	157		284		796				1,247	
Outfit		7,070		20,235		36,200				63,571
Steamers transporting			1	1,000	16	63,500	2	$10,200	19	74,700
Tonnage			16		351		51		418	
Outfit				400		15,790		3,216		19,406
Boats	134	9,955	49	8,055	630	57,797	63	3,059	876	79,466
Pile-drivers			10	1,155	48	22,705	11	2,190	69	26,050
Seines	4	400			92	7,425	8	565	104	8,390
Gill nets	6,279	39,168	11,364	66,002	24,035	123,922			41,678	229,182
Pound nets			50	19,900	988	259,475	260	33,750	1,298	313,125
Trap nets	24	1,035	102	3,710	257	10,400	43	1,230	426	16,375
Fyke nets					535	15,130	82	620	617	15,750
Lines, etc		2,620		90		902				3,612
Shore property and cash capital		227,145		275,265		1,071,110		15,107		1,588,627
Total investment		321,393		456,102		1,871,022		70,537		2,719,054

Summary of the quantities and values of the species of fishes obtained in the fisheries of Lake Erie in 1899.

Species.	New York.		Pennsylvania.		Ohio.		Michigan.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Black bass	10,579	$822	38,299	$3,031	83,714	$5,933	1,154	$80	133,746	$9,866
Carp	9,505	190	12,195	244	3,417,094	47,176	194,903	3,846	3,633,697	51,456
Cat-fish	136,243	4,087	100,727	3,022	704,029	21,503	61,705	1,839	1,002,704	30,451
Crappie			60,000	1,800					60,000	1,800
Herring	3,321,558	43,554	10,742,315	134,142	19,389,822	253,609	17,938	539	33,471,633	431,904
Perch	257,932	4,391	815,553	16,911	2,174,564	30,310	67,447	1,013	3,315,496	52,625
Rock bass					5,296	91			5,296	91
Sheepshead	10,130	102	57,993	580	1,043,818	6,792	35,181	177	1,147,122	7,651
Sturgeon	627,433	40,997	99,570	7,090	50,094	4,519	12,305	786	789,402	53,392
Sucker	93,370	1,068	120,245	1,339	1,171,782	12,920	183,337	2,750	1,568,734	18,077
Sun-fish			125,000	3,750	36,800	407	13,040	205	175,440	4,362
Trout	29,242	1,510	722	61	2,060	165			32,024	1,736
Pike and pike perch	840,244	32,369	1,609,940	48,575	6,371,497	194,993	504,310	26,359	9,325,991	302,296
White bass	45,432	908	454,434	8,039	1,055,951	20,046	40,707	1,010	1,596,524	30,003
White-fish	172,456	10,907	615,821	46,690	1,049,578	76,276	228,459	18,136	2,066,314	152,009
Other fish	200	14	190	13	108	9	550	39	1,048	75
Frogs					982	172			982	172
Turtles					67,211	2,324			67,211	2,324
Total	5,554,324	140,019	14,853,004	275,887	36,624,400	677,305	1,361,636	56,779	58,393,364	1,150,890

For purposes of comparison the following table is given, showing the yield and value of the fisheries of Lake Erie in former years:

Species.	1880.		1885.		1890.		1893.		1897 (fiscal year).
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.
All varieties	29,087,300	$474,880	51,456,517	$1,109,096	64,850,873	$1,000,905	42,068,325	$805,979	(*)
White-fish	8,833,800		3,531,855		2,341,451		1,202,410		689,906
Herring	11,774,400		19,354,900		38,868,283		20,931,076		19,038,289

* Information on all species not obtained.

FISHERIES OF LAKE ONTARIO.

The commercial fisheries of this lake, after several years of decrease, now show a gratifying increase, the products being, in quantity and value, nearly three times as great as in 1897, the year when last investigated. The same increase is shown in the amount of capital invested, and the number of persons employed is much greater. Fish-cultural operations here are apparently giving good results, the plantings of white-fish and pike perch having been noticeably beneficial.

The total number of persons engaged in the commercial fisheries in 1899 was 391. The capital invested amounted to $80,350. The fisheries yielded 2,407,132 pounds of products, worth $101,130.

Among the products cat-fish are prominent in quantity and value, 518,423 pounds, worth $18,834, being taken. The yield of perch was 407,017 pounds, valued at $11,822. The catch of sturgeon was 189,955 pounds, worth $17,843. Pike and pike perch, 297,801 pounds, were worth $16,127, and white-fish, 161,935 pounds, were worth $10,978.

The figures for Lake Ontario include, however, the fisheries of the St. Lawrence and Niagara rivers. In the St. Lawrence 69 fishermen obtained 81,900 pounds of products in 1899, valued at $6,988; in the Niagara River 7 fishermen procured 13,170 pounds, worth $484.

Table showing the persons employed in the fisheries of Lake Ontario in 1899.

How engaged.	No.
On vessels transporting	5
In shore fisheries	373
Shoresmen	13
Total	391

Vessels, apparatus, and capital employed in the Lake Ontario fisheries in 1899.

Items.	No.	Value.	Items.	No.	Value.
Vessels transporting	2	$1,000	Apparatus—Continued.		
Tonnage	22	.....	Dip nets	4	$20
Outfit	.....	90	Set and hand lines	.....	1,355
Boats	287	8,482	Spears	9	7
Apparatus:			Fishing machines	4	400
Seines	24	420	Shore and accessory property	.....	18,440
Gill nets	1,187	18,674	Cash capital	.....	20,200
Pound nets	1	60			
Trap nets	144	5,790	Total	.....	80,350
Fyke nets	451	5,412			

Table showing the species and yield of the fisheries of Lake Ontario in 1899.

Products.	Lbs.	Value.	Products.	Lbs.	Value.
Black bass	48,046	$3,133	Sucker	278,738	$5,101
Cat-fish	518,423	18,834	Sun-fish	148,449	2,099
Carp	1,000	50	Trout	15,432	853
Eels	123,840	6,163	Pike and pike perch	297,801	16,127
Herring	85,478	3,736	White bass	2,300	92
Long-jaw or bloater	1,300	77	White-fish	161,935	10,978
Minnows	22,700	1,593	Frogs	1,750	306
Perch, yellow	407,017	11,822			
Sturgeon	189,955	17,843	Total	2,407,132	101,130
Rock bass	102,968	2,323			

FISHERIES OF BOSTON AND GLOUCESTER.

The reports of the agents of the Commission stationed at these ports show a large increase in the quantity and value of fishery products landed during the year. The figures for 1899, as compared with those of the previous year, exhibit an increase of 33,370,561 pounds, valued at $1,204,564. The total quantity of products landed by American vessels was 176,774,301 pounds, worth $4,193,652. The total number of fares was 7,820.

At Boston there has been a slight increase in the total quantity and value of products as compared with 1898. This is shown both in the supply derived from the eastern banks and from fishing-grounds off the New England coast. There has been an increase in the quantity of both fresh and salted fish and in the value of fresh fish, with a small decrease in the value of salted fish. The increase in the quantity of fresh fish landed was 9,956,659 pounds and $390,831 in value. In the salted fish the increase amounted to 88,500 pounds, with a decrease in value of $4,125. The total increase in fresh and salted fish amounted to 10,045,159 pounds, and $386,706 in value.

The total quantity of products landed at Boston was 64,724,729 pounds, valued at $1,428,346. The number of fares was 3,866, of which 183 were from the eastern banks and 3,683 from grounds off the New England coast. The fresh and salted fish from the eastern banks amounted to 9,908,910 pounds, valued at $246,206, and from grounds off the New England coast to 54,815,819 pounds, valued at $1,182,140.

Summary, by fishing-grounds, of certain fishery products landed at Boston, Mass., in 1899 by American fishing vessels.

Fishing-grounds.	No. of trips.	Cod, fresh.		Cod, salted.		Cusk, fresh.		Haddock, fresh.	
		Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. long.:									
La Have Bank	54	786,500	$18,481			220,000	$3,172	552,910	$14,107
Western Bank	48	1,263,400	25,282	50,000	$1,250	55,000	687	170,800	4,674
Grand Bank	8								
Burgeo Bank	2								
Bacalieu Bank	1								
Off Newfoundland	27								
Cape Shore	42	407,000	8,095			67,600	480	286,000	6,873
Gulf of St. Lawrence	6	6,000	90						
Total	183	2,462,900	51,948	50,000	1,250	342,600	4,498	1,009,710	25,654
West of 66° W. long.:									
Browns Bank	65	1,114,500	19,007			271,500	2,878	1,224,000	21,614
Georges Bank	378	3,090,400	73,629			94,500	1,166	6,438,000	131,405
Cashes Bank	31	220,000	4,088			109,000	1,074	121,700	3,725
Clark Bank	4	24,500	500					120,000	1,750
Pippenies Bank	1	3,000	75					1,000	13
Middle Bank	336	648,400	16,501			15,800	186	1,573,800	37,626
Jeffreys Ledge	261	563,200	14,397			82,200	453	1,183,500	30,867
South Channel	552	4,694,300	104,451			145,500	1,819	9,115,200	193,050
Nantucket Shoals	161	2,058,200	80,788					188,200	3,860
Off Highland Light	81	266,100	6,556			3,000	39	450,900	11,464
Off Chatham	87	353,300	7,706			13,000	210	624,300	15,494
Shore, general	1,728	4,185,750	108,115			75,700	1,035	3,094,850	77,676
Total	3,683	17,221,650	385,808			760,200	8,855	24,135,450	528,544
Grand total	3,866	19,684,550	437,756	50,000	1,250	1,102,800	13,353	25,145,160	554,198

Summary, by fishing-grounds, of certain fishery products landed at Boston, Mass., in 1899 by American fishing vessels—Continued.

Fishing-grounds.	Hake, fresh.		Pollock, fresh.		Halibut, fresh.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. longitude:						
La Have Bank	297,000	$3,992	33,500	$458	194,400	$15,258
Western Bank	211,600	2,067	18,000	173	341,100	28,459
Grand Bank					150,000	7,500
Burgeo Bank					115,000	5,750
Bacalieu Bank					50,000	3,500
Off Newfoundland					180,000	10,600
Cape Shore	107,000	1,235	7,600	77	16,500	1,677
Gulf of St. Lawrence					285,000	15,000
Total	615,600	7,294	59,100	708	1,332,000	87,744
West of 66° W. longitude:						
Browns Bank	165,000	1,885	3,000	98	119,300	9,163
Georges Bank	370,700	4,986	68,400	641	85,060	7,977
Cashes Bank	276,500	3,043	6,500	64	2,000	217
Clark Bank	10,000	75	1,500	18	1,400	168
Fippenies Bank	15,000	150	1,000	10		
Middle Bank	758,300	8,946	34,500	469	8,700	914
Jeffreys Ledge	1,100,100	12,156	257,400	2,646	2,700	255
South Channel	3,689,700	42,236	236,000	2,183	39,250	4,434
Nantucket Shoals	62,300	482	120,700	1,281	1,400	126
Off Highland Light	256,200	3,454	11,400	140	575	60
Off Chatham	261,900	3,060	36,500	384	200	16
Shore, general	902,500	11,941	445,850	4,241	13,400	1,388
Total	7,874,200	92,414	1,227,750	12,175	274,585	24,718
Grand total	8,489,800	99,708	1,286,850	12,883	1,606,585	112,462

Fishing-grounds.	Mackerel, fresh.		Mackerel, salted.		Other fish, fresh.		Other fish, salted.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. long.:								
Western Bank					2,000	$60	10,000	$225
Off Newfoundland					3,020,000	52,975	1,005,000	13,850
Total					3,022,000	53,035	1,015,000	14,075
West of 66° W. long.:								
Georges Bank					1,073,700	48,884		
Middle Bank	8,800	$1,119						
Jeffreys Ledge					1,500	111		
South Channel	55,500	4,810			1,400	96		
Nantucket Shoals	9,000	675						
Off Chatham	1,500	160	25,000	$2,500	1,782	69		
Shore, general	723,952	37,141	171,400	12,195	1,235,450	21,671	13,000	195
Total	798,752	43,905	196,400	14,695	2,313,832	70,831	13,000	195
Grand total	798,752	43,905	196,400	14,695	5,335,832	123,866	1,028,000	14,270

Fishing grounds.	Total, fresh.		Total, salted.		Grand total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
West of 66° W. longitude:						
Browns Bank	2,902,300	$54,640			2,902,300	$54,640
Georges Bank	11,221,360	268,688			11,221,360	268,688
Cashes Bank	735,700	12,211			735,700	12,211
Clark Bank	157,400	2,511			157,400	2,511
Fippenies Bank	20,000	248			20,000	248
Middle Bank	3,048,300	65,761			3,048,300	65,761
Jeffreys Ledge	3,146,600	60,885			3,146,600	60,885
South Channel	17,976,850	353,079			17,976,850	353,079
Nantucket Shoals	2,439,800	37,207			2,439,800	37,207
Off Highland Light	988,175	21,713			988,175	21,713
Off Chatham	1,292,482	27,099	25,000	$2,500	1,317,482	29,599
Shore, general	10,677,452	263,208	184,400	12,390	10,861,852	275,598
Total	54,606,419	1,167,250	209,400	14,890	54,815,819	1,182,140

Summary, by fishing-grounds, of certain fishery products landed at Boston, Mass., in 1899 by American fishing vessels—Continued.

Fishing-grounds.	Total, fresh.		Total, salted.		Grand total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. longitude:						
La Have Bank	2,084,310	$55,468	.....	.....	2,084,310	$55,468
Western Bank	2,061,900	61,352	60,000	$1,475	2,121,900	62,827
Grand Bank	150,000	7,500	.....	.....	150,000	7,500
Burgeo Bank	115,000	5,750	.....	.....	115,000	5,750
Bacalieu Bank	50,000	3,500	.....	.....	50,000	3,500
Off Newfoundland	3,200,000	63,575	1,005,000	13,850	4,205,000	77,425
Cape Shore	891,700	18,646	.....	.....	891,700	18,646
Gulf of St. Lawrence	291,000	15,090	.....	.....	291,000	15,090
Total	8,843,910	230,881	1,065,000	15,325	9,908,910	246,206
Grand total	63,450,329	1,398,131	1,274,400	30,215	64,724,729	1,428,346

There were 112,049,572 pounds of fish landed at Gloucester, valued at $2,765,306, an increase over the previous year of 23,325,402 pounds and $817,858. The increase is shown in the quantity and value of both fresh and salted fish, in the former amounting to 9,436,768 pounds, worth $252,391, and in the latter to 13,888,634 pounds, worth $565,467.

The fares landed at Gloucester numbered 3,954, of which 867 were from the Eastern banks and 3,087 from grounds off the New England coast. The total of fresh and salted fish from the Eastern banks was 72,924,652 pounds, valued at $1,750,896, and from grounds off the New England coast 39,124,920 pounds, valued at $1,006,410.

Summary, by fishing-grounds, of certain fishery products landed at Gloucester, Mass., in 1899 by American fishing vessels.

Fishing-grounds.	No. of trips.	Cod, fresh.		Cod, salted.		Cusk, fresh.		Cusk, salted.	
		Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. long.:									
La Have Bank	200	4,102,386	$79,921	485,400	$13,354	1,025,962	$13,570	11,000	$248
Western Bank	172	8,945,058	142,065	2,142,500	59,348	153,710	1,975	18,000	451
Quereau Bank	215	7,641,420	126,069	5,043,367	135,757	46,000	583	6,000	135
Green Bank	2	75,000	1,350	53,000	1,478	.....	.....	.....	.....
Grand Bank	100	.....	.....	17,378,595	444,443	.....	.....	.....	.....
Canso Bank	1	77,000	1,386	.....	.....	.....	.....	.....	.....
Burgeo Bank	2	.....	.....	.....	.....	.....	.....	.....	.....
Bacalieu Bank	50	.....	.....	21,500	613	.....	.....	.....	.....
Off Newfoundland	100	30,000	495	201,380	5,788	.....	.....	.....	.....
Cape North	3	50,000	935	397,000	10,523	.....	.....	.....	.....
Cape Shore	16	325,000	5,232	135,000	4,191	12,000	150	.....	.....
Total	867	21,305,864	357,453	25,857,742	675,491	1,237,672	16,278	35,000	834
West of 66° W. long.:									
Browns Bank	48	862,287	16,312	244,000	6,894	192,188	2,570	.....	.....
Georges Bank	568	2,828,902	58,736	10,208,534	325,213	374,077	4,814	186,122	4,197
Cashes Bank	55	847,189	15,500	.....	.....	336,030	4,473	6,865	154
Bay of Fundy	8	101,760	1,679	.....	.....	62,745	775	.....	.....
Middle Bank	32	4,000	90	.....	.....	.....	.....	.....	.....
German Bank	4	41,945	762	.....	.....	46,236	593	.....	.....
Jeffreys Ledge	1	2,000	50	.....	.....	.....	.....	.....	.....
Ipswich Bay	8	135,345	2,515	.....	.....	.....	.....	.....	.....
South Channel	7	.....	.....	.....	.....	.....	.....	.....	.....
Nantucket Shoals	13	35,750	664	249,373	6,822	.....	.....	.....	.....
Block Island	26	25,000	467	142,000	3,958	.....	.....	.....	.....
Shore, general	2,317	2,418,996	52,346	154,000	4,138	59,801	782	.....	.....
Total	3,087	7,303,174	149,121	10,997,907	347,025	1,071,077	14,007	192,987	4,351
Grand total	3,954	28,609,038	506,574	36,855,649	1,022,516	2,308,749	30,285	227,987	5,185

Summary, by fishing-grounds, of certain fishery products landed at Gloucester, Mass., in 1899 by American fishing vessels—Continued.

Fishing-grounds.	Haddock, fresh.		Haddock, salted.		Hake, fresh.		Hake, salted.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. long.:								
La Have Bank	1,962,008	$28,279			3,485,154	$29,637	15,000	$188
Western Bank	909,025	10,037			786,670	6,885	12,000	200
Quereau Bank	109,000	925			124,440	1,086	4,000	110
Cape Shore	10,000	150			45,000	383		
Total	2,990,033	39,391			4,441,264	37,991	31,000	498
West of 66° W. long.:								
Browns Bank	342,309	4,510			361,260	2,902		
Georges Bank	4,183,012	65,013	4,000	$50	418,548	3,683	9,500	119
Cashes Bank	165,818	2,085			1,104,440	9,300		
Clark Bank	13,150	79			295,320	2,095		
Middle Bank	7,000	158			35,000	525		
German Bank	5,450	67			130,380	977		
Jeffreys Ledge	1,000	23			20,000	300		
Ipswich Bay	1,970	26			1,445	11		
Nantucket Shoals	1,000	9						
Block Island	30,000	225	9,000	113			13,000	190
Shore, general	405,466	7,417	2,279	24	1,359,167	20,824		
Total	5,156,175	79,612	15,279	187	3,725,540	40,617	22,500	309
Grand total	8,146,208	119,003	15,279	187	8,166,804	78,608	53,500	807

Fishing-grounds.	Pollock, fresh.		Pollock, salted.		Halibut, fresh.		Halibut, salted.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. long.:								
La Have Bank	84,514	$588			150,731	$12,840		
Western Bank	65,458	372	6,500	$81	150,783	12,679		
Quereau Bank	9,000	68			1,714,644	132,426		
Green Bank					17,167	740		
Grand Bank					596,794	37,353	39,790	$1,850
Canso Bank					4,000	240		
Burgeo Bank					89,450	2,924		
Bacalieu Bank					2,199,932	147,778	747,000	57,268
Off Newfoundland					1,276,902	47,775		
Cape North							2,000	100
Total	158,972	1,028	6,500	81	6,200,463	394,755	788,790	59,218
West of 66° W. long.:								
Browns Bank	10,859	66			3,880	296		
Georges Bank	36,767	319	14,500	181	425,264	33,288		
Cashes Bank	15,077	75						
Clark Bank	4,120	22						
German Bank	370	2						
Ipswich Bay	3,010	16						
Nantucket Shoals	540	3	1,000	12	200	10		
Block Island			2,000	25				
Shore, general	5,826,537	39,616	120,000	1,500				
Total	5,897,280	40,119	137,500	1,718	429,344	33,574		
Grand total	6,056,252	41,147	144,000	1,799	6,629,807	428,329	788,790	59,218

Fishing-grounds.	Mackerel, fresh.		Mackerel, salted.		Other fish, fresh.		Other fish, salted.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. long.:								
Quereau Bank					352	$49		
Off Newfoundland					3,302,000	72,645	6,407,000	$91,910
Cape Shore			162,000	$11,274				
Total			162,000	11,274	3,302,352	72,694	6,407,000	91,910
West of 66° W. long.:								
Georges Banks			177,200	9,242	38,611	1,308		
Middle Bank	18,540	$1,702	475,400	35,145				
Ipswich Bay							7,000	97
South Channel	30,960	988	40,600	3,477				
Block Island	18,776	1,075	72,000	4,046	229	16		
Shore, general	362,512	23,608	2,738,600	212,386	134,729	1,591	61,000	1,089
Total	430,788	27,373	3,503,800	264,296	173,569	2,915	68,000	1,186
Grand total	430,788	27,373	3,665,800	275,570	3,475,921	75,609	6,475,000	93,096

Summary, by fishing-grounds, of certain fishery products landed at Gloucester, Mass., in 1899 by American fishing vessels—Continued.

Fishing-grounds.	Total fresh.		Total salted.		Grand total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. longitude:						
La Have Bank	10,870,755	$164,835	511,400	$13,790	11,382,155	$178,625
Western Bank	11,010,704	174,013	2,179,000	60,078	13,189,704	234,091
Quereau Bank	9,644,856	261,206	5,053,367	136,002	14,698,223	397,208
Green Bank	92,167	2,090	53,000	1,478	145,167	3,568
Grand Bank	596,794	37,353	17,418,385	446,293	18,015,179	483,646
Canso Bank	81,000	1,626	.....	.....	81,000	1,626
Burgeo Bank	89,450	2,924	.....	.....	89,450	2,924
Bacalieu Bank	2,199,932	147,778	768,500	57,881	2,968,432	205,659
Off Newfoundland	4,608,962	120,915	6,608,380	97,696	11,217,342	218,611
Cape North	50,000	935	399,000	10,623	449,000	11,558
Cape Shore	392,000	5,915	297,000	15,465	689,000	21,380
Total	39,636,620	919,590	33,288,032	839,306	72,924,652	1,758,896
West of 66° W. longitude:						
Browns Bank	1,772,783	26,656	244,000	6,894	2,016,783	33,550
Georges Bank	8,305,181	167,141	10,599,856	339,002	18,905,037	506,143
Cashes Bank	2,468,554	31,433	6,865	154	2,475,419	31,587
Clark Bank	477,095	4,650	.....	.....	477,095	4,650
Middle Bank	64,540	2,475	475,400	35,145	539,940	37,620
German Bank	224,361	2,401	.....	.....	224,361	2,401
Jeffreys Ledge	23,000	373	.....	.....	23,000	373
Ipswich Bay	141,770	2,568	7,000	97	148,770	2,665
South Channel	30,960	988	40,600	3,477	71,560	4,465
Nantucket Shoals	37,490	686	250,373	6,834	287,863	7,520
Block Island	74,005	1,783	238,000	8,332	312,005	10,115
Shore, general	10,567,208	146,184	3,075,879	219,137	13,643,087	365,321
Total	24,186,947	387,338	14,937,973	619,072	39,124,920	1,006,410
Grand total	63,823,567	1,306,928	48,226,005	1,458,378	112,049,572	2,765,306

Statement, by months, of quantities and values of certain fishery products landed at Boston and Gloucester by American fishing vessels during 1899.

Months.	No. of trips.	Cod, fresh.		Cod, salted.		Cusk, fresh.		Cusk, salted.	
		Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
January	317	1,080,150	$32,350	.....	.....	51,500	$1,024	.....	.....
February	216	635,650	20,834	.....	.....	79,000	1,299	.....	.....
March	298	1,386,850	47,953	.....	.....	39,500	890	.....	.....
April	427	1,514,400	27,565	.....	.....	102,300	1,816	.....	.....
May	393	2,163,200	35,548	.....	.....	207,000	2,469	.....	.....
June	286	2,059,350	34,153	.....	.....	109,500	1,095	.....	.....
July	307	2,297,950	42,686	.....	.....	37,000	408	.....	.....
August	301	2,195,300	42,462	.....	.....	42,000	403	.....	.....
September	270	1,889,700	46,056	50,000	$1,250	30,500	393	.....	.....
October	394	1,750,700	39,888	.....	.....	65,000	792	.....	.....
November	358	1,307,400	34,505	.....	.....	76,500	753	.....	.....
December	299	1,403,900	33,806	.....	.....	148,000	2,011	.....	.....
Total at Boston	3,866	19,684,550	437,756	50,000	1,250	1,102,800	13,353	.....	.....
January	276	664,281	15,246	187,765	6,010	113,822	1,488	.....	.....
February	177	903,900	23,751	223,610	7,071	131,330	1,886	6,000	$135
March	280	1,660,263	34,763	821,180	26,387	73,001	904	8,000	68
April	597	2,945,042	52,535	1,076,667	34,620	254,010	3,300	28,000	630
May	418	2,608,474	46,870	2,122,300	62,214	619,200	8,052	41,987	944
June	264	1,043,307	17,553	2,786,021	77,112	320,588	4,009	43,000	969
July	273	1,728,327	30,792	7,313,738	198,484	452,340	5,657	76,000	1,743
August	249	4,047,543	73,155	4,268,065	124,114	122,000	1,554	10,000	225
September	379	3,390,115	53,654	5,243,931	140,127	38,000	1,479	9,000	198
October	378	5,914,950	96,447	6,668,183	176,455	89,000	1,263	11,000	273
November	417	2,627,535	42,736	4,882,700	129,807	31,335	419	.....	.....
December	246	1,068,401	19,072	1,260,280	40,115	64,123	1,274	.....	.....
Total at Gloucester	3,954	28,609,038	506,574	36,855,049	1,022,516	2,308,749	30,285	227,987	5,185
Grand total	7,820	48,293,588	944,330	36,905,049	1,023,766	3,411,549	43,638	227,987	5,185
Landed at Boston in 1898	3,491	14,882,500	317,079	70,000	1,550	1,754,100	24,141	.....	.....
Landed at Gloucester in 1898	3,441	16,792,005	279,872	26,416,021	666,819	3,163,933	36,070	107,190	2,395

Statement, by months, of quantities and values of fishery products landed at Boston and Gloucester by American fishing vessels during 1899—Continued.

Months.	Haddock, fresh.		Haddock, salted.		Hake, fresh.		Hake, salted.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
January	2,044,910	$47,265			337,100	$7,578		
February	2,337,750	49,909			207,100	4,646		
March	2,350,600	67,641			114,000	2,700		
April	2,556,350	39,229			261,600	3,375		
May	1,545,900	36,221			537,000	4,456		
June	1,752,850	28,275			393,550	3,576		
July	2,061,200	29,196			444,600	4,235		
August	2,225,300	42,807			478,050	4,750		
September	2,476,800	49,518			751,100	9,249		
October	2,677,700	62,972			2,297,200	23,876		
November	1,629,400	53,664			1,844,200	19,419		
December	1,486,400	47,501			823,700	11,848		
Total at Boston	25,145,160	554,198			8,489,800	99,708		
January	1,496,866	24,400			75,272	1,152		
February	1,404,030	25,221			147,597	2,321	4,000	$110
March	1,705,155	28,378			53,158	725		
April	1,217,550	11,290	2,279	$24	360,458	2,702		
May	302,720	2,994			1,388,902	10,427	5,000	63
June	233,269	2,041	5,000	63	1,335,728	9,707	20,000	250
July	231,078	2,740	8,000	100	2,082,166	17,096	14,500	209
August	165,750	1,858			642,703	5,528		
September	43,310	405			84,388	684		
October	288,705	3,221			767,232	9,100	10,000	175
November	490,590	6,748			936,685	15,703		
December	467,185	9,709			292,455	3,465		
Total at Gloucester	8,146,208	119,003	15,279	187	8,166,804	78,608	53,500	807
Grand total	33,291,368	673,201	15,279	187	16,656,604	178,316	53,500	807
Landed at Boston in 1898	21,769,300	378,944			7,382,430	70,535		
Landed at Gloucester in 1898	10,712,623	124,390	36,820	439	10,119,143	73,981	18,800	230

Months.	Pollock, fresh.		Pollock, salted.		Halibut, fresh.		Halibut, salted.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
January	16,900	$398			25,200	$2,682		
February	15,800	360			50,600	3,328		
March	16,300	473			60,175	5,620		
April	10,600	196			170,800	12,481		
May	175,000	1,241			200,500	15,189		
June	108,500	775			375,100	20,237		
July	67,700	595			174,000	14,483		
August	239,700	2,256			196,060	12,378		
September	319,100	3,481			9,600	1,540		
October	184,500	1,606			175,800	10,160		
November	96,850	1,093			40,550	3,751		
December	35,900	409			68,200	10,615		
Total at Boston	1,286,850	12,883			1,606,585	112,462		
January	26,842	218			214,415	21,955		
February	43,889	475			355,410	25,021		
March	71,690	426			593,445	40,901		
April	43,372	267			548,412	31,339		
May	243,521	1,332	88,500	$1,104	600,529	27,815		
June	19,559	106	22,500	282	1,144,452	40,148	4,000	$180
July	19,158	119			724,689	52,745	25,490	1,020
August	25,497	187			484,114	35,287	95,500	5,658
September	221,914	1,601			818,572	49,579	659,000	52,024
October	1,814,319	13,336	5,000	63	700,542	49,711	4,200	336
November	3,239,135	20,818	8,000	100	235,828	26,150		
December	286,878	2,262	20,000	250	209,399	21,678		
Total at Gloucester	6,056,252	41,147	144,000	1,799	6,629,807	428,329	788,790	59,218
Grand total	7,343,102	54,030	144,000	1,799	8,236,392	540,791	788,790	59,218
Landed at Boston in 1898	1,412,100	11,655			768,585	65,133	250,000	7,650
Landed at Gloucester in 1898	3,052,139	18,278	20,000	250	7,612,431	449,264	1,747,165	56,335

Statement, by months, of quantities and values of fishery products landed at Boston and Gloucester by American fishing vessels during 1899—Continued.

Months.	Mackerel, fresh.		Mackerel, salted.		Other fish, fresh.*		Other fish, salted.*	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
January					820,000	$19,400	360,000	$5,400
February					1,630,000	24,450	5,000	150
March					570,000	9,125		
May	16,300	$1,281						
June	176,950	10,623			27,450	332	10,000	225
July	130,300	4,190	23,400	$1,273	559,800	28,008		
August	53,850	4,733	49,200	2,538	653,550	26,546		
September	141,127	11,571	75,400	6,878	69,482	5,206		
October	8,625	777	44,800	3,718	506,850	5,583	13,000	195
November	271,600	10,730	3,600	288	373,900	3,680		
December					124,800	1,550	640,000	8,300
Total at Boston	798,752	43,905	196,400	14,695	5,335,832	123,866	1,028,000	14,270
January					1,291,000	26,620	1,444,200	23,020
February					780,000	13,800	228,000	3,706
March					355,000	8,825	55,200	896
May	15,663	1,547						
June	31,925	2,387	354,000	22,670				
July	95,906	2,477	677,800	35,795	26,740	910		
August	38,710	3,141	808,400	54,286	13,509	473		
September	93,140	7,207	1,343,400	118,735	103,320	932	47,000	898
October	155,444	10,614	447,000	40,338	352	49	21,000	288
November			35,200	3,766	240,000	1,800	2,048,800	29,945
December					606,000	22,200	2,630,800	34,343
Total at Gloucester	430,788	27,373	3,665,800	275,570	3,475,921	75,609	6,475,000	93,096
Grand total	1,229,540	71,278	3,862,200	290,265	8,811,753	199,475	7,503,000	107,366
Landed at Boston in 1898	439,755	26,280	414,900	18,335	5,084,900	113,533	451,000	6,805
Landed at Gloucester in 1898	434,000	27,004	1,806,800	102,017	2,500,525	45,618	4,184,575	64,426

Months.	Total, fresh.		Total, salted.		Grand total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
January	4,375,760	$110,697	360,000	$5,400	4,735,760	$116,097
February	4,955,900	104,824	5,000	150	4,960,900	104,974
March	4,537,425	134,402			4,537,425	134,402
April	4,676,050	84,662			4,676,050	84,662
May	4,964,900	96,405			4,964,900	96,405
June	5,003,250	99,066	10,000	225	5,013,250	99,291
July	5,772,550	123,751	23,400	1,273	5,795,950	125,024
August	6,084,410	136,335	49,200	2,538	6,133,610	138,873
September	5,687,409	127,014	125,400	8,128	5,812,809	135,142
October	7,666,375	145,654	57,800	3,913	7,724,175	149,567
November	5,640,400	127,575	3,600	288	5,644,000	127,863
December	4,085,900	107,746	640,000	8,300	4,725,900	116,046
Total at Boston	63,450,329	1,398,131	1,274,400	30,215	64,724,729	1,428,346
January	3,882,498	91,079	1,631,905	29,030	5,514,463	120,109
February	3,766,156	92,475	461,610	11,022	4,227,766	103,497
March	4,517,712	114,022	879,389	27,351	5,397,101	142,273
April	5,369,744	101,433	1,106,946	35,274	6,476,690	136,707
May	5,779,069	99,037	2,257,787	64,325	8,036,856	163,362
June	4,128,808	81,951	3,235,121	101,526	7,363,929	183,477
July	5,460,404	112,536	8,115,528	237,351	13,575,932	349,887
August	5,539,826	121,179	5,182,565	184,263	10,722,391	305,442
September	4,792,759	114,541	7,302,931	311,982	12,095,690	426,523
October	9,731,044	183,741	7,166,383	217,928	16,897,427	401,669
November	7,801,106	114,374	6,974,700	163,018	14,775,806	277,992
December	3,054,441	79,660	3,911,080	74,708	6,965,521	154,368
Total at Gloucester	63,823,567	1,306,928	48,226,005	1,458,378	112,049,572	2,765,306
Grand total	127,273,896	2,705,059	49,500,405	1,488,593	176,774,301	4,193,652
Landed at Boston in 1898	53,493,670	1,007,300	1,185,900	34,340	54,679,570	1,041,640
Landed at Gloucester in 1898	54,386,799	1,054,537	34,337,371	892,911	88,724,170	1,947,448

*Includes herring from Newfoundland, 6,082,000 pounds frozen, $123,820, and 7,412,000 pounds salted, $105,760.

FISHERIES OF THE NEW ENGLAND STATES.

There has been a decrease in the fisheries of this region, since their canvass in 1889, of 259,814,470 pounds of products, amounting to $877,813 in value. A large part of this decrease is represented by algæ, which, if eliminated from the figures of both years, leaves an actual decrease in fish products of 111,030,570 pounds, worth $825,512.

The catch of menhaden has largely decreased. In 1889 the quantity was 173,632,210 pounds, worth $428,228, whereas in 1898 only 23,140,177 pounds, valued at $65,175, were taken, a decrease of 150,492,023 pounds, worth $363,053. The reduction in this fishery is traceable chiefly to the transfer of the industry to New York State. It is therefore apparent that the food fisheries of the New England States have increased in quantity and have decreased but slightly in value.

One of the most noticeable changes is in connection with the lobster fishery. The total catch of lobsters in 1889 was 30,449,603 pounds, worth $833,736, and in 1898 14,661,808 pounds, worth $1,276,968. The yield of this fishery has therefore diminished more than 50 per cent in quantity and increased more than 50 per cent in value.

The total number of persons engaged in the fisheries of the New England States was 35,445, distributed as follows: Maine, 16,954; New Hampshire, 154; Massachusetts, 14,177; Rhode Island, 1,687; and Connecticut, 2,473. A total decrease of 1,091 is shown since 1889.

The amount of capital invested in the fisheries was $19,637,036, an apparent decrease of $437,758, caused by the transfer of the menhaden fishery and the omission of certain valuations which were included in the former canvass.

The vessels employed in the fisheries numbered 1,427, and were valued with their outfits at $4,224,339. The apparatus of capture was valued at $1,218,898. Pound nets and weirs represent the greatest value among the apparatus, aggregating $405,424. Hand and trawl lines are next in importance, valued at $278,815. Lobster pots were worth $219,045; seines, $132,140, and gill nets, $100,679.

Massachusetts leads in the New England States in respect to importance of the fisheries, the products being worth $4,454,139. Maine is next, with fisheries valued at $2,654,919, followed by Connecticut at $1,559,599, Rhode Island at $955,058, and New Hampshire at $48,987. The yield of the entire region amounted to 393,355,570 pounds and was valued at $9,672,702.

The fishery for cod, cusk, haddock, hake, and pollock leads all the others, being valued at $2,798,109. The oyster fishery of Connecticut and Rhode Island, worth $1,910,684, ranks next, followed by the lobster fishery, valued at $1,276,967; the herring fishery at $596,688; the halibut fishery, at $569,515, and the mackerel fishery at $481,933.

Other important fisheries are those maintained for alewives, smelt, blue-fish, scup, and sword-fish.

Table showing the number of persons engaged in the fisheries of the New England States in 1898.

States.	Fishermen.	Shoresmen.	Total.
Maine	8,717	8,237	16,954
New Hampshire	143	11	154
Massachusetts	10,205	3,972	14,177
Rhode Island	1,340	347	1,687
Connecticut	1,826	647	2,473
Total	22,231	13,214	35,445

Table showing the investment in the fisheries of the New England States in 1898.

Items.	Maine.		New Hampshire.		Massachusetts.	
	No.	Value.	No.	Value.	No.	Value.
Vessels	497	$538,400	5	$3,900	637	$1,776,025
Tonnage	8,175		79		30,558	
Outfit		182,427		3,458		939,772
Boats	5,741	284,897	123	5,395	2,025	178,082
Seines	251	20,660	1	500	272	88,382
Bag nets	202	8,645				
Dip nets	182	637			213	272
Drag nets					27	1,610
Fyke nets	26	710			88	1,124
Gill nets	3,722	37,413	60	844	4,032	50,312
Pound nets	67	14,680	17	6,960	126	141,835
Snap nets	20	20				
Trap nets	33	14,125			4	900
Weirs	557	111,618				
Lines, hand and trawl		51,965		2,118		221,365
Pots, eel	333	188			1,290	2,376
Pots, lobster	155,978	155,777	1,675	1,666	26,254	31,481
Harpoons		1,155				1,200
Spears	145	127				
Dredges, tongs, rakes, hoes, and forks		2,032		32		15,199
Other apparatus						469
Shore and accessory property		1,193,478		12,775		5,125,248
Cash capital		1,385,099		15,000		4,797,250
Total		4,013,053		52,648		13,372,902

Items.	Rhode Island.		Connecticut.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Vessels	93	$167,850	195	$434,650	1,427	$2,920,825
Tonnage	1,454		3,555		43,821	
Outfit		46,597		131,200		1,303,514
Boats	854	72,381	1,214	80,915	10,557	621,670
Seines	49	7,243	67	6,355	640	132,140
Bag nets					202	8,645
Dip nets					395	909
Drag nets					27	1,610
Fyke nets	329	2,462	410	3,522	853	7,818
Gill nets	134	7,085	89	5,025	8,637	100,679
Pound nets	202	110,395	66	19,930	478	293,800
Snap nets	4	20			24	40
Trap nets					37	15,025
Weirs					557	111,618
Lines, hand and trawl		2,010		1,357		278,815
Pots, eel	3,139	1,987	1,313	1,197	6,075	5,748
Pots, lobster	10,312	12,716	10,880	17,405	205,049	219,045
Harpoons		109		177		2,641
Spears	29	46	56	37	220	210
Dredges, tongs, rakes, hoes, and forks		6,549		15,131		88,943
Other apparatus		43		700		1,212
Shore and accessory property		439,149		344,380		7,115,030
Cash capital		80,500		172,250		6,457,099
Total		957,142		1,241,291		19,637,036

Table showing the quantity and value of products taken in the fisheries of the New England States in 1898.

Species.	Maine.		New Hampshire.		Massachusetts.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	925,325	$8,016	25,000	$250	1,877,061	$22,208
Alewives, salted	986,600	8,437	200,000	2,500	586,700	6,790
Alewives, smoked	606,800	8,849	.....	.....	71,440	2,230
Blue-fish	.....	.....	.....	.....	832,849	38,089
Bonito	.....	.....	.....	.....	89,136	2,410
Butter-fish	14,800	740	.....	.....	30,620	818
Cod, fresh	10,091,088	167,231	689,150	10,756	40,632,151	688,721
Cod, salted	5,232,622	147,024	2,000	70	30,682,827	718,318
Cunners	148,300	1,025	.....	.....	85,350	5,250
Cusk, fresh	1,138,201	12,545	97,500	995	5,825,173	63,308
Cusk, salted	86,667	1,210	.....	.....	128,863	2,206
Eels	163,811	12,942	.....	.....	425,846	17,635
Flounders and flat-fish	786,697	17,539	.....	.....	1,167,812	14,761
Haddock, fresh	7,274,909	119,982	1,379,750	14,552	35,451,284	418,526
Haddock, salted	956,657	12,369	4,000	100	130,230	1,292
Hake, fresh	13,320,899	110,558	115,400	1,379	21,099,428	161,495
Hake, salted	2,405,578	23,886	1,500	38	232,388	2,139
Halibut, fresh	304,890	22,075	.....	.....	8,663,443	487,714
Halibut, salted	.....	.....	.....	.....	1,859,854	59,726
Herring, fresh	37,017,814	174,313	65,000	650	16,562,338	256,335
Herring, salted	1,400,650	20,159	.....	.....	5,801,159	76,212
Herring, smoked	3,738,500	63,005	.....	.....	.....	.....
Mackerel, fresh	1,441,157	85,344	58,750	3,207	3,791,233	197,339
Mackerel, salted	163,000	12,761	.....	.....	2,912,131	164,525
Menhaden	7,319,900	20,706	.....	.....	1,497,367	10,544
Pollock, fresh	1,126,746	8,463	180,200	1,559	6,566,388	38,256
Pollock, salted	1,002,704	10,901	1,200	24	517,649	4,789
Salmon	53,322	10,009	.....	.....	60	30
Scup	.....	.....	.....	.....	1,043,625	14,253
Sea bass	.....	.....	.....	.....	99,300	4,946
Shad	861,879	19,752	.....	.....	29,333	1,426
Smelt	1,608,045	130,345	.....	.....	7,079	515
Squeteague	.....	.....	.....	.....	1,371,910	39,518
Striped bass	25,067	4,206	850	85	12,948	989
Sword-fish	878,290	44,395	.....	.....	597,186	35,280
Tautog	.....	.....	.....	.....	289,505	7,567
Tomcod	310,083	6,158	.....	.....	.....	.....
Miscellaneous fish	16,275	408	1,050	165	147,672	5,692
Refuse fish	55,000	354	.....	.....	.....	.....
Squid	.....	.....	.....	.....	1,069,425	14,620
Lobsters	11,183,294	992,855	108,515	9,372	1,693,741	147,702
Shrimp	.....	.....	.....	.....	25,200	1,183
Quahogs or hard clams	.....	.....	.....	.....	510,536	50,724
Clams (soft), fresh	8,758,800	274,885	6,000	360	1,470,951	102,594
Clams (soft), salted	711,200	48,568	.....	.....	.....	.....
Oysters	.....	.....	.....	.....	708,575	156,235
Scallops	166,509	14,522	.....	.....	773,176	85,383
Irish moss	.....	.....	70,000	2,450	700,000	22,375
Oil, fish	157,920	4,591	14,250	475	358,927	13,963
Oil, sea elephant	.....	.....	.....	.....	472,500	20,790
Oil, whale	.....	.....	.....	.....	3,119,450	199,023
Whalebone	.....	.....	.....	.....	27,100	65,875
Other products	955,502	18,791	.....	.....	107,062	3,810
Total	123,404,561	2,654,919	3,020,715	48,987	202,155,481	4,454,139

Species.	Rhode Island.		Connecticut.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	628,132	$6,621	868,400	$7,346	4,323,918	$44,501
Alewives, salted	74,100	940	.....	.....	1,847,400	18,667
Alewives, smoked	136,390	2,712	.....	.....	814,630	13,791
Blue-fish	330,290	15,521	963,285	32,851	2,126,424	86,461
Bonito	124,450	2,615	.....	.....	213,586	5,025
Butter-fish	207,000	5,615	60,280	2,370	312,700	9,543
Cod, fresh	1,111,811	23,556	451,225	10,978	52,975,425	901,242
Cod, salted	315,101	13,154	.....	.....	36,232,550	878,566
Cunners	3,300	100	.....	.....	236,950	6,375
Cusk, fresh	.....	.....	.....	.....	7,060,874	74,848
Cusk, salted	.....	.....	.....	.....	215,530	3,416
Eels	443,374	20,030	206,970	14,149	1,240,001	64,756
Flounders and flat-fish	1,710,057	27,576	443,864	13,383	4,107,930	73,259
Haddock, fresh	366,525	8,373	112,800	856	44,585,208	562,289
Haddock, salted	.....	.....	.....	.....	1,090,887	13,761
Hake, fresh	.....	.....	.....	.....	34,544,727	273,432
Hake, salted	.....	.....	.....	.....	2,639,466	26,063
Halibut, fresh	.....	.....	.....	.....	8,968,338	509,789
Halibut, salted	.....	.....	.....	.....	1,859,854	59,726
Herring, fresh	2,000	10	.....	.....	53,647,152	431,308

Table showing the quantity and value of products taken in the fisheries of the New England States in 1898—Continued.

Species.	Rhode Island.		Connecticut.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Herring, salted					7,201,809	$102,371
Herring, smoked					3,738,500	63,005
Mackerel, fresh	359,900	$15,004	40,913	$1,753	5,691,953	302,647
Mackerel, salted			28,000	2,000	3,103,131	170,286
Menhaden	3,140,000	7,591	11,182,910	26,334	23,140,177	65,175
Pollock, fresh	50,000	500			7,923,334	48,778
Pollock, salted					1,521,553	15,714
Salmon					53,382	10,039
Scup	6,390,225	75,596	101,040	3,504	7,534,890	93,353
Sea bass	440,950	11,935	247,789	12,182	788,039	29,003
Shad	25,112	1,625	499,825	21,215	1,415,649	44,018
Smelt	4,100	215	5,600	837	1,624,824	140,912
Squeteague	3,125,635	63,976	193,643	5,451	4,691,188	108,045
Striped bass	101,950	10,511	13,845	1,002	154,660	17,403
Sword-fish	55,875	2,935	85,980	7,520	1,617,331	90,130
Tautog	248,129	7,214	70,540	3,118	608,174	17,899
Tomcod	8,000	240	38,750	1,677	356,833	8,075
Miscellaneous fish	314,123	8,402	82,923	3,489	562,643	18,156
Refuse fish	1,012,000	1,222			1,067,000	1,576
Squid	124,000	1,375	6,900	150	1,200,325	16,145
Crabs, hard	7,875	575			7,875	575
Crabs, soft	5,020	1,675			5,020	1,675
Lobsters	578,006	43,290	1,098,102	83,748	14,661,808	1,276,907
Shrimp	2,250	750			27,450	1,933
Quahogs or hard clams	249,695	31,816	234,000	29,900	994,232	112,440
Clams (soft), fresh	150,150	20,569	199,800	19,039	10,585,701	417,447
Clams (soft), salted					711,200	48,568
Oysters	3,201,646	505,378	14,633,283	1,249,071	18,543,504	1,910,048
Scallops	115,386	10,471	50,160	5,016	1,105,231	115,392
Irish moss					770,000	24,825
Oyster shells	7,674,000	3,968			7,674,000	3,968
Oil, fish					531,097	19,029
Oil, sea elephant					472,500	20,790
Oil, whale					3,119,450	199,023
Whalebone					27,100	65,875
Other products	17,778	1,402			1,080,402	24,003
Total	32,854,396	955,058	31,920,417	1,559,599	393,355,570	9,672,702

THE FUR-SEAL ROOKERIES OF THE PRIBILOF ISLANDS.

Near the close of the fiscal year Mr. Townsend left for the Pribilof Islands to ascertain the condition of the fur-seal rookeries, in accordance with the requirements of the law respecting the relations of the Fish Commission with the fur-seal fisheries. The customary records relating to the size of the rookeries in 1899 were secured in part by the resident Treasury agents upon the islands. The American seal herd is still declining on account of the continuance of pelagic sealing in Bering Sea and the North Pacific Ocean.

For a number of years all the seals born on several of the more accessible rookeries have been counted systematically. The counts, when compared with those of previous seasons, show more or less decrease in the number of seals born from year to year. The diminution of the herd is shown also in the annual photographs and charts of the rookeries. The total number of seals taken on the Pribilof Islands in 1899 by the lessees under Government supervision was 16,812. Seals of the class available for killing, the surplus males, become less in number from year to year.

The pelagic catch made from the American herd by the Canadian sealing fleet of 26 vessels during 1899 was 33,755. Of this number 23 284 were taken in Bering Sea and 10,471 in the North Pacific Ocean.

To the vessel catch should be added 892 seals taken off the Northwest coast by Indian canoes. The only Canadian vessel sealing in Asiatic waters took 699 seals, but a fleet of 11 Japanese vessels secured 7,308 seals from the Asiatic herd. One American vessel obtained 336 seals from the American herd in waters south of the award area.

NOTES ON THE FISHERIES.

THE WHALE FISHERY.

The vessels engaged in whaling during the year 1899 numbered 48, 3 additional vessels having been lost; 22 vessels were employed in the Pacific Ocean and 26 in the Atlantic. The yield of the whale fishery for the year amounted to 11,903 barrels of sperm oil, valued at $583,274; 3,827 barrels of whale oil, valued at $133,945, and 320,100 pounds of whalebone, valued at $864,270.

CARP.

Investigations of the fisheries of the Great Lakes and the Mississippi and its tributaries, now being made by field agents of this division, reveal the fact that an important quantity of carp is finding its way into the fish markets—chiefly those of the larger Eastern cities.

The catch of carp in Lake Erie in 1899 amounted to 3,633,679 pounds, valued at $51,456. The report of the Illinois Fishermen's Association shows that the catch of carp in the Illinois River is greater than that of all other species combined, the quantity of carp taken in 1899 amounting to 6,332,990 pounds, valued at $189,980. The yield of carp from the Ohio River and two of its tributaries, the Cumberland and Wabash Rivers, during the same year, amounted to 113,387 pounds, worth $6,654.

These figures show an increase in the quantity of carp derived from the above-named waters amounting to nearly nine times the quantity yielded six years ago. During the same period the total fishery products of Lake Erie increased more than 15,000,000 pounds and those of the Illinois River more than 5,000,000 pounds. There are, therefore, no indications that the presence of the carp has produced any injurious effect on the native species associated with it, but, on the contrary, its presence may have a salutary effect, the young of the carp doubtless being food for black bass and other species. It is certain that the black bass has increased in the Illinois River along with the carp, the yield of black bass in 1899 being greater than ever before, amounting to over 70,000 pounds. The last canvass of the fisheries of the Middle Atlantic States, made in 1897, shows the yield of carp from the coastal waters of these States to have been 1,333,263 pounds, valued at $63,567, whereas in 1891 the catch amounted to only 46,798 pounds, worth $1,715. More than half of the catch of carp in this region in 1897 was made in New Jersey, most of the fish being taken in partly brackish water. Complete returns respecting the interior waters now being investigated will probably show that the carp is entering largely into the food supply of the country.

EASTERN OYSTERS IN SAN FRANCISCO BAY.

This industry has reached large proportions. From 1887 to 1900 more than 11,000 tons of eastern yearling seed oysters have been shipped to the bay of San Francisco and laid out for further growth. The time required for seed oysters to become marketable is from two to four years, according to the sizes demanded by Pacific Coast consumers. The beds of transplanted oysters occupy flats or tide lands and are exposed during the lowest tides. The areas where they are laid out are inclosed by fences of closely set stakes, which lessen the action of the waves in these shallows and keep out stingrays and other marauders. The value of the mature oysters sold is considerably over $500,000 a year, the quantity and value being on the increase.

An important fact in connection with the maturing of large quantities of eastern oysters in the bay is the extensive degree of propagation that has been going on. The writer has investigated this subject several times during the past ten years, finding each time evidences of greater natural increase.

For a number of years considerable quantities of oysters of volunteer growth have been picked at low tide from areas remote from the transplanted beds, and it has been ascertained that oystering of this character has been carried on without decreasing the supply.

Oyster spat from extensive planted beds along the west side of the bay drifts with the prevailing winds, toward the east side, where a very considerable set takes place, over an area more than 20 miles long.

Here there are broad stretches of shell banks of the small worthless native oyster of San Francisco Bay, upon the shells of which the young of the eastern oyster find lodgment. The strong winds of midsummer create a heavy wave wash over the reefs, drifting the light shells of the natives and burying many of the eastern oysters growing among them. Fencing lessens the action of the waves and protects the interests of the owners. From a tract of 150 acres in this section of the bay, recently inclosed, over a million oysters were picked before any imported seed was laid out. It appears that the amount of spat set free from the transplanted beds is increasing, and the indications are that with the fencing in and planting of the shell banks of the east side the increment from natural propagation will grow in importance.

Table showing the quantity of eastern seed oysters shipped to San Francisco Bay from 1887 to 1900.

Year.	Pounds.	Year.	Pounds.
1887		1895	1,680,000
1888	1,562,000	1896	1,485,000
1889	1,128,000	1897	859,000
1890	1,007,000	1898	1,564,000
1891	1,559,000	1899	1,086,000
1892	3,273,000	1900 (first 8 months)	1,608,000
1893	2,123,000		
1894	1,007,000	Total	22,873,000
	1,332,000		

THE LOBSTER FISHERY.

The lobster fishery is prosecuted to a greater or less extent in all the States on the Atlantic coast from Maine to Delaware, but nearly 75 per cent of the total annual yield is from the waters of Maine. The statistics show that the total yield in 1880 was 20,128,033 pounds, valued at $488,871, and in 1889 it was 30,771,573 pounds, valued at $861,297, an increase of 10,643,540 pounds in quantity and of $372,426 in value. There has since been a great reduction in the quantity of lobsters annually produced, but the value has been constantly increasing. In 1898 the total yield was 15,188,062 pounds, valued at $1,318,299, a decrease, as compared with 1889, of over 50 per cent in quantity and an increase of over 50 per cent in value. The greater part of this decrease in quantity has occurred in Maine and Massachusetts. From 1889 to 1898 the lobster yield of Maine declined about 55 per cent in quantity, while it increased about 70 per cent in value. In Massachusetts there has been an almost steady decline in the yield since 1880. In that year the catch was 4,315,416 pounds, valued at $158,229, and in 1898 it was 1,693,741 pounds, valued at $147,702, a decrease of 2,621,675 pounds, or 60 per cent in quantity, and of $10,527, or about 6 per cent, in value.

The following table shows the quantity and value of lobsters taken in each of the lobster-producing States in each year for which this fishery has been investigated from 1880 to 1898:

States.	1880.		1887.		1888.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Maine	14,234,182	$268,739	22,916,642	$512,044	21,694,731	$515,880
New Hampshire	250,000	7,500	142,824	6,208	130,350	6,256
Massachusetts	4,315,416	158,229	3,511,075	156,204	3,743,475	172,936
Rhode Island	423,250	15,871	570,039	27,128	588,500	28,047
Connecticut	613,385	23,002	1,487,020	82,594	1,477,226	85,723
New York	135,000	5,062	114,000	6,850	248,000	13,900
New Jersey	156,800	5,488	101,580	7,719	181,688	12,965
Delaware	.....	.....	39,000	910	89,000	910

States.	1889.		1890.		1891.		1892.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Maine	25,001,351	$574,165	.....	.....	.....	.....	17,642,677	$963,048
New Hampshire	137,175	6,415	.....	.....	.....	.....	196,350	11,700
Massachusetts	3,353,787	148,492	.....	.....	.....	.....	3,182,270	205,638
Rhode Island	456,000	21,565	.....	.....	.....	.....	774,100	53,702
Connecticut	1,501,290	83,099	.....	.....	.....	.....	1,614,530	101,358
New York	124,023	12,780	150,400	$14,754	165,093	$15,655	.....	.....
New Jersey	188,347	14,301	185,321	13,683	165,664	12,463	143,905	10,861
Delaware	9,600	480	7,200	360	8,200	410	5,600	285

States.	Fiscal year 1897.		Calendar year 1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Maine	10,300,880	$683,082	.....	.....	11,183,294	$992,855
New Hampshire	90,300	5,493	.....	.....	108,515	9,372
Massachusetts	2,089,502	157,330	.....	.....	1,693,741	147,702
Rhode Island	.....	.....	.....	.....	578,066	48,290
Connecticut	.....	.....	.....	.....	1,098,192	83,748
New York	130,610	10,913	381,020	$31,458	332,378	30,235
New Jersey	79,230	6,197	99,230	8,573	123,876	11,097
Delaware	.....	.....	5,095	459	.....	.....

THE PEARL FISHERY OF THE TUAMOTU ARCHIPELAGO.

During the voyage of the *Albatross* in the South Pacific Ocean in 1899, the writer made some investigations respecting the pearl fisheries of the Tuamotu Islands. This archipelago, more than 1,500 miles in length, consists of atolls, or low coral islands having large inclosed lagoons, within which the pearl fisheries are prosecuted.

The yield of pearl shell fluctuates according to the sections of the archipelago thrown open for pearl diving each year, and the methods of conducting the fishery have changed somewhat since it was investigated for the French Government, in 1884, by Mr. G. Bouchon-Brandeley. Until 1889 the pearl fisheries of the Tuamotus were free to all, and were participated in by both natives and whites, the latter as well as some of the natives employing diving suits. From 1890 to 1892 the use of diving apparatus was subject to special regulations, but since 1892 it has been prohibited, with the idea of restricting the taking of pearl shell and preserving the industry for the benefit of the native inhabitants.

Under present methods pearling is permitted each year in certain lagoons only, others being closed for periods of two or three years to permit the growth of shell. The different pearl-bearing lagoons are thus worked in succession. The diving season begins October 1, the natives concentrating at the most favorable places upon the official announcement of the list of islands to be fished. The industry employs about 20 small sail vessels and 600 boats or canoes.

The more important pearling islands are: Hiqueru, Hao, Raroia, Katiu, Takapoto, Ahe, Manihi, Apataki, Marutea, Aratika, Fakarava, Kaukura, Marokau, and Mangareva. Hiqueru is by far the most important of the group. It is worked at intervals of three years, its output of shell averaging over 250 tons per season. In 1896 the first month's diving produced about half the entire yield of the archipelago. Hao Island is next in importance for pearl shell. Pearls appear to be derived chiefly from Kaukura.

At the opening of the season of 1899 the *Albatross* called at Hiqueru, where over 3,000 persons were gathered, representing the majority of the pearling population of the Tuamotus. The bulk of the pearl shell was being taken from depths of 8 to 10 fathoms. Less than 25 per cent of the divers work at depths greater than 12 fathoms, while a few only can descend to 20 fathoms. When conditions are best, good divers earn $2.20 to $2.50 (Chilean silver) a week.

The industry here as elsewhere is based on pearl shell or mother-of-pearl, worth in the European market $375 to $800 per ton, according to the grade. Pearls when found are usually secreted by those discovering them, and disposed of privately. There are no statistics available respecting this feature of the fishery, although the total value of the pearls that come from the islands through various channels is known to be considerable.

The following statement respecting the quantity and value of mother-of-pearl shell from the Tuamotu Archipelago, exported from Tahiti during the period from 1873 to 1898 was secured with the assistance of Mr. J. L. Doty, consul of the United States at Tahiti:

Quantity and value of mother-of-pearl shell from the Tuamotu Archipelago, exported from Tahiti from 1873 to 1898.

Year.	Tons.	Value in United States coin.	Year.	Tons.	Value in United States coin.
1873	328	$38,572.80	1886	162	$59,535.00
1874	410	150,597.00	1887	271	99,592.50
1875	240	95,080.00	1888	387	113,778.00
1876	390	76,340.00	1889	583	214,252.50
1877	234	57,330.00	1890	646	237,713.70
1878	591	173,654.00	1891	598	242,275.00
1879	470	138,180.00	1892	593	248,140.80
1880	281	82,614.00	1893	566	225,790.00
1881	502	196,784.00	1894	675	274,640.00
1882	471	207,711.00	1895	296	91,644.30
1883	384	169,344.00	1896	591	289,955.00
1884	343	134,456.00	1897	445	238,953.60
1885	249	75,407.00	1898	437	181,887.60

A more extended account of the Tuamotu pearl fishery is being prepared, as the facts relating to it may prove of interest in connection with the pearl fishery of the Philippine Islands.

THE CHINESE SHRIMP FISHERY OF SAN FRANCISCO BAY.

The fishery for shrimps has been conducted in this bay for many years. The products are marketed fresh in California, or dried and exported to China, together with certain dried fish also yielded by the fishery. The industry is a declining one. When visiting the camps and fishing grounds in 1891 the writer counted 46 boats. The number from which licenses are collected at the present time is 31. The export of dried shrimps is decidedly less than in former years, while the quantity of dried fish exported is not great, the total amount from 1890 to 1898 being a little more than 3,600,000 pounds, or about equal to the export of shrimp products for any one year prior to 1894.

The following table shows the yield and value of the shrimp fishery in San Francisco Bay in 1889, 1890, 1891, 1892, 1895, and 1898, though the figures for 1898 are probably incomplete:

Year.	Pounds.	Value.
1889	5,522,104	$251,637
1890	5,812,848	264,823
1891	4,886,558	222,451
1892	5,310,075	241,163
1895	5,425,000	162,759
1898	1,750,492	93,622

The following table shows the exports of dried shrimp, shrimp shells, and dried fish from 1890 to 1898.

Table showing the quantity of products of the Chinese shrimp fishery of San Francisco Bay exported to China during the period from 1890 to 1898.

Months.	1890.			1891.			1892.		
	Fish.	Shrimp.	Shrimp shells.	Fish.	Shrimp.	Shrimp shells.	Fish.	Shrimp.	Shrimp shells.
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
January	4,260	5,832	278,705	850	18,192	257,567	8,900	16,800	179,100
February	8,403	8,789	843,215	8,567	39,736	790,788	.....	38,400	679,500
March	4,325	3,407	72,322	8,210	1,580	333,354	762,600	43,400	589,800
April	13,181	17,792	58,530	57,537	83,329	235,313	3,560	83,000	304,800
May	1,835	39,935	156,595	38,338	93,328	238,396	1,967	51,200	159,700
June	138,737	208,310	417,172	231,489	91,750	285,127	81,200	79,000	262,800
July	71,091	106,307	238,224	112,249	188,408	304,520	114,310	128,400	334,500
August	87,579	131,240	82,977	69,105	104,919	38,753	100,200	80,400	174,300
September	24,184	116,785	12,620	77,542	210,306	39,153	104,800	168,600	59,400
October	29,286	45,457	37,894	80,000	150,800	86,000	23,200	167,400	39,300
November	8,921	95,339	7,000	.....	23,800	.....	.....	77,000	17,100
December	.....	7,630	.....	900	106,200	189,300	1,400	47,800	109,500
Total	391,302	786,823	2,205,854	684,787	1,107,348	2,746,271	697,077	976,400	2,909,800

Months.	1893.			1894.			1895.		
	Fish.	Shrimp.	Shrimp shells.	Fish.	Shrimp.	Shrimp shells.	Fish.	Shrimp.	Shrimp shells.
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
January	.....	72,200	47,700	.....	13,400	278,700	.....	15,400	145,200
February	.....	2,000	491,100	.....	6,800	243,600	.....	15,800	96,000
March	.....	27,200	617,700	.....	53,800	433,500	.....	28,000	47,400
April	.....	50,600	168,200	.....	57,400	210,300	.....	63,000	104,400
May	.....	42,200	138,400	.....	60,200	167,400	6,400	81,200	112,500
June	120,400	69,400	175,200	76,600	60,400	175,800	26,400	82,000	185,100
July	32,200	50,200	190,200	21,600	55,600	233,100	31,800	73,400	114,900
August	36,800	50,600	241,200	71,400	40,800	112,500	1,200	33,800	170,700
September	8,600	81,800	207,000	207,200	63,400	17,400	4,600	88,800	80,700
October	.....	100,200	56,100	80,600	40,200	5,700	15,000	53,600	33,900
November	600	53,000	53,700	55,600	110,200	6,600	83,600	119,000	.....
December	5,000	18,200	27,900	.....	31,600	.....	19,800	74,100	.....
Total	203,600	617,600	2,412,400	513,000	599,800	1,884,600	188,800	778,100	1,090,800

Months.	1896.			1897.			1898.		
	Fish.	Shrimp.	Shrimp shells.	Fish.	Shrimp.	Shrimp shells.	Fish.	Shrimp.	Shrimp shells.
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
January	14,600	6,200	.....	66,010	69,130	69,720	1,000	22,400	900
February	15,400	308,200	16,500	900	82,125	167,000	900	40,400	1,200
March	2,500	19,400	145,000	600	26,700	223,439	2,000	66,800	1,200
April	47,200	77,400	179,700	183,899	9,400	100,755	55,000	55,000	1,500
May	15,200	19,600	90,600	1,000	75,106	163,645	11,600	38,400	600
June	54,400	44,600	64,800	.....	.....	.....	90,600	86,200	3,000
July	163,600	83,400	261,000	4,000	9,300	47,400	.....	.....	.....
August	46,600	96,000	59,400	.....	.....	.....	90,600	98,800	1,200
September	10,800	85,600	77,800	3,600	99,800	.....	19,600	86,400	.....
October	13,400	162,000	74,200	29,006	75,200	4,200	5,000	21,200	32,700
November	15,600	70,000	27,300	.....	.....	.....	.....	11,000	1,000
December	19,200	62,200	2,100	2,500	47,429	6,670	.....	42,200	1,000
Total	418,700	1,034,600	958,400	291,521	494,190	782,829	275,700	568,800	44,300

There has been considerable local discussion respecting the bearing of the shrimp fishery upon the food of important fishes frequenting the same bay. The fishery can not be conducted successfully without the use of small-meshed nets, which involves the taking of the young of many species of fishes which are either themselves valuable fish or supposed to be the food of such species. Many of these are sculpins or other unimportant kinds. A careful search was made for young shad, salmon, and striped bass, but none were found. The food of the important fishes of this region is not yet well known.

Investigations of this subject by the writer in May and November revealed the presence of the following fishes in the shrimp nets as they came from the waters:

List of fishes commonly taken in shrimp nets.

Food-fishes.		Unimportant species.	
Scientific name.	Common name.	Scientific name.	Common name.
Platichthys stellatus	Flounder.	Liparis pulchellus	Sea snail.
Parophrys vetulus	Do.	Lampetra ciberia	Lead-colored lamprey.
Psettichthys melanostictus	Do.		
Engraulis mordax	California anchovy.	Siphostoma californiense	Pipe-fish.
		Pholis ornatus	Butter-fish.
Clupanodon cæruleus	California sardine.	Leptocottus armatus	Sculpin.
		Porichthys margaritatus	Midshipman.
Osmerus thaleichthys	Smelt.	Lepidogobius lepidus	
Genyonemus lineatus	Little roncador.	Myliobatis californicus	Sting ray.
Sebastodes juv	Rock-fish.	Raia binoculata	Skate.
Cyprinus carpio	Scale carp.	Notorhynchus maculatus	Spotted shark.
Microgadus proximus	California tomcod.	Galeus californicus	Hound-shark.
		Triakis semifasciatum	Leopard-shark.
Cymatogaster aggregatus	Viviparous perch.	Rhinotriacis henlei	Small dog-shark.

A METHOD OF RECORDING EGG DEVELOPMENT, FOR USE OF FISH-CULTURISTS.

By CLAUDIUS WALLICH.

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A METHOD OF RECORDING EGG DEVELOPMENT, FOR USE OF FISH-CULTURISTS.

By CLAUDIUS WALLICH.

In watching the development of fish embryos it is observed that the rate of growth of the embryo is dependent almost directly upon the temperature of the water. It has been customary to refer to the various stages of growth as making their appearance in a certain number of days or hours at a given mean water-temperature. As this mean is obviously subject to great variations, the lengths of time at which given phenomena appear are subject to correspondingly great variations. Then, too, in the embryonic life of each separate species of fish there are a number of definite periods that must be well known to the fish-culturist, for efficient work; such, for instance, as the beginning of the critical stage, the ending of the same, the earliest shipping age for eyed eggs, the latest shipping age for a given distance and conditions, the length of the incubation period, and the time required for sac absorption—all very important questions, concerning which accurate and immediate knowledge is often required. Again, the given mean water-temperature for the varying lengths of time at which these definite phenomena appear is not and can not well be computed until the phenomena have actually occurred, and it is therefore impossible to closely predict their time of occurrence.

The complexity of these data, as well as their importance, makes very desirable a simpler, more convenient, and more efficient terminology expressive of the rate of growth than the one above mentioned.

During the season of 1898 and 1899, at the United States Fish Commission station at Baird, Cal., there was tested a system of recording egg development which may be termed the "temperature or thermal unit system." By temperature unit (t. u.) is meant 1° F. above 32° for a period of 24 hours. Thus a mean temperature of 36° F. for one day is equivalent to 4 temperature units, etc. One degree centigrade for the same period would make a more convenient unit, as it would do away with the subtraction of 32 each day to find the resultant units; but as Fahrenheit thermometers were in general use the Fahrenheit scale was employed in this case.

To use this system of recording egg development, subtract 32 from the mean water-temperature of the day the first eggs are taken. This gives the age of the eggs in temperature units on the second day. The temperature units of the second day are added to those of the

first, and in this manner those of each succeeding day throughout the season are added to the total of the day previous. At a station where the temperature units are reckoned daily from the opening of the season the age of any lot of eggs may be at once known by subtracting from the reading on the day of examination the reading of the day on which the eggs were taken. In practice it is found simple and convenient, and as the season advances the answers to many questions may be had from this interesting column of figures.

The result of the tests at Baird shows that the incubation period of the quinnat salmon is about 900 t. u. From irregular data and some observation, it seems that this is also the number required for brook trout (*Salvelinus fontinalis*), while from similar data it is thought that rainbow trout (*Salmo irideus*) require a somewhat less number. Each species undoubtedly has its peculiar norm.

This unit seems preeminently to include the factors determining the length of the incubation period. Without going deeply into the merits of the old rule, "in 50 days at a mean water-temperature of 50° F. trout eggs will hatch, and for each degree warmer or colder 5 days less or more will be required, the difference, however, increasing the farther we recede from 50°," it will be seen at a glance that the law is an empirical one, and while recognizing perhaps the factors of incubation, it is not sufficiently accurate and explicit to be available in determining the entire period when the mean is slightly removed from 50° and is entirely silent as to intermediate stages. There are but two important variable factors that affect this period, namely, time and the temperature of the water. There are many other conditions that affect incubation, such as quality, volume, aeration, etc., conditions of such importance that success is not possible if they are not right, and these conditions must in some degree affect the length of the incubation period. The two main factors, however, as before stated, are time and the temperature of the water.

As water freezes at 32° F., and will, of course, congeal all life within it when frozen, rendering growth, if not life itself, impossible, it is only rational, so far as temperature is concerned, that this be the point of starting. In many stations, it is true, hatching operations are conducted in waters that are very cold, and it would seem that the eggs of *Salmonidæ* could hardly be subjected to as many as 900 t. u. before hatching. Cod work in winter time is also done at very low temperatures. It must be remembered, however, that the growth of the embryo salmonoid in such stations takes place mainly in the fall before the waters reach extremely low temperatures, and again in the spring when they begin to warm up. It is also conceded that cod work at 32° or 33° is very unsatisfactory.

It is hardly necessary to say that neither the "temperature-unit system," nor any other "system," will give uniform results in waters which through unsuitable temperatures will not produce healthy fry;

such, for example, as the extremely low temperatures in cod work and abnormally high temperatures for those species of *Salmonidæ* that naturally seek glacial waters for their spawning-grounds.

The accompanying extract from the temperature sheets of Baird Station shows the record of water-temperatures and the manner in which the age of the eggs was kept. It will be noticed that the daily mean is compiled from the morning and evening temperatures only, as by repeated trials they were shown to be the maxima and minima. It would have been better, perhaps, to have had readings every 3 hours, as the times during which these temperatures prevailed would have been more accurately gauged and a slightly different norm would probably have been found. The test, however, was thought to have been sufficiently thorough to show the value of the system.

Extract from Baird water-temperature record.

Date.	Temperature.				Temp. unit.	Date.	Temperature.				Temp. unit.
	6 a.m.	12 m.	6 p.m.	Mean.			6 a.m.	12 m.	6 p.m.	Mean.	
1898.						1898.					
Aug. 16	55	59	61	58	.....	Oct. 19	47	49	51	49	1322.5
17	54	60	60	57	26	20	46	49	51	48.5	1339.5
18	54	59	59	56.5	51	21	46	49	51	48.5	1356
19	53	59	59	56	75.5	22	46	49	51	48.5	1372.5
Sept. 6	51	56	58	54.5	499	23	49	50	51	50	1389
7	52	56	57	54.5	521.5	24	47	48	50	48.5	1407
8	51	56	57	54	544	25	45	47	49	47	1423.5
9	51	56	57	54	566	26	46	48	49	47.5	1438.5
10	50	53	56	53	588	27	46	48	50	48	1454
11	50	53	55	52.5	609	28	45	48	50	47.5	1470
12	50	55	56	53	629.5	29	45	47	49	47	1485.5
13	50	54	55	52.5	650.5	30	46	48	50	48	1500.5
14	50	52	55	52.5	671	31	48	49	50	49	1516.5
15	50	54	56	53	691.5	Nov. 1	46	48	49	47.5	1533.5
16	50	54	56	53	712.5	2	44	46	47	45.5	1549
17	50	53	55	52.5	733.5	3	45	46	47	46	1562.5
18	52	54	56	54	754	4	44	49	50	47	1576.5
19	51	54	56	53.5	776	5	46	49	50	48	1591.5
20	50	53	55	52.5	797.5	6	46	47	48	47	1607.5
21	51	52	53	52	818	7	44	46	47	45.5	1622.5
22	51	52	54	52.5	838	8	43	46	45	44	1636
23	50	53	54	52	858.5	9	42	44	45	43.5	1648
24	50	52	53	51.5	878.5	10	41	43	45	43	1659.5
25	50	52	53	51.5	898	11	42	44	45	43.5	1670.5
26	51	53	54	52.5	917.5	12	42	44	45	43.5	1682
27	51	53	55	53	938	13	42	44	45	43.5	1693.5
28	50	52	53	51.5	959	14	42	44	45	43.5	1705
29	48	51	52	50	978.5	15	42	44	45	43.5	1716.5
30	42	49	50	46	996.5	16	44	45	45	44.5	1728
Oct. 1	45	47	49	47	1010.5	17	44	46	47	45.5	1740.5
2	46	48	49	47.5	1025.5	Dec. 30	38	39	40	39	2208
3	47	49	49	48	1041	31	38	39	40	39	2215
4	48	49	50	49	1057						
5	46	48	49	47.5	1074	1899.					
6	48	49	51	49.5	1089.5	Jan. 1	34	34	34	34	2222
7	49	50	50	49.5	1107	2	34	36	37	35.5	2224
8	48	50	51	49.5	1124.5	Feb. 18	40	59	57	48.5	2090
9	49	51	51	50	1142	19	41	58	57	49	2712.5
10	49	51	52	50.5	1160	20	38	52	53	45.5	2729.5
11	50	53	53	51.5	1178.5	21	37	50	52	44.5	2743
12	49	53	52	50.5	1198	22	40	52	56	48	2755.5
13	49	52	54	51.5	1216.5	23	40	52	55	47.5	2771.5
14	49	51	52	50.5	1236	24	37	50	50	43.5	2787
15	48	51	51	49.5	1254.5	25	37	49	49	43	2798.5
16	49	51	51	50	1272	26	36	55	50	43	2809.5
17	48	49	50	48	1290	27	41	53	50	45.5	2820.5
18	46	49	51	48.5	1306	28	46	48	48	47	2834

In the table following is submitted a list of eggs hatched at Baird during the season of 1898–99, showing, for each lot of eggs, the date of taking, date of hatching, and number of days and number of tem-

perature units required for incubation. It will be noted that although the period of incubation varied from 48 to 90 days, yet the greater number of eggs hatched at very close to 900 t. u. The failure of a few lots to obey the general rule in most cases seemed to be due to some special cause, such as a sudden fall in temperature when near the hatching stage; for example, those hatching on January 8 and 13. Fry had already begun to appear at the top of the baskets before January 1, when a heavy snowstorm caused a drop of 5° in the temperature of the water and delayed hatching for several days. A sudden rise in temperature at hatching time also unduly accelerates hatching; note those hatched on February 19, 22, and 28; about this time abnormal variations of temperature prevailed, reaching a maximum difference between morning and noon of 19°.

Record of eggs hatched at Baird, Cal., 1898-99.

When taken.	When hatched	Reading on day taken.	Reading on day hatched	Temperature units.	Days.	When taken.	When hatched	Reading on day taken.	Reading on day hatched	Temperature units.	Days.
1898.	1898.					1898.	1899.				
Sept. 6	Oct. 24	499	1407	908	48	Nov. 17	Feb. 14	1740.5	2645	904	89
7	25	521.5	1423.5	902	48	18	14	1754	2645	891	88
8	27	544	1454	910	49	19	15	1767.5	2659	891	88
10	30	588	1500.5	912	50	20	16	1782.5	2671	888	88
11	31	609	1516.5	907	50	21	18	1795	2696	901	89
12	Nov. 1	629.5	1533.5	904	50	22	18	1805.5	2696	890	88
14	5	671	1501.5	920	52	24	19	1827.5	2712.5	885	87
16	7	712.5	1622.5	910	52	25	19	1838.5	2712.5	874	86
18	11	754	1670.5	916	54	26	20	1849	2729.5	880	86
22	17	838	1740.5	902	56	28	22	1869	2755.5	886	86
	1899.					29	22	1881.5	2755.5	874	85
Oct. 20	Jan. 8	1339.5	2272.5	933	80	30	24	1896.5	2787	890	86
23	13	1389	2315	926	82	Dec. 1	26	1910.5	2809.5	899	87
27	16	1464	2341.5	887	81	2	27	1924.5	2820.5	896	87
29	19	1485.5	2379.5	894	82	3	28	1936.5	2834	897	87
30	21	1500.5	2404.5	904	83	4	28	1947.5	2834	886	86
31	21	1516.5	2404.5	888	82	5	28	1958	2834	876	85
Nov. 1	24	1533.5	2440.5	907	84	6	Mar. 3	1969.5	2882.5	913	87
5	28	1591.5	2489.5	898	84	7	3	1980.5	2882.5	902	86
6	29	1607.5	2503	896	84	8	5	1991.5	2911.5	920	87
7	30	1622.5	2516.5	894	84	9	5	2001	2911.5	910	86
*4	30	1576.5	2516.5	940	87	10	5	2010	2911.5	901	85
8	Feb. 4	1636	2567.5	931	88	15	7	2049	2943	894	82
10	5	1659.5	2570	910	87	16	8	2059.5	2959.5	900	82
11	6	1670.5	2573	902	87	17	10	2069.5	2983.5	914	83
12	9	1682	2593	911	89	20	11	2106	2992	886	81
13	11	1693.5	2612.5	919	90	18	12	2080.5	3008	927	84
14	12	1705	2623.5	918	90	22	13	2129	3021	892	81
15	12	1716.5	2623.5	907	89	27	17	2178	3076.5	900	80

* Very few eggs in this basket. Hatching always seems slower with a single layer of eggs than in full baskets; probably less animal heat.

The main advantage of this system of recording egg development lies in the fact that information is secured at a time when it is needed. By this it is not intended that entire reliance should be placed upon the record for determining the condition of the eggs. On the contrary, the chief dependence should always be placed on their appearance, especially in determining how far along they are in the tender stage and when they are well out of the same. The information obtained from the record is corroborative of our work and enables it to be checked up. For example, when selecting eggs for shipment a

short calculation will tell just what eggs are most suitable. Suppose a foreign shipment requiring a two or three weeks' journey is to be made. It is desirable to select the oldest eggs that will arrive before hatching, with a margin for safety besides. By estimating the probable temperature of the package, the number of temperature units required for the journey can be readily computed. Thus, if the temperature of the package be maintained at about 50° F., in 20 days it will be subjected 20 times 18, or 360 t. u., and if 100 t. u. be allowed for excess in temperature or delay on the journey a total of 460 t. u. is required. By subtracting these 460 t. u. from 900 t. u. it is seen that eggs of an age of 440 t. u. are required—so young that the eye-spot is barely visible when viewed in the ordinary way, but old enough to stand shipment. If this 440 t. u. be now subtracted from the reading on the day of shipment, the remainder corresponds to the reading of the day on which the required eggs were taken. Eggs for long foreign shipments are especially difficult to select, and any evidence corroborative of the exact age of the eggs at a time when mistakes are particularly to be avoided is very gratefully received.

In handling quinnat-salmon eggs at Baird Station it is safe and practical to pick them till they have an age of 100 t. u., when they are carefully picked for the last time before entering the tender stage. It is not thought that the entrance on this stage involves any sudden transformation, but the eggs are believed to increase daily in sensitiveness from the time they are taken until a time when, with the apparatus employed, it is no longer safe to handle them. After entering the tender stage they are left undisturbed until the germ disk has completed its growth around the egg. In the "summer run" eggs this occurred very close to 225 t. u. At this time it was found safe to uncover them; that is, to raise the baskets gently until the contained eggs are near the surface of the water and then suddenly, but carefully, to lower it, thus forcing the water up through the eggs and removing any accumulations of sediment that may have been deposited upon them, until they are clean or nearly so. Sediment usually collects only upon the upper layer of eggs. In performing this operation care must be taken to allow all the eggs to settle before it is repeated. After they have been treated in this manner for several days and have an age of about 300 t. u., they are quite out of the tender stage and may be subjected to daily pickings, the same as older eggs.

In observing eggs from time to time while in the tender stage the most striking phenomenon and the one most readily seen with the unaided eye is the ring or loop which defines the germinal layer in its growth around the egg. This ring is visible to the unaided eye as early as the sixth day, at 57° F., or at an age of 125 t. u., as seen in fig. 6 of the accompanying sketches, when it is apparently not yet fully formed. It retains its circular shape until it passes the equa-

torial position, which occurs on the eighth day, at 57° F., or 175 t. u., after which it gradually assumes a loop-like or pear-shaped form while traversing the lower hemisphere. This shape becomes the more pronounced the more nearly it approaches closure. This thickened blastodermic ring is the seat of the greatest vital activity in the layer, and any shock sufficient to cause the death of the egg first manifests its effects in the whitening of the ring and its surrounding tissue. The distinct outline of the fish is first seen when the ring is well down to the equator of the egg. This appearance of the outline of the fish, however, does not indicate that the tender stage is passed, for it is seen that a rupture of the germinal layer is quite fatal and is liable to occur until the egg is completely enveloped and some little time has elapsed to allow for the hardening or toughening of the layer.

The experiment that seemed to force the above conclusions consisted in taking a few eggs at a time and allowing them to fall from different elevations upon the canvas trough-covers, after which they were at once replaced in the water. Death following a severe jar for a given stage was indicated by an almost immediate whitening of the egg, but in the case of a less severe jar this clouding of the substance of the egg took place only after the lapse of several hours.

During the entire summer run of 1898 the blastopore closed, with very slight variations, at 225 t. u. When, on examining the eggs, it was found necessary to uncover a new lot, the record was always first consulted to find the age in temperature units, and the uniformity of the record in this respect established the fact that the ring closed at 225 t. u. However, when it came to the fall run, with its colder water, it was found that the same phenomenon occurred at 250 t. u., and this number was likewise uniform for the entire fall run; but as fall-run eggs, with but few exceptions, hatched at as close to 900 t. u. as did the summer-run eggs, it must be concluded either that up to a certain period of its growth the progress of the embryo is more rapid (when measured in temperature units) in warmer temperatures than in colder ones, or else it might be considered a point in favor of the argument that the spring and fall runs are made by distinct and separate varieties of fish. The former is probably the case, as the slight variations observed in a long summer-run series seem to point that way.

In attempting a description of the accompanying sketches of salmon embryos one is almost necessarily restricted to terms that are not always scientific. Phenomena that appear to the unaided eye in the entire egg are often quite different from the real biological changes taking place in the egg and which can only be seen by means of sections and a high-power microscope. Thus, when reference is made to the "nucleus," the dark central spot or kernel that is visible to the unaided eye is intended. The true nucleus is microscopic in size and is situated in the upper part of the germ disk, where, after the

two processes of cell division resulting in the extrusion of the polar bodies, it unites with the male nucleus derived from the spermatozoon, which in the meantime has entered the egg through the micropyle, has become embedded in the germ disk, and has separated into a nucleus and its accompanying aster. The union of these two nuclei and the formation of an aster inaugurate the process of segmentation. All these processes are microscopic, and not even a suggestion of what is taking place could be inferred from the external appearance.

These sketches are intended simply to give an idea of what can be seen with the unaided eye during the tender stage; and as landmarks showing progress in that stage it is hoped that they may be of some practical value. They show stages in the growth of summer-run quinnat-salmon eggs with the water at a mean temperature of 57° F. Sketches were made daily, and the age of the stage in temperature units was noted. As the water grew colder, it was noticed that while it sometimes took several days longer to reach a certain stage, yet the number of temperature units was always, within narrow limits, the same for a given stage. This uniformity of results at the given stages is the feature of the system that seems most strongly to recommend it for general use, and while different stations, with their differing conditions of water and weather, may produce slightly different results, still, as the conditions at any one station, year in and year out, are the same, the resultant differential will be the same.

Fig. 1 represents the egg about 1½ hours after impregnation and shows the concentration of minute vesicles at the pole; also their general distribution over the entire surface of the egg. They are quite sparsely scattered, however, and soon draw up into the upper third of the egg. A bluish translucent substance occupies the upper quarter of the egg, always rising to the top as the egg is turned. As no microscopic work was done at this time, this substance can not be positively named, but it is believed to be the germ disk attached to the inner egg or yolk mass, the whole inner egg turning with the disk. The eggs are extremely slippery when young. This quality is retained until they enter the tender stage, but is lost before they emerge from it.

Fig. 2 represents the egg 1 day old at a mean water-temperature of 57° F., or at an age of 25 t. u. It shows a distinct "nucleus" surrounded by a clouded band of very minute vesicles. The width of this band is about equal to the diameter of the nucleus. Around it are vesicles which extend down to about one-third the depth of the egg.

Fig. 3 is very similar to Fig. 2, the nucleus and band being larger. It represents 2 days' growth at the same water-temperature, or an age of 50 t. u.

Fig. 4 shows a partial clearing up of the clouded band; also a diminution in the size of the central nucleus. Age, 3 days at 57° F. mean temperature, or 75 t. u.

Fig. 5 shows the egg 4 days old. Central area clearer than at 3 days.

Fig. 6 represents the egg at 5 days old, or an age of 125 t. u., and shows now for the first time the presence of a secondary ring, not quite complete, with vesicles on both sides of it. The inner ring is of about the same appearance as on the day previous. This secondary "ring" is the outer edge of the germ disk or blastoderm and forms the margin of the blastopore.

Fig. 7 shows the egg with 6 full days' growth at 57° F., or 150 t. u. The blastoderm is now well developed and has grown sufficiently to pass the zone of vesicles. It is a very interesting as well as very delicate stage of the egg. Phenomena appear that are not seen the day previous nor the day following. It is at this time that the laying of the "neural keel" or forming of the body outline of the fish takes place. This outline can be quite readily detected the following day at the same water-temperature.

Fig. 8 represents the growth of the germinal layer halfway down the egg. Its edge, previously referred to as forming the "ring" or "loop" or blastopore, has the appearance of an addled ring. The body outline of the fish is now seen for the first time, the tail extending down to the edge of the ring. The relative positions of the tail of the fish and the ring do not change. The edge of the germ disk, in its further growth finally encircling the egg, seems to remain attached at this point and closes up in the shape of a continuously diminishing loop, disappearing after the tenth day at 57° F.

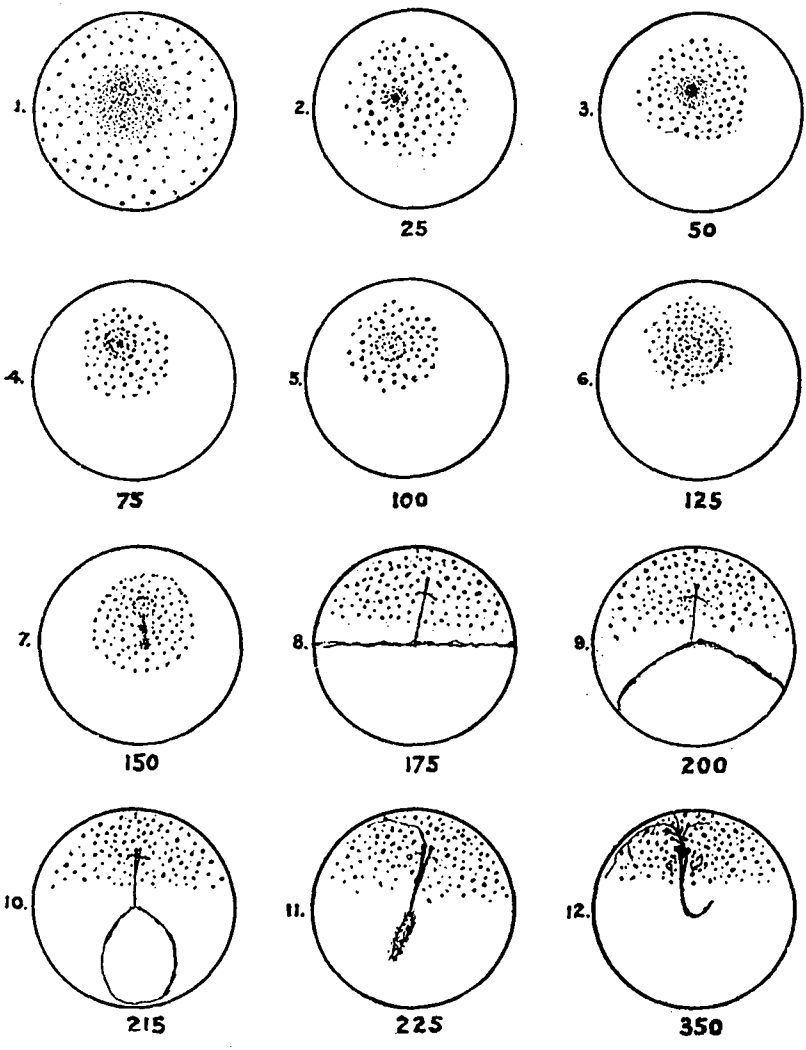
Fig. 9, at 200 t. u., shows a partial closing of the loop and a faint differentiation of the head into two eye-spots; also the appearance of a line crossing the body back of the head, which in a few days seems to deflect from this position and extend out forward. This line finally branches out and assumes the bright color of an artery.

Fig. 10, at 8½ days old, or an age of 215 t. u., shows the loop distinctly as such. Body outline clearer.

Fig. 11 shows the egg on the tenth day, or 9 full days old, 225 t. u. The loop is closed, and its remains may be seen hanging to the tail of the fish. The artery may now be seen extending out from the head, although it has not yet assumed its bright-red color. The fish is now practically formed, though the germ layer is still quite tender and liable to rupture.

One of the commonest monstrosities among young salmon is that of tailless fish; and as this thickened blastodermic ring forms the caudal plate, it is thought that an injury to the embryo caused by rough treatment at this time may be responsible for the loss.

Fig. 12 shows the egg at 14 days old, or 350 t. u. The artery projecting out from the head has assumed color, the tail is bent upward, and the fish is capable of motion. It is now well out of the tender stage, and must be kept free and clean to insure that degree of aeration which the increasing color of the artery shows that it requires.



EMBRYOS OF THE QUINNAT SALMON (SUMMER RUN).

STATISTICS

OF THE

FISHERIES OF THE MIDDLE ATLANTIC STATES.

PREPARED IN THE DIVISION OF STATISTICS AND METHODS OF THE FISHERIES, UNITED STATES FISH COMMISSION.

C. H. TOWNSEND, Assistant in Charge.

INTRODUCTORY NOTE.

The following report on the fisheries of the Middle Atlantic States has been prepared from data collected by agents of this Commission in 1898 and 1899, the information relating to the year 1897, with supplementary statistics on New York and New Jersey for 1898.

The statistics presented for the various States of this region relate wholly to the commercial fisheries of the coastal waters, in which are included the lower sections of the coast rivers. The fisheries of the interior waters have not been considered.

The general results of this work have already been published in Statistical Bulletins Nos. 11 and 13, and in the report of the Commissioner for 1899.

The report has been prepared under the direction of Mr. C. H. Townsend, assistant in charge of the division of fisheries.

The inquiries in the field were made by agents of the division, as follows: C. H. Stevenson in Maryland and New York; W. A. Wilcox in Virginia; T. M. Cogswell in Virginia and Maryland; Ansley Hall in Virginia, Maryland, Delaware, and New Jersey; John N. Cobb in Maryland, Delaware, Pennsylvania, and New Jersey; W. A. Roberts in Virginia, Maryland, and New Jersey; and E. S. King in Maryland, Delaware, and Pennsylvania.

Mr. Townsend spent a few days in visiting certain fisheries in New Jersey and New York, and Mr. J. B. Wilson was employed temporarily in Virginia and New York.

The field agents have assisted in the preparation of the statistical tables and have made contributions to the explanatory notes relating to the States canvassed by them.

GEO. M. BOWERS, *Commissioner.*

STATISTICS OF THE FISHERIES OF THE MIDDLE ATLANTIC STATES.

GENERAL NOTES AND STATISTICS.

The number of persons engaged in the coast fisheries of the Middle Atlantic States in 1897 was 95,316. Of this number, 73,169 were fishermen and 22,147 shoresmen. The States which had the greatest number of persons employed in their fisheries were Maryland and Virginia, the former having 42,812 and the latter 28,277. New Jersey comes third, with 12,494, followed by New York with 7,443, Delaware with 2,392, and Pennsylvania with 1,898. Since the general canvass of the fisheries of this region in 1891 there has been an increase in the number of persons employed of 5,808. This increase has taken place in four of the States here considered, while in two States there have been decreases. The largest increase has occurred in Virginia, amounting to 4,682 persons.

The capital invested in the fisheries of the region amounted to $15,188,615. In Maryland the investment was $5,821,610; in Virginia, $2,891,536; in New Jersey, $2,371,253; in New York, $2,094,869; in Pennsylvania, $1,601,528, and in Delaware, $407,819. As compared with the year 1891 the capital invested in the fisheries is shown to have increased $787,807, the increase being largest in New York.

The number of vessels employed was 3,874, having a tonnage of 58,315 tons, and a value, with their outfits, of $4,167,469. The boats employed in the shore fisheries numbered 32,290, and were valued, with accessory scows and floats, at $1,875,965. The apparatus of capture was valued at $1,515,723. The value of shore property and cash capital was $7,629,458.

The products of the fisheries, aggregating 594,172,210 pounds, were valued at $14,324,463. This amount is apportioned as follows: Maryland, $3,617,306; New Jersey, $3,614,434; New York, $3,391,595; Virginia, $3,179,498; Pennsylvania, $269,507, and Delaware, $252,123. The oyster fishery, which is the most important in this region, was valued at $8,866,829. The shad fishery ranks next in importance, being valued at $981,246. The clam fishery was valued at $937,872. Other important species were blue-fish, valued at $581,563; menhaden, at $473,359; squeteague, at $380,371; crabs, at $337,264, and alewives, at $229,983.

The fishery products since 1891 have increased 3,717,841 pounds in quantity and have decreased $4,699,011 in value. The States which show an increase in the quantity of their products are New Jersey, Delaware, and Virginia, while there has been a decrease in value in all of the States except New Jersey. It is interesting to note that the yield of shad, a species which has been the subject of extensive artificial propagation in this region, has increased 5,655,151 pounds in quantity and has decreased $235,343 in value. The yield of cod has increased 2,480,537 pounds and $25,205 in value. The cod has also been extensively planted in the inshore waters north of this region.

In making comparisons of the present condition of the fisheries of this region with their condition in former years, the following earlier publications of the United States Fish Commission may be consulted advantageously:

The Fishery Industries of the United States, section II. Geographical Review of the Fisheries for 1880. Parts VI to XI, inclusive.

The Fishery Industries of the United States, section V. History and Methods of the Fisheries.

A Statistical Report on the Fisheries of the Middle Atlantic States, by Hugh M. Smith, M. D. Bull. U. S. Fish Com. 1894, pp. 339–467.

The Oyster Industry of Maryland, by Charles H. Stevenson. Bull. U. S. Fish Com. 1892, pp. 203–297.

The Sturgeon and Sturgeon Industries of the Eastern Coast of the United States, by John A. Ryder. Bull. U. S. Fish Com. 1888, pp. 231–328.

The Sturgeon Fishery of Delaware River and Bay, by John N. Cobb. Rept. U. S. Fish Com. 1899, pp. 369–380.

Notes on the Oyster Industry of New Jersey, by Ansley Hall. Rept. U. S. Fish Com. 1892, pp. 463–528.

The Shad Fisheries of the Atlantic Coast of the United States, by Charles H. Stevenson. Rept. U. S. Fish Com. 1898, pp. 101–269.

Notes on the Extent and Condition of the Alewife Fisheries of the United States in 1896, by Hugh M. Smith. Rept. U. S. Fish Com. 1898, pp. 31–43.

The three following tables show in detail the number of persons employed, capital invested, and the quantity and value of the products in 1897:

Table showing the number of persons engaged in the fisheries of the Middle Atlantic States in 1897.

States.	Fishermen.	Shoremen.	Total.
New York	6,937	506	*7,443
New Jersey	11,884	610	12,494
Pennsylvania	1,461	437	1,898
Delaware	2,008	384	2,392
Maryland	26,627	16,185	42,812
Virginia	24,252	4,025	28,277
Total	73,169	22,147	95,316

*Exclusive of persons engaged in the wholesale trade of New York city.

Table showing the investment in the fisheries of the Middle Atlantic States in 1897.

Items.	New York.		New Jersey.	
	No.	Value.	No.	Value.
Vessels	643	$810,575	675	$649,451
Tonnage	9,664		8,452	
Outfit		201,075		117,393
Boats	4,089	267,181	6,365	485,059
Scows, floats, etc		7,160		
Seines	179	26,810	522	39,894
Gill nets	3,169	65,187	4,142	124,158
Pound nets, traps, and weirs	197	53,780	180	98,995
Fyke nets	3,487	17,195	2,556	16,488
Stop nets			82	5,178
Dip nets	13	7		
Lines		6,763		6,385
Pots, eel and lobster	8,940	10,992	4,484	5,176
Dredges, tongs, rakes, and hoes		32,658		83,966
Crab scrapes or dredges			144	612
Other apparatus		56		1,156
Shore and accessory property		*437,930		563,992
Cash capital		*157,500		178,400
Total		2,094,869		2,371,253

Items.	Pennsylvania.		Delaware.	
	No.	Value.	No.	Value.
Vessels	40	$71,200	42	$32,375
Tonnage	757		554	
Outfit		20,555		5,479
Boats	504	21,485	953	39,349
Seines	125	12,921	176	8,676
Gill nets	177	9,711	983	31,037
Pound nets, traps, and weirs			8	625
Fyke nets	1,120	1,508	656	1,125
Dip nets	110	320		
Lines		172		101
Pots, eel and lobster	125	90	677	354
Dredges, tongs, rakes, and hoes		2,500		3,725
Other apparatus		390		399
Shore and accessory property		828,576		196,374
Cash capital		692,100		88,200
Total		1,601,528		407,819

Items.	Maryland.		Virginia.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Vessels	1,419	$1,078,560	1,055	$675,862	3,874	$3,818,023
Tonnage	23,670		15,218		58,315	
Outfit		265,982		238,962		849,446
Boats	10,077	562,455	10,302	493,276	32,290	1,868,805
Scows, floats, etc						7,160
Seines	330	39,282	145	54,012	1,477	181,595
Gill nets	8,464	77,264	9,307	46,235	26,242	353,592
Pound nets, traps, and weirs	856	81,115	1,250	264,600	2,491	499,115
Fyke nets	7,117	23,108	361	4,687	15,297	64,061
Stop nets					82	5,178
Dip nets					123	327
Trammel nets	31	2,320			31	2,320
Slat traps			68	1,345	68	1,345
Lines		2,238		1,632		17,291
Pots, eel and lobster	4,910	2,546	270	404	19,406	19,562
Dredges, tongs, rakes, and hoes		155,464		75,804		354,117
Crab scrapes or dredges	2,806	10,294	826	2,063	3,776	12,969
Other apparatus		2,028		222		4,251
Shore and accessory property		1,878,669		607,682		*4,613,223
Cash capital		1,640,285		424,750		*3,116,235
Total		5,821,610		2,891,586		15,188,615

* Exclusive of the shore property and cash capital in the wholesale trade of New York city.

Table showing the quantity and value of products taken in the fisheries of the Middle Atlantic States in 1897.

Species.	New York.		New Jersey.		Pennsylvania.		Delaware.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	955,000	$11,367	2,053,802	$9,529	422,335	$2,883	1,924,607	$11,910
Black bass	.....	.....	150	12	4,103	418	.....	.....
Blue-fish	11,146,424	391,027	5,164,173	148,257	12,800	321	.....	.....
Bonito	42,823	2,103	358,700	9,605	.....	.....	.....	.....
Butter-fish	728,616	26,125	217,057	5,867	.....	.....	.....	.....
Carp	205,560	8,318	785,409	39,370	114,950	6,695	111,300	5,192
Cat-fish	90,090	5,656	221,985	11,114	120,096	6,985	68,290	3,847
Cero	.....	.....	5,100	160	.....	.....	.....	.....
Cod	2,116,316	69,879	3,481,890	71,208	.....	.....	.....	.....
Croakers	.....	.....	280,800	5,021	.....	.....	297,600	2,554
Drum	.....	.....	82,900	842	.....	.....	.....	.....
Eels	420,730	29,226	749,405	35,862	51,794	4,273	128,810	6,352
Flounders	1,108,057	85,174	1,225,725	29,018	31,545	792	2,000	85
Haddock	153,320	4,904	167,375	3,060	.....	.....	.....	.....
Hake	24,300	608	69,735	1,538	.....	.....	.....	.....
Hickory shad	.....	.....	3,719	229	.....	.....	.....	.....
King-fish	10,440	872	43,027	3,766	.....	.....	.....	.....
Mackerel	140,812	6,978	24,300	1,628	.....	.....	.....	.....
Menhaden	60,605,712	147,697	30,552,825	70,056	.....	.....	.....	.....
Mullet	.....	.....	22,075	537	.....	.....	37,700	844
Perch, white	62,490	3,244	596,917	37,924	.....	.....	399,300	19,128
Perch, yellow	8,100	121	5,960	297	.....	.....	.....	.....
Pike and pickerel	.....	.....	2,770	152	.....	.....	41,250	2,027
Pollock	3,000	90	300	9	.....	.....	.....	.....
Pompano	.....	.....	40	10	.....	.....	.....	.....
Scup	746,873	16,911	757,450	13,816	29,150	719	.....	.....
Sea bass	354,441	16,245	2,131,480	74,281	900,000	36,000	1,900	95
Shad	1,884,228	62,953	13,000,783	342,931	2,007,325	63,587	1,620,364	47,962
Sheepshead	4,900	252	49,835	8,565	.....	.....	.....	.....
Spanish mackerel	11,360	1,825	108,030	11,539	.....	.....	.....	.....
Spots	.....	.....	20,700	682	.....	.....	.....	.....
Squeteague	2,561,627	69,474	8,679,132	180,989	.....	.....	1,440,880	25,149
Striped bass	116,465	14,177	287,189	31,978	9,556	991	128,770	12,033
Sturgeon	427,547	26,248	813,449	26,464	9,945	260	280,350	9,014
Suckers	16,050	635	142,130	6,720	25,250	1,244	35,200	1,543
Tautog	49,181	1,534	289,400	5,513	.....	.....	4,800	240
Tomcod or frost-fish	41,000	912	1,850	20	.....	.....	.....	.....
Whiting	9,000	250	4,000	50	.....	.....	.....	.....
Other fish	1,239,200	6,066	27,972	1,316	1,952	173	.....	.....
Crabs, hard	809,333	2,473	535,088	14,411	.....	.....	13,800	256
Crabs, soft	103,847	8,502	260,213	25,658	.....	.....	155,000	5,133
King crabs	.....	.....	1,124,800	4,495	.....	.....	675,000	2,025
Lobsters	881,020	31,458	99,230	8,573	.....	.....	5,095	459
Shrimp	.....	.....	2,896	1,565	.....	.....	320	160
Squid	151,000	3,393	.....	.....	.....	.....	.....	.....
Clams, hard	1,472,304	198,930	4,730,177	543,795	.....	.....	6,800	1,530
Clams, soft	747,000	54,953	745,000	63,725	.....	.....	.....	.....
Oysters, market	13,559,630	1,954,995	9,545,361	1,453,369	1,861,538	143,974	644,560	45,974
Oysters, seed	1,327,410	95,063	11,489,980	228,646	.....	.....	501,830	17,923
Mussels	30,000	960	2,520,000	1,575	.....	.....	.....	.....
Scallops	885,960	80,122	72,000	4,000	.....	.....	.....	.....
Terrapins	.....	.....	13,528	6,096	825	98	8,322	2,556
Turtles	.....	.....	14,550	999	1,021	78	44,570	2,396
Frogs and crawfish	.....	.....	.....	.....	78	16	.....	.....
Caviar	.....	.....	200,155	67,592	.....	.....	69,479	25,736
Shells	5,310,000	4,875	.....	.....	.....	.....	.....	.....
Total	109,555,566	3,391,595	103,782,517	3,614,434	5,604,263	269,507	8,647,897	252,123

Species.	Maryland.		Virginia.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	17,139,459	$123,453	13,089,510	$70,841	36,184,713	$229,983
Black bass	6,765	613	14,075	654	25,093	1,697
Blue-fish	186,708	7,156	1,505,228	34,802	18,015,333	581,568
Bonito	1,000	50	25,350	798	427,873	12,556
Butter-fish	87,040	2,348	465,828	10,624	1,498,541	44,964
Carp	110,925	3,825	5,119	167	1,333,263	63,567
Cat-fish	578,021	19,644	457,417	12,292	1,535,899	59,588
Cero	1,000	50	1,200	73	7,300	288
Cod	.....	.....	800	40	5,599,006	141,127
Croakers	236,295	2,889	4,161,529	28,144	4,976,224	88,608
Drum	43,000	386	114,420	1,094	240,320	2,322
Eels	406,744	14,684	84,560	2,790	1,842,043	93,187
Flounders	27,357	1,097	265,280	7,930	2,659,964	74,096
Haddock	.....	.....	.....	.....	320,695	7,964
Hake	.....	.....	.....	.....	94,035	2,146
Hickory shad	3,752	53	196,916	8,409	204,387	8,691
King-fish	1,000	85	120,075	4,970	174,542	9,643

Table showing the quantity and value of products taken in the fisheries of the Middle Atlantic States in 1897—Continued.

Species.	Maryland.		Virginia.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Mackerel			300	$18	165,412	$8,624
Menhaden	353,100	$365	178,656,362	255,241	270,167,999	473,359
Mullet	1,500	60	54,521	1,196	116,796	2,637
Perch, white	925,545	49,963	273,294	13,527	2,257,546	123,786
Perch, yellow	395,735	12,283	113,885	2,993	518,680	15,694
Pike and pickerel	114,710	8,919	34,963	2,680	193,693	13,778
Pollock					3,300	99
Pompano	310	35	70,135	5,515	70,485	5,560
Scup			4,000	120	1,536,978	31,566
Sea bass	16,200	690	1,765	40	3,405,786	127,351
Shad	5,799,563	159,865	11,529,474	304,448	35,841,737	981,246
Sheepshead	200	12	28,968	1,905	83,903	10,734
Spanish mackerel	9,762	833	503,106	39,911	632,258	54,108
Spots	2,928	139	1,081,292	26,539	1,104,920	27,360
Squeteague	597,179	14,792	6,525,806	89,967	19,804,524	380,371
Striped bass	935,347	70,045	576,262	35,079	2,053,589	164,303
Sturgeon	145,569	5,008	631,619	16,563	2,308,479	83,557
Suckers	83,030	1,801	75,606	2,250	377,266	14,198
Tautog					343,381	7,287
Tomcod or frost-fish					42,850	932
Whiting			14,100	285	27,100	585
Other fish	4,000	152	169,534	4,256	1,442,658	11,963
Crabs, hard	5,333,316	89,949	5,331,398	28,831	11,522,935	85,420
Crabs, soft	4,115,879	177,637	1,068,116	39,914	5,703,055	251,844
King crabs					1,799,800	6,520
Lobsters					485,345	40,490
Shrimp	1,020	510			4,236	2,235
Squid					151,000	3,393
Clams, hard	122,288	8,842	841,568	66,097	7,173,137	819,194
Clams, soft					1,492,000	118,678
Oysters, market	50,784,538	2,885,202	49,166,936	2,041,683	125,562,563	8,525,197
Oysters, seed					13,319,220	841,632
Mussels					2,550,000	2,585
Scallops					957,960	84,122
Terrapins	7,266	3,226	11,822	2,104	41,763	14,080
Turtles	5,465	289	56,825	1,077	122,431	4,839
Frogs and crawfish	2,908	262	1,025	108	4,011	386
Caviar	1,594	644	63,960	19,023	335,188	112,995
Shells					5,310,000	4,875
Total	88,588,018	3,617,306	277,993,949	3,179,498	594,172,210	14,324,463

Certain crustacean and molluscan products obtained in the fisheries of the Middle Atlantic States in 1897, which have been designated in pounds in the foregoing table, are presented in number or bushels in the following supplementary table:

Products.	New York.		New Jersey.		Pennsylvania.		Delaware.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Crabs, hard.... number	927,999	$2,473	1,605,264	$14,411	.....	.....	41,400	$256
Crabs, soft.....do	311,541	3,502	780,639	25,658	.....	.....	465,000	5,133
King crabs.....do			562,400	4,495	.....	.....	337,500	2,025
Clams, hard....bushels	184,038	198,980	591,272	543,795	.....	.....	850	1,530
Clams, soft.....do	74,700	54,953	74,500	68,725	.....	.....	.....	.....
Oysters.....do	2,126,720	2,050,058	3,005,049	1,682,015	265,934	$148,974	168,770	63,897
Mussels.....do	3,000	960	50,400	1,575	.....	.....	.....	.....
Scallops.....do	147,660	80,122	12,000	4,000	.....	.....	.....	.....
Shells.....do	88,500	4,875	.....	.....	.....	.....	.....	.....

Products.	Maryland.		Virginia.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Crabs, hard.....number	15,999,948	$39,949	15,994,194	$28,331	34,568,805	$85,420
Crabs, soft.....do	12,347,637	177,637	3,204,348	39,914	17,109,165	251,844
King crabs.....do					899,900	6,520
Clams, hard.....bushels	15,286	8,842	105,196	66,097	896,642	819,194
Clams, soft.....do					149,200	118,678
Oysters.....do	7,254,934	2,885,202	7,028,848	2,041,683	19,840,254	8,866,829
Mussels.....do					53,400	2,585
Scallops.....do					159,660	84,122
Shells.....do					88,500	4,875

Comparative table showing the extent of the fisheries of the Middle Atlantic States in 1891 and 1897.

PERSONS ENGAGED.

States.	1891.	1897.	Increase or decrease in 1897 compared with 1891.	Percentage of increase or decrease in 1897 compared with 1891.
New York	12,246	8,862	−3,384	−27.63
New Jersey	10,639	12,494	+1,855	+17.44
Pennsylvania	2,273	1,898	− 375	−16.50
Delaware	2,230	2,392	+ 162	+ 7.26
Maryland	39,944	42,812	+2,868	+ 7.18
Virginia	23,595	28,277	+4,682	+19.84
Total	90,927	96,735	+5,808	+6.38

CAPITAL INVESTED.

States.	1891.	1897.	Increase or decrease in 1897 compared with 1891.	Percentage of increase or decrease in 1897 compared with 1891.
New York	$5,283,200	$7,012,725	+$1,729,525	+32.73
New Jersey	2,467,865	2,371,253	− 96,612	− 3.91
Pennsylvania	944,140	1,601,528	+ 657,388	+69.63
Delaware	208,082	407,819	+ 199,737	+95.99
Maryland	7,466,718	5,821,610	− 1,645,108	−22.03
Virginia	2,948,659	2,891,536	−57,123	− 1.94
Total	19,318,664	20,106,471	+ 787,807	+ 4.07

PRODUCTS.

States.	Pounds.			Percentage of increase or decrease in 1897 compared with 1891.
	1891.	1897.	Increase or decrease in 1897 compared with 1891.	
New York	170,885,022	109,555,566	−61,329,456	−35.89
New Jersey	79,116,380	103,782,517	+24,666,137	+31.18
Pennsylvania	7,583,657	5,604,263	− 1,979,394	−26.10
Delaware	7,697,649	8,647,897	+ 950,248	+12.34
Maryland	141,177,827	88,588,018	−52,589,809	−37.25
Virginia	183,993,834	277,993,949	+94,000,115	+51.09
Total	590,454,369	594,172,210	+ 3,717,841	+ .63

States.	Value.			Percentage of increase or decrease in 1897 compared with 1891.
	1891.	1897.	Increase or decrease in 1897 compared with 1891.	
New York	$4,817,369	$3,391,595	−$1,425,774	−29.60
New Jersey	3,520,057	3,614,434	+ 94,377	+ 2.68
Pennsylvania	322,021	269,507	− 52,514	−16.31
Delaware	255,423	252,123	− 3,300	− 1.29
Maryland	6,460,759	3,617,306	− 2,843,453	−44.01
Virginia	3,647,845	3,179,498	− 468,347	−12.84
Total	19,023,474	14,324,463	− 4,699,011	−24.70

NOTE.—In the first two sections of the above table, comparing the statistics for 1897 with those for 1891, it has been necessary, in order to secure the same basis of comparison for both years, to include in the data for 1897 an estimate of the number of persons engaged and the amount of capital invested in the wholesale fishery trade of New York City, based on statistics for the year 1898, no data on the wholesale trade of that city having been obtained for the year 1897.

FISHERIES OF NEW YORK.

Compared with 1891 the returns for the fishery industries of New York State show a considerable decrease as regards the total number of persons employed and the value of the products, the former item decreasing from 12,246 in 1891 to 9,185 in 1898, and the latter from $4,817,369 to $3,545,189 in the same period. In the item of value of investment there has been a large increase—from $5,283,200 in 1891 to $7,589,787 in 1898; but this increase has been principally in the valuation of shore property and cash capital, the returns for which show an increase from $3,374,655 to $5,741,221. Omitting these items, the value of investment has decreased during the period under comparison from $1,908,545 to $1,848,566.

The decrease in the number of fishermen of this State has been principally in the shore or boat fisheries, due not only to the reduced extent of the fisheries, but also to the semiprofessional fishermen finding employment in the various other industries developing along the coast. The number of shoresmen has also decreased, while on the other hand the vessel fisheries have largely increased, especially those for blue-fish and menhaden.

The most important fishery industry of the State is the oyster industry, which in 1898 yielded 56 per cent in value of the total products. Next comes the menhaden fishery, with a yield of $405,488, or 8 per cent of the total; but these figures fail in doing justice to that industry, since the rendering of the fish into oil and fertilizer gives employment to nearly as many men and as large a capitalization as the taking of the fish. The blue-fish fishery is almost as important as the menhaden, the value of the product in 1898 being $387,167. This is the most important fishery of the State for the taking of food-fish proper, and its extent has increased almost constantly during the past ten years, the total yield in 1898 being 11,214,433 pounds, whereas ten years previously it was less than half that amount. This is not due to an increase in abundance of that species, but to its enhanced popularity as a food article and to an increase in the size of the fleet and the extension of the fishing season and grounds, vessels now leaving port in March and going as far south as Cape Lookout. The fisheries for hard clams, cod, shad, squeteague, and soft clams, which, in the order named, rank next in value, all show a decrease from the extent of ten years ago. With the exception of blue-fish and menhaden, the only products showing an increase as compared with ten years ago are sturgeon, lobsters, mackerel, and scallops.

The returns for the extent of the fisheries of New York in 1897 and 1898 are here presented in three tables, relating, respectively, to quantity and value of the products, the persons employed, and the capital invested.

Table of products.

Species.	1897.		1898.	
	Lbs.	Value.	Lbs.	Value.
Alewives	955,000	$11,367	1,028,110	$12,652
Blue-fish	11,146,424	391,027	11,214,433	387,167
Bonito	42,823	2,103	63,244	1,718
Butter-fish	728,616	26,125	470,836	15,488
Carp	205,560	8,318	286,400	11,543
Cat-fish	90,090	5,656	102,340	6,151
Cod	2,116,316	69,879	2,040,137	69,032
Eels	420,730	29,226	396,945	27,517
Flounders	1,108,057	35,174	876,683	28,455
Haddock	153,320	4,904	172,883	5,548
Hake	24,300	608	32,621	684
King-fish	10,440	872	11,854	978
Mackerel	140,812	6,978	84,458	6,208
Menhaden	60,605,712	147,697	163,280,345	405,488
Perch, white	62,490	3,244	60,310	3,245
Perch, yellow	3,100	121	3,040	117
Pike			1,800	90
Pollock	3,000	90	4,635	130
Scup	746,373	16,911	645,397	14,102
Sea bass	354,441	16,245	311,181	13,990
Shad	1,884,228	62,953	1,828,977	62,745
Sheepshead	4,900	252	3,150	174
Skates	150,000	100	127,500	85
Snappers, red	92,000	3,680	76,000	3,040
Spanish mackerel	11,360	1,825	13,007	2,061
Squeteague	2,561,527	69,474	2,076,930	53,706
Striped bass	116,465	14,177	81,795	9,765
Sturgeon *a*	427,547	26,248	391,055	34,581
Suckers	16,050	635	17,550	758
Sun-fish			2,000	100
Tautog	49,181	1,534	51,260	1,607
Tomcod or frost-fish	41,000	912	34,700	699
Whiting	9,000	250	15,473	449
Other fish	997,200	2,286	847,298	1,756
Caviar *a*			17,256	11,992
Crabs, hard	[1] 309,333	2,473	[2] 246,633	1,793
Crabs, soft	[3] 103,847	3,502	[4] 100,823	3,394
Lobsters	381,020	31,458	332,378	30,235
Squid	151,000	3,393	276,257	6,188
Clams, hard	[5] 1,472,304	198,930	[6] 1,503,192	205,952
Clams, soft	[7] 747,000	54,953	[8] 817,800	60,797
Oysters, market	[9] 13,559,630	1,954,995	[10] 12,823,237	1,863,607
Oysters, seed	[11] 1,327,410	95,063	[12] 1,612,275	121,422
Mussels	[13] 30,000	960		
Scallops	[14] 885,960	80,122	[15] 653,178	53,430
Shells	[16] 5,310,000	4,875	[17] 5,460,000	4,550
Total	109,555,566	3,391,595	210,497,376	3,545,189

a The returns for sturgeon in 1897 show the gross weight and value of the fish, whereas those for 1898 show the net or dressed weight of the fish and its value—the weight and value of the caviar being listed separately.

[1] 927,999 in number.
[2] 739,899 in number.
[3] 311,541 in number.
[4] 302,469 in number.
[5] 184,038 bushels.
[6] 187,899 bushels.
[7] 74,700 bushels.
[8] 81,780 bushels.
[9] 1,937,090 bushels.
[10] 1,831,891 bushels.
[11] 189,630 bushels.
[12] 230,325 bushels.
[13] 3,000 bushels.
[14] 147,660 bushels.
[15] 108,863 bushels.
[16] 88,500 bushels.
[17] 91,000 bushels.

A supplementary table is here presented showing for the same period as above noted the product of mollusks and crustaceans according to the unit of quantity in which they are usually sold, instead of by pounds, which for the purpose of comparison is the unit of quantity employed in the main tables:

Products.	1897.		1898.	
	No.	Value.	No.	Value.
Crabs, hard ..... number..	927,999	$2,473	739,899	$1,793
Crabs, soft ..... do....	311,541	3,502	302,469	3,394
Clams, hard ..... bushels..	184,038	198,930	187,899	205,952
Clams, soft ..... do....	74,700	54,953	81,780	60,797
Oysters, market ..... do....	1,937,090	1,954,995	1,831,891	1,863,607
Oysters, seed ..... do....	189,630	95,063	230,325	121,422
Mussels ..... do....	3,000	960		
Scallops ..... do....	147,660	80,122	108,863	53,430
Shells ..... do....	88,500	4,875	91,000	4,550

Number of persons employed.

How engaged.	1897.	1898.
On vessels fishing	2,010	2,549
On vessels transporting	271	270
In shore or boat fisheries	4,656	4,522
Shoresmen	*506	1,844
Total	*7,443	9,185

*Exclusive of persons in the wholesale trade of New York City.

Table of apparatus and capital.

Items.	1897.		1898.	
	No.	Value.	No.	Value.
Vessels fishing	477	$682,790	501	$940,415
Tonnage	7,413	.....	9,258	.....
Outfit	.....	191,782	.....	256,486
Vessels transporting	166	127,785	166	148,895
Tonnage	2,261	.....	2,365	.....
Outfit	.....	9,293	.....	9,789
Boats	4,089	267,181	3,970	258,262
Apparatus—vessel fisheries:				
Seines	39	16,800	81	38,250
Gill nets	51	4,770	69	4,641
Lines	.....	5,025	.....	5,085
Eel pots	655	653	661	647
Lobster pots	2,236	3,698	2,796	4,663
Dredges	1,155	9,644	1,159	9,735
Tongs and rakes	603	4,222	590	8,932
Apparatus—shore fisheries:				
Seines	140	10,010	148	9,840
Gill nets	3,118	60,417	2,870	59,048
Pound nets	197	53,780	195	55,385
Fyke nets	3,487	17,195	3,531	16,016
Dip nets	13	7	13	7
Lines	.....	1,738	.....	1,927
Eel pots	3,572	4,167	3,399	3,926
Lobster pots	2,477	2,474	2,873	2,856
Spears	94	56	85	51
Dredges	1,381	5,282	1,294	4,674
Tongs and rakes	2,399	13,134	2,300	12,607
Hocs and forks	632	376	656	399
Scows, floats, etc	30	7,160	28	6,530
Shore property	.....	*437,930	.....	2,760,421
Cash capital	.....	*157,500	.....	2,980,800
Total	.....	*2,094,869	.....	7,589,787

*Exclusive of shore property and cash capital in the wholesale trade of New York City.

STATISTICS OF THE FISHERIES BY COUNTIES.

The following tables show the extent of the fisheries of New York by counties. Suffolk County easily leads in persons employed and in quantity and value of products, the yield amounting to 87 per cent of the total weight and 43 per cent of the total value in the State. It also has the greatest variety of products, nearly every kind of fishery products in the State being found in the limits of that county. The most important fisheries are for oysters and menhaden, their value aggregating $1,181,013, or 75 per cent of the value of the total yield. Prominent among other products in this county are hard clams, scallops, squeteague, sturgeon, flounders, blue-fish, butter-fish, and scup. The sturgeon fishery, prosecuted on the south side of this county from Fire Island to Amaganset, is a comparatively new industry, originating about seven years ago.

Next to Suffolk, the counties most prominent in the fisheries are Queens, New York, Richmond, and Kings, in the order named, the value of products in those counties in 1898 ranging from $620,591 in Queens to $374,870 in Kings County. The oyster yield is the most valuable in each except New York, in which the blue-fish fishery is far the most valuable. In those counties bordering on the Hudson the fisheries are of much less importance, the principal species being shad and alewives, which are taken chiefly in gill nets and seines.

Table showing, by counties, the number of persons employed in the fisheries of New York in 1897 and 1898.

Counties.	On vessels fishing.		On vessels transporting.		In shore or boat fisheries.		Shoresmen.		Total.	
	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.
Albany	.....	.....	.....	.....	50	49	.....	.....	50	49
Columbia	.....	.....	.....	.....	57	61	.....	1	57	62
Dutchess	.....	.....	.....	.....	216	204	2	2	218	206
Greene	.....	.....	.....	.....	78	89	2	2	80	91
Kings	75	30	45	47	495	481	82	10	697	568
New York	629	671	8	8	.....	.....	.....	1,419	*637	2,098
Orange	.....	.....	.....	.....	68	64	.....	.....	68	64
Putnam	.....	.....	.....	.....	14	10	.....	.....	14	10
Queens	161	176	104	90	998	952	9	9	1,272	1,227
Rensselaer	.....	.....	.....	.....	30	30	.....	.....	30	30
Richmond	252	245	.....	.....	330	322	5	13	587	580
Rockland	.....	.....	.....	.....	123	119	.....	.....	123	119
Suffolk	873	1,406	114	125	1,539	1,498	391	373	2,917	3,402
Ulster	.....	.....	.....	.....	268	264	9	9	277	273
Westchester	20	21	.....	.....	390	379	6	6	416	406
Total	2,010	2,549	271	270	4,656	4,522	*506	1,844	*7,443	9,185

* Exclusive of persons engaged in the wholesale trade of New York City.

Table showing, by counties, the vessels, boats, and apparatus employed in the fisheries of New York in 1897 and 1898.

Items.	Albany.				Columbia.				Dutchess.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	No.	Val.	No.	Val.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Boats	19	$430	19	$430	25	$750	30	$1,182	111	$4,815	105	$4,616
Apparatus—shore fisheries:												
Seines	5	370	5	350	8	775	5	525	3	360	6	495
Gill nets	.....	.....	.....	.....	10	406	10	406	100	6,571	97	6,296
Fyke nets	60	210	54	190	52	270	60	274	76	284	77	309
Eel pots	12	15	12	15	.....	.....	.....	.....	26	26	27	27
Shore property	.....	220	.....	220	.....	575	.....	650	.....	1,665	.....	1,855
Total	.....	1,245	.....	1,205	.....	2,776	.....	3,037	.....	13,721	.....	13,589

Items.	Greene.				Orange.				Putnam.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Val.	No.	Val.
Boats	46	$1,146	55	$1,269	37	$1,707	35	$1,517	7	$402	5	$272
Apparatus—shore fisheries:												
Seines	11	1,070	11	1,055	1	40	1	40	1	40	1	45
Gill nets	17	612	24	770	38	2,320	30	1,995	6	430	4	320
Fyke nets	40	140	36	128	74	562	70	548	.....	.....	.....	.....
Shore property	.....	655	.....	770	.....	750	.....	745	.....	90	.....	60
Total	.....	3,623	.....	3,992	.....	5,379	.....	4,845	.....	962	.....	697

Table showing, by counties, the vessels, boats, and apparatus employed, etc.—Continued.

Items.	Kings.				New York.				Queens.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	15	$22,200	13	$7,120	59	$196,500	63	$203,550	53	$39,055	58	$49,200
Tonnage	229	.....	79	.....	2,648	.....	2,886	.....	431	.....	460	.....
Outfit	....	10,015	....	2,648	.....	100,612	.....	103,468	.....	9,901	....	10,976
Vessels transporting	34	22,680	36	22,750	3	3,670	3	3,650	56	41,175	49	35,570
Tonnage	364	.....	387	.....	66	.....	66	.....	802	.....	695	.....
Outfit	....	1,715	....	1,753	.....	560	.....	575	.....	2,703	....	2,363
Boats	378	21,930	374	21,240	.....	.....	.....	.....	1,016	76,144	956	71,984
Apparatus—vessel fisheries:												
Seines	4	2,000	....	.....	4	1,800	4	1,750	4	500	3	300
Gill nets	....	.....	....	.....	4	200	4	200	11	1,185	11	1,160
Lines	....	241	....	236	.....	4,320	.....	4,525	.....	243	....	253
Eel pots	175	128	175	123	.....	.....	.....	.....	.....	.....	.....	.....
Lobster pots	....	.....	....	.....	1,100	1,697	1,660	2,662	.....	.....	.....	.....
Dredges	....	.....	....	.....	28	495	24	895	80	861	100	1,176
Tongs and rakes	....	.....	....	.....	.....	.....	.....	.....	6	24	6	24
Apparatus—shore fisheries:												
Seines	....	.....	....	.....	.....	.....	.....	.....	23	1,595	20	1,215
Gill nets	174	5,410	108	4,176	.....	.....	.....	.....	10	760	9	635
Pound nets	3	900	3	930	.....	.....	.....	.....	6	1,820	3	900
Fyke nets	36	900	34	870	.....	.....	.....	.....	1	25	1	25
Lines	....	274	....	290	.....	.....	.....	.....	.....	98	....	74
Eel pots	504	463	488	444	.....	.....	.....	.....	702	1,022	652	964
Lobster pots	310	190	670	864	.....	.....	.....	.....	.....	.....	.....	.....
Spears	30	18	26	16	.....	.....	.....	.....	28	15	24	18
Dredges	30	210	24	167	.....	.....	.....	.....	374	2,271	335	2,034
Tongs and rakes	391	1,954	379	1,890	.....	.....	.....	.....	697	3,580	665	3,383
Hoes and forks	180	96	210	126	.....	.....	.....	.....	255	149	250	144
Scows, floats, etc	2	160	1	80	.....	.....	.....	.....	14	1,400	14	1,250
Shore property	....	62,900	....	27,200	.....	.....	.....	2,048,656	.....	59,855	....	64,780
Cash capital	....	45,000	....	.....	.....	.....	.....	2,869,200	.....	.....	....	.....
Total	....	199,384	....	92,478	.....	309,854	.....	5,238,631	.....	244,411	....	248,423

Items.	Richmond.				Suffolk.				Westchester.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	No.	Val.	No.	Val.	No.	Val.	No.	Val.	No.	Val.	No.	Val.
Vessels fishing	83	$89,845	81	$85,180	256	$329,135	276	$589,875	11	$6,025	10	$5,490
Tonnage	1,014	.....	987	.....	2,999	.....	4,764	.....	92	.....	82	.....
Outfits	.....	10,410	.....	9,870	.....	59,794	.....	128,677	....	1,050	.....	847
Vessels transporting	.....	.....	.....	.....	73	60,260	78	81,425	....	.....	.....	.....
Tonnage	.....	.....	.....	.....	1,029	.....	1,217	.....	....	.....	.....	.....
Outfit	.....	.....	.....	.....	.....	4,315	.....	5,098	.....	.....	.....	.....
Boats	319	23,797	309	22,420	1,592	113,469	1,566	112,123	319	13,117	305	12,506
Apparatus—vessel fisheries:												
Seines	.....	.....	.....	.....	27	12,500	74	36,200	....	.....	.....	.....
Gill nets	.....	.....	.....	.....	36	3,385	54	3,281	....	.....	.....	.....
Lines	.....	.....	.....	.....	.....	221	.....	71	....	.....	.....	.....
Eel pots	.....	.....	.....	.....	480	525	486	524	....	.....	.....	.....
Lobster pots	.....	.....	.....	.....	1,136	2,001	1,136	2,001	....	.....	.....	.....
Dredges	96	3,720	92	3,560	916	4,333	913	4,404	35	235	30	200
Tongs and rakes	268	2,844	261	2,580	318	1,258	309	1,244	16	96	14	84
Apparatus—shore fisheries:												
Seines	.....	.....	.....	.....	69	3,780	78	4,075	6	400	7	400
Gill nets	193	2,930	159	3,185	524	19,405	630	21,864	430	9,483	1,151	8,962
Pound nets	1	400	1	360	187	50,660	188	53,145	....	.....	.....	.....
Fyke nets	13	1,270	9	730	2,638	9,834	2,745	9,878	231	2,086	189	1,555
Dip nets	.....	.....	.....	.....	13	7	13	7	....	.....	.....	.....
Lines	.....	52	.....	28	.....	1,314	.....	1,535	....	.....	.....	.....
Eel pots	20	30	20	30	2,075	2,436	1,984	2,288	215	155	200	140
Lobster pots	1,605	1,169	1,510	1,072	319	518	411	732	243	607	282	688
Spears	.....	.....	.....	.....	36	23	35	22	....	.....	.....	.....
Dredges	.....	.....	.....	.....	957	2,661	919	2,361	20	140	16	112
Tongs and rakes	395	3,438	388	3,425	780	3,123	738	2,963	136	979	130	946
Hoes and forks	.....	.....	.....	.....	135	86	136	86	62	45	60	43
Scows, floats, etc	14	5,600	13	5,200	.....	.....	.....	.....	....	.....	.....	.....
Shore property	.....	15,055	.....	15,405	.....	286,630	.....	590,560	....	5,870	.....	5,880
Cash capital	.....	.....	.....	.....	.....	112,500	.....	111,600	....	.....	.....	.....
Total	.....	160,610	.....	153,045	.....	1,084,178	.....	1,766,089	....	40,288	.....	37,853

Table showing, by counties, the vessels, boats, and apparatus employed, etc.—Continued.

Items.	Rensselaer.				Rockland.				Ulster.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Boats	13	$240	14	$255	67	$3,055	66	$2,790	140	$6,179	131	$5,658
Apparatus — shore fisheries:												
Seines	3	165	3	165	.....	.....	.....	.....	10	1,415	11	1,475
Gill nets	.....	.....	.....	.....	480	2,960	516	2,784	136	9,130	132	7,655
Fyke nets	48	156	44	140	72	854	67	780	146	604	145	598
Eel pots	.....	.....	.....	.....	18	20	16	18	.....	.....	.....	.....
Shore property	.....	160	.....	120	.....	895	.....	875	.....	2,610	.....	2,645
Total	.....	721	.....	680	.....	7,784	.....	7,247	.....	19,938	.....	18,031

Table showing, by counties, the yield of the fisheries of New York in 1897 and 1898.

Species.	Albany.				Columbia.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	61,600	$853	83,000	$1,187	84,640	$1,156	62,400	$970
Carp	1,900	110	1,520	91	250	14	350	20
Cat-fish	3,400	264	3,230	254	7,800	604	8,800	804
Eels	700	48	635	48	90	7	100	8
Perch, white	1,880	96	1,500	96	170	8	140	7
Perch, yellow	.....	.....	.....	.....	3,100	121	3,040	117
Shad	256	13	758	40	47,438	2,007	60,244	2,304
Striped bass	1,030	142	1,090	140	260	37	380	46
Sturgeon	.....	.....	.....	.....	300	12	220	9
Suckers	1,000	50	850	43	3,950	118	4,250	128
Total	71,766	1,576	92,583	1,849	147,998	4,084	139,924	4,413

Species.	Dutchess.				Greene.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	155,826	$1,320	130,800	$1,412	256,640	$3,299	298,000	$3,736
Carp	1,150	47	1,430	58	350	17	610	30
Cat-fish	5,200	395	5,450	396	3,490	247	3,270	238
Eels	600	48	610	48	.....	.....	.....	.....
Perch, white	2,450	87	2,450	100	1,330	87	1,040	70
Shad	387,710	11,068	356,488	10,876	52,716	2,389	55,151	2,273
Striped bass	100	12	180	24	280	34	400	48
Sturgeon	29,767	1,710	11,441	1,028	3,520	231	1,125	56
Suckers	300	10	300	11	650	32	580	29
Total	582,603	14,697	508,149	13,953	318,976	6,336	360,176	6,480

Species.	Richmond.				Rockland.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	3,520	$44	.....	.....	.....	.....	.....	.....
Carp	.....	.....	.....	.....	150	$6	420	$19
Cat-fish	400	31	.....	.....	4,200	272	5,000	360
Cod	111,000	3,370	19,650	$834	.....	.....	.....	.....
Eels	2,380	181	2,100	168	1,800	126	1,600	112
Perch, white	260	15	.....	.....	3,800	258	4,300	294
Shad	167,725	5,675	157,567	6,884	117,044	3,984	110,947	3,875
Striped bass	300	36	.....	.....	5,720	752	8,000	360
Sturgeon	800	22	640	21	2,000	86	2,100	98
Suckers	.....	.....	.....	.....	1,100	47	1,220	51
Lobsters	43,200	4,268	39,968	4,053	.....	.....	.....	.....
Clams, hard	108,920	12,625	87,880	10,233	.....	.....	.....	.....
Oysters, market	2,590,280	353,045	2,337,895	326,807	.....	.....	.....	.....
Oysters, seed	238,350	13,615	567,350	32,620	.....	.....	.....	.....
Scallops	20,400	2,210	22,800	2,470	.....	.....	.....	.....
Total	8,287,535	395,137	8,235,850	384,090	185,814	5,531	128,587	5,169

Table showing, by counties, the yield of fisheries of New York in 1897 and 1898—Cont'd.

Species.	Kings.				New York.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	2,000	$20	19,200	$555				
Blue-fish	145,860	7,386	173,450	8,699	9,899,466	$336,059	10,222,689	$340,051
Bonito					4,703	139	5,856	159
Cod	191,890	5,430	196,830	5,544	1,182,410	38,300	1,265,150	42,712
Eels	101,520	8,867	96,650	8,362				
Flounders	9,510	393	16,170	608	1,045	41	1,179	41
Haddock	6,650	178	7,400	194	78,870	2,637	75,383	2,548
Hake	400	15	300	9	1,000	20	1,190	28
Mackerel	1,080	83	1,200	96	9,000	720	8,500	680
Menhaden	13,206,752	33,043	14,700	98				
Scup					45,200	1,266	85,555	1,892
Sea bass	1,550	106	1,525	104	166,095	6,838	201,612	8,117
Shad	182,029	6,257	128,170	4,593				
Sheepshead	300	18						
Snappers, red					92,000	3,680	76,000	3,040
Squeteague	21,300	772	86,300	1,414	1,100	13	2,241	12
Striped bass	2,700	284	2,810	297				
Tautog	380	19	450	23				
Tomcod or frost-fish	400	18	200	8				
Other fish							98	4
Crabs, soft	680	102	480	114				
Lobsters	12,860	1,193	26,240	2,362	230,420	16,445	188,410	15,078
Clams, hard	206,504	24,980	214,240	26,476				
Clams, soft	373,000	27,110	446,650	33,104				
Oysters, market	2,201,500	322,755	1,937,670	282,210	528,500	61,080	486,150	54,162
Mussels	30,000	960						
Total	16,698,865	439,939	3,370,635	374,870	12,239,808	467,238	12,620,013	468,519

Species.	Queens.				Suffolk.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	3,944	$86			48,210	$960	26,230	$524
Blue-fish	485,400	24,097	368,950	$18,532	615,699	23,535	449,344	19,885
Bonito					38,120	1,964	57,388	1,559
Butter-fish	800	64			727,816	26,061	470,836	15,488
Carp					162,500	6,500	223,250	8,930
Cat-fish					41,000	2,002	48,150	1,883
Cod	143,500	5,490	130,000	4,950	487,216	17,284	427,807	14,981
Eels	90,410	6,417	79,510	5,620	205,680	12,163	198,290	11,789
Flounders	106,700	4,243	96,900	3,833	990,802	30,497	762,434	23,973
Haddock	11,800	882	12,500	425	56,000	1,707	77,600	2,381
Hake					22,900	573	31,131	647
King-fish					10,440	872	11,854	978
Mackerel	600	72	950	118	130,132	6,103	73,808	5,314
Menhaden	16,800	112	18,000	120	47,382,160	114,542	163,247,645	405,270
Perch, white					38,800	1,940	34,600	1,730
Pike							1,800	90
Pollock					3,000	90	4,635	130
Scup	10,750	488	8,500	390	690,423	15,157	551,342	11,820
Sea bass					186,796	9,301	108,044	5,769
Shad	8,385	804	2,347	160	20,040	864	5,223	238
Sheepshead	4,600	234	3,150	174				
Skates					150,000	100	127,500	85
Spanish mackerel	900	210	1,310	259	10,460	1,615	11,697	1,802
Squeteague	397,900	12,346	299,550	9,227	2,141,227	56,343	1,688,839	43,053
Striped bass	15,450	2,046	11,150	1,389	63,165	7,658	49,135	5,836
Sturgeon					340,860	21,511	353,969	31,872
Tautog			30	2	48,801	1,515	50,780	1,582
Tomcod or frost-fish					40,600	894	34,500	691
Whiting					9,000	250	15,473	449
Other fish					997,200	2,286	847,200	1,752
Caviar							17,256	11,992
Crabs, hard	26,667	240	21,333	180	282,666	2,233	225,300	1,613
Crabs, soft	88,000	1,770	86,260	1,650	15,167	1,630	14,063	1,630
Lobsters					72,440	6,514	68,480	5,683
Squid					151,000	3,393	276,257	6,188
Clams, hard	435,520	64,990	434,832	65,667	587,760	78,115	631,040	85,283
Clams, soft	231,000	15,655	231,300	15,747	106,000	7,348	105,350	7,884
Oysters, market	3,553,550	553,475	2,971,822	480,511	4,425,750	633,935	4,909,625	698,258
Oysters, seed	174,160	11,338	137,620	10,637	898,100	68,930	896,105	77,485
Scallops	9,000	750	12,000	1,000	856,560	77,162	618,378	49,960
Shells					5,310,000	4,875	5,460,000	4,550
Total	5,815,886	705,309	4,928,034	620,591	68,364,490	1,248,422	183,202,358	1,570,522

Table showing, by counties, the yield of fisheries of New York in 1897 and 1898—Cont'd.

Species.	Orange.				Putnam.				Rensselaer.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	13,600	$136	18,400	$192	.....	.....	.....	.....	89,600	$1,077	114,400	$1,324
Carp	3,800	154	4,500	180	4,000	$160	5,000	$200	110	6	140	8
Cat-fish	3,000	216	2,600	182	.....	.....	.....	.....	2,400	169	2,000	141
Eels	250	15	200	12	.....	.....	.....	.....	.....	.....	.....	.....
Perch, white	800	48	700	42	.....	.....	.....	.....	800	49	680	42
Shad	80,450	3,043	93,243	3,443	15,225	554	14,625	550	180	10	406	22
Striped bass	750	90	1,000	125	.....	.....	.....	.....	640	86	1,000	134
Sturgeon	21,050	1,180	6,600	516	2,120	120	.....	.....	.....	.....	.....	.....
Suckers	950	40	1,000	42	500	20	400	16	800	46	550	30
Total	124,650	4,922	128,243	4,784	21,845	854	20,025	766	94,530	1,443	119,176	1,701

Species.	Ulster.				Westchester.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	232,600	$2,357	273,000	$2,748	3,320	$59	2,680	$54
Carp	1,150	56	1,800	70	80,200	1,248	47,380	1,937
Cat-fish	8,750	610	12,600	1,008	10,450	846	11,240	885
Cod	300	5	700	11	.....	.....	.....	.....
Eels	.....	.....	400	40	17,300	1,354	16,850	1,810
Perch, white	4,100	207	4,900	260	8,100	449	10,000	604
Shad	523,752	16,367	541,433	16,541	281,278	9,918	303,375	10,951
Striped bass	600	72	750	81	25,470	2,928	10,900	1,285
Sturgeon	3,700	190	9,600	695	23,430	1,186	5,360	286
Suckers	3,000	120	3,300	142	3,800	152	5,100	266
Sun-fish	.....	.....	2,000	100	.....	.....	.....	.....
Lobsters	.....	.....	.....	.....	22,100	3,038	19,280	3,064
Clams, hard	.....	.....	.....	.....	133,600	18,220	135,200	18,293
Clams, soft	.....	.....	.....	.....	37,000	4,840	34,500	4,562
Oysters, market	.....	.....	.....	.....	260,050	30,705	180,075	21,659
Oysters, seed	.....	.....	.....	.....	16,800	1,180	11,200	680
Total	777,952	19,984	850,483	21,696	872,898	76,123	793,140	65,836

THE SHAD FISHERY.

Compared with other fisheries of New York State, the shad fishery bears a relatively less important position than in any other of the Middle Atlantic States. Most of the catch in this State is taken from the Hudson River. The principal shad counties are Ulster, Dutchess, and Westchester, which yielded more in 1897 and 1898 than all other counties combined, as shown by the following table:

Counties.	1897.		1898.	
	No.	Value.	No.	Value.
Albany	68	$13	202	$40
Columbia	12,650	2,007	16,065	2,304
Dutchess	103,116	11,068	94,799	10,876
Greene	14,526	2,389	14,740	2,273
Kings	48,548	6,257	34,179	4,593
Orange	21,720	3,043	24,865	3,443
Putnam	4,060	554	3,900	550
Queens	2,236	804	626	160
Rensselaer	48	10	108	22
Richmond	45,268	5,675	42,018	6,884
Rockland	31,215	3,984	29,586	3,875
Suffolk	5,344	864	1,393	233
Ulster	143,000	16,367	146,230	16,541
Westchester	74,474	9,918	80,900	10,951
Total	[1] 506,278	62,953	[2] 488,611	62,745

[1] 1,884,228 pounds.

[2] 1,828,977 pounds.

THE PRODUCTS BY DIFFERENT FORMS OF APPARATUS.

The yield of the fisheries according to the apparatus used is given in detail for each form of apparatus in the following series of tables. As regards value of the product, dredges, tongs, and rakes are the most important forms of apparatus, their catch in 1898 being valued at $2,310,876, consisting chiefly of oysters, hard clams, and soft clams, and, to a less extent, of scallops, shells, and hard crabs. The shells reported in these returns are the shells of jingles and quarter-decks, which are caught in Peconic Bay for sale to Connecticut oyster-growers.

Of the forms of apparatus employed in taking fish proper the seine is the most important, although in value of the product it is nearly equaled by lines, the value of the yield of the former in 1898 being $456,381, and of the latter $441,251. The principal species taken by means of seines is the menhaden, the yield of which was 159,992,645 pounds, worth $399,558. Practically all of these were used in the manufacture of oil and fertilizer. The yield of food-fish by seines is very small, amounting in 1898 to only 1,892,847 pounds, worth $56,823, and consisting principally of shad, carp, squeteague, striped bass, flounders, etc.

Lines constitute the most important form of apparatus for the capture of food-fish in New York State, the yield in 1898 aggregating $441,251, or more than the yield of food fish proper in all other apparatus in the State. The most important species in the line fishery is the blue-fish, the yield of which in 1898 was valued at $353,160, or 80 per cent of the total line catch. Cod ranks second in importance as regards the value of the catch, amounting to $67,725, or over three times as much as all other species taken, exclusive of blue-fish. The other species consist principally of sea bass, haddock, and red snapper.

The gill-net fishery is prosecuted in nearly every county bordering the coastal waters, and next to the line fishery it yields the greatest return of food-fish, amounting in 1898 to 4,849,397 pounds, worth $144,607. Shad, sturgeon, and squeteague made up the principal items, the yield of shad being 1,509,737 pounds, worth $52,736; of sturgeon, 406,011 pounds, worth $46,468, including the caviar; and of squeteague, 351,255 pounds, worth $12,225.

The pound-net fishery, which is prosecuted in Suffolk, Kings, Queens, and Richmond counties, but principally in the first named, shows somewhat of a decrease from the conditions of 1891, when the yield was 9,953,928 pounds, worth $125,719. In 1898 the yield was 6,219,601 pounds, worth $108,939, the most important items being squeteague, 1,486,545 pounds, for which the fishermen received $33,735; butter-fish, 461,436 pounds, worth $15,251; flounders, 439,836 pounds, worth $13,367; and scup, 536,532 pounds, worth $11,348.

The principal fyke-net fishery in New York is for flounders, etc., in the vicinity of Sag Harbor and Springs, Suffolk County, and for shad

in Richmond and Kings counties. The total fyke-net yield is comparatively small, aggregating 638,880 pounds, with a valuation of $24,226. The more important items in this yield are flounders, 316,000 pounds, worth $10,229; cat-fish, 79,510 pounds, worth $4,671; and shad, 35,130 pounds, worth $1,356.

The eel-pot and spear fisheries yielded 374,685 pounds of eels and 1,160 pounds of flounders, the value of the former being $25,982, and of the latter $62. These fisheries are carried on principally in Suffolk, Kings, and Queens counties.

Notwithstanding the decrease in the lobster yield in most of the New England States, the returns for that fishery in New York show a considerable increase, due to an increase in the number of pots used rather than an increased abundance of that crustacean.

The following tables, relating to the years 1897 and 1898, present, by counties, detailed statistics of the yield by each form of apparatus:

Table showing, by counties, the yield of the seine fisheries of New York in 1897 and 1898.

Species.	Albany.				Columbia.				Dutchess.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Alewives	61,600	$853	83,000	$1,137	70,800	$991	56,800	$900	106,526	$872	76,800	$860
Carp	1,500	90	1,100	70	250	14	350	20	50	3	80	4
Cat-fish	900	64	1,030	78	2,400	192	3,000	340	200	15	250	17
Eels	300	18	160	12	90	7	100	8	.....	.....	.....	.....
Perch, white and yellow	1,080	48	800	40	270	14	180	9	50	3	100	6
Shad	256	13	758	40	20,775	913	21,225	761	31,150	824	29,813	816
Striped bass	430	60	290	42	60	7	120	14	.....	.....	.....	.....
Sturgeon	.....	.....	.....	.....	300	12	220	9	.....	.....	.....	.....
Total	66,066	1,146	87,138	1,419	94,945	2,150	81,995	2,061	137,976	1,717	107,043	1,703

Species.	Kings.*		New York.				Queens.			
	1897.		1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Blue-fish	.....	.....	.....	.....	.....	.....	39,800	$1,960	23,000	$1,210
Flounders	.....	.....	.....	.....	.....	.....	31,400	1,450	22,000	970
Menhaden	13,200,000	$33,000	.....	.....	.....	.....	.....	.....	.....	.....
Scup	.....	.....	42,000	$1,170	36,760	$1,070	2,550	115	2,600	119
Sea bass	.....	.....	49,000	1,994	45,496	1,765	.....	.....	.....	.....
Sheepshead	.....	.....	.....	.....	.....	.....	1,100	59	950	54
Spanish mackerel	.....	.....	.....	.....	.....	.....	50	10	100	18
Squeteague	.....	.....	.....	.....	.....	.....	34,000	1,050	23,500	645
Striped bass	.....	.....	.....	.....	.....	.....	300	41	500	74
Total	13,200,000	33,000	91,000	3,164	82,256	2,835	109,200	4,685	72,650	3,090
Shore fisheries:										
Blue-fish	.....	.....	.....	.....	.....	.....	160,100	8,012	87,350	4,512
Eels	.....	.....	.....	.....	.....	.....	700	62	3,450	280
Flounders	.....	.....	.....	.....	.....	.....	75,300	2,793	74,900	2,863
Mackerel	.....	.....	.....	.....	.....	.....	.....	.....	100	16
Menhaden	.....	.....	.....	.....	.....	.....	16,800	112	18,000	120
Scup	.....	.....	.....	.....	.....	.....	8,200	373	5,900	271
Sheepshead	.....	.....	.....	.....	.....	.....	3,500	175	2,200	120
Spanish mackerel	.....	.....	.....	.....	.....	.....	350	80	480	96
Squeteague	.....	.....	.....	.....	.....	.....	236,600	7,324	156,200	4,893
Striped bass	.....	.....	.....	.....	.....	.....	13,950	1,861	10,650	1,315
Total	.....	.....	.....	.....	.....	.....	515,500	20,792	359,230	14,485
Total vessel and shore	13,200,000	33,000	91,000	3,164	82,256	2,835	624,700	25,477	431,880	17,575

*Statistics for 1898 can not be given.

Table showing the yield of the seine fisheries of New York in 1897 and 1898—Continued.

Species.	Greene.				Orange.				Putnam.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Alewives	190,000	$2,456	217,200	$2,788								
Carp	300	15	510	25	3,600	$146	4,200	$168	4,000	$160	5,000	$200
Cat-fish	1,490	117	1,470	116								
Perch, white and yellow	530	31	440	28								
Shad	49,416	2,146	50,851	2,051								
Striped bass	180	22	200	24								
Sturgeon	200	8	200	8								
Suckers	50	2	80	4	450	18	500	20	500	20	400	16
Total	242,166	4,797	270,951	4,994	4,050	164	4,700	188	4,500	180	5,400	216

Species.	Ulster.				Westchester.				Rensselaer.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Alewives	171,760	$1,768	179,600	$1,824	1,000	$30	1,000	$30	89,600	$1,077	114,400	$1,324
Carp					30,000	1,240	46,980	1,921	60	3	60	3
Cat-fish	260	20	400	32	600	60	580	50	600	43	500	36
Perch, white and yellow	100	7			1,600	96	2,000	120	150	10	180	12
Shad	133,916	3,953	157,058	3,968			750	40	180	10	406	22
Striped bass	300	27	450	36	3,300	384	3,050	352	340	48	350	50
Sturgeon	580	28	240	16	500	25	600	30				
Suckers					2,500	100	2,700	110				
Total	306,906	5,803	337,748	5,876	39,500	1,935	57,660	2,653	90,930	1,191	115,896	1,447

Species.	Suffolk.				Total.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	1,200	$82	1,300	$91	41,000	$2,042	24,300	$1,301
Flounders					31,400	1,450	22,000	970
Menhaden	42,884,160	106,907	159,590,645	398,478	56,084,160	139,907	159,590,645	398,478
Scup					44,550	1,285	39,360	1,189
Sea bass					49,000	1,994	45,496	1,765
Sheepshead					1,100	59	950	54
Spanish mack'l					50	10	100	18
Squeteague	20,000	525	15,000	440	54,000	1,575	38,500	1,085
Striped bass	1,370	165	2,000	245	1,670	206	2,500	319
Total	42,906,730	107,679	159,608,945	399,254	56,306,930	148,528	159,763,851	405,179
Shore fisheries:								
Alewives					691,286	8,047	728,800	8,813
Blue-fish	250	18	100	6	160,350	8,025	87,450	4,518
Carp	151,000	6,040	212,000	8,480	190,760	7,711	270,280	10,891
Cat-fish	7,700	273	8,700	310	14,140	784	15,930	979
Cod	6,300	246	3,800	153	6,300	246	3,800	153
Eels	6,400	374	7,900	466	7,490	461	11,610	766
Flounders	5,200	208	6,600	260	80,500	3,001	81,500	3,123
Haddock	400	16	400	16	400	16	400	16
Mackerel							100	16
Menhaden	300,000	750	384,000	960	816,800	862	402,000	1,080
Perch, white and yellow	20,500	1,025	24,500	1,225	24,280	1,234	28,200	1,440
Scup					8,200	373	5,900	271
Shad					235,693	7,859	260,861	7,698
Sheepshead					8,500	175	2,200	120
Spanish mack'l					350	80	480	95
Squeteague	1,200	36	8,100	276	237,800	7,360	159,300	5,169
Striped bass	40,400	5,122	26,580	3,368	58,960	7,581	41,690	5,201
Sturgeon					1,580	73	1,260	63
Suckers					3,500	140	3,680	150
Other fish	22,200	986	16,200	640	22,200	986	16,200	640
Total	561,550	15,089	693,880	16,160	2,064,089	54,964	2,121,641	51,202
Total vessel and shore	43,468,280	122,768	160,302,825	415,414	58,371,019	203,492	161,885,492	456,381

Table showing, by counties, the yield of the gill-net fisheries of New York in 1897 and 1898.

Species.	Columbia.				Dutchess.				Greene.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Alewives	13,840	$165	5,600	$70	48,800	$448	54,000	$552	66,640	$843	80,800	$998
Shad	26,663	1,094	39,019	1,543	356,560	10,244	325,675	10,060	3,300	243	4,300	222
Sturgeon	.....	.....	.....	.....	29,767	1,710	11,441	1,028	3,820	223	925	48
Total	40,503	1,259	44,619	1,613	435,127	12,402	391,116	11,640	73,260	1,309	86,025	1,268

Species.	New York.				Kings.				Queens.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Vessel fisheries:												
Blue-fish	.....	.....	.....	.....	.....	.....	.....	.....	150,500	$7,525	132,000	$6,600
Mackerel	9,000	$720	8,500	$680	.....	.....	.....	.....	400	48	500	60
Spanish mackerel	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300	60
Squeteague	.....	.....	.....	.....	.....	.....	.....	.....	74,000	2,255	73,500	2,275
Total	9,000	720	8,500	680	.....	.....	.....	.....	224,900	9,828	206,300	8,995
Shore fisheries:												
Blue-fish	.....	.....	.....	.....	.....	.....	.....	.....	68,500	3,275	70,100	3,385
Cod	.....	.....	.....	.....	150	$10	80	$6	.....	.....	.....	.....
Flounders	.....	.....	.....	.....	100	8	200	15	.....	.....	.....	.....
Mackerel	.....	.....	.....	.....	.....	.....	.....	.....	200	24	350	42
Shad	.....	.....	.....	.....	150,228	5,271	101,782	3,744	750	62	247	20
Spanish mackerel	.....	.....	.....	.....	.....	.....	.....	.....	300	80	200	40
Squeteague	.....	.....	.....	.....	.....	.....	.....	.....	45,000	1,395	42,000	1,270
Total	.....	.....	.....	.....	150,478	5,289	102,062	3,765	114,750	4,836	112,897	4,757
Total vessel and shore	9,000	720	8,500	680	150,478	5,289	102,062	3,765	339,650	14,664	319,197	13,752

Species.	Richmond.				Rockland.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Carp	.....	.....	.....	.....	.....	.....	200	$10
Cat-fish	.....	.....	.....	.....	2,000	$140	3,000	240
Perch	.....	.....	.....	.....	3,000	210	3,600	252
Shad	132,213	$4,442	132,899	$5,795	117,044	3,984	110,947	3,875
Striped bass	.....	.....	.....	.....	5,120	680	2,000	240
Sturgeon	.....	.....	.....	.....	1,600	64	1,800	81
Suckers	.....	.....	.....	.....	800	32	900	36
Total	132,213	4,442	132,899	5,795	129,564	5,110	122,447	4,734

Species.	Orange.				Putnam.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	13,600	$136	18,400	$192	.....	.....	.....	.....
Shad	80,450	3,043	93,243	3,443	15,225	$554	14,625	$550
Sturgeon	21,050	1,180	6,600	516	2,120	120	.....	.....
Total	115,100	4,359	118,243	4,151	17,345	674	14,625	550

Table showing the yield of the gill-net fisheries of New York in 1897 and 1898—Continued.

Species.	Ulster.				Westchester.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	60,840	$589	93,400	$924	2,320	$29	1,680	$24
Carp							100	4
Cat-fish					3,800	278	8,500	245
Cod	300	5	700	11				
Perch					5,600	308	7,200	444
Shad	389,836	12,414	384,375	12,578	281,278	9,918	302,625	10,911
Striped bass					16,800	1,840	3,550	416
Sturgeon	3,120	162	9,360	679	22,630	1,148	4,660	252
Suckers					500	20	1,800	182
Total	454,096	13,170	487,835	14,187	332,428	13,541	325,115	12,428

Species.	Suffolk.				Total.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	110,352	$5,812	65,604	$3,704	260,852	$13,337	197,604	$10,304
Bonito	1,320	78	84	5	1,320	78	84	5
Carp	7,000	280	8,000	320	7,000	280	8,000	320
Cat-fish	500	20	400	16	500	20	400	16
Flounders	1,510	68	950	47	1,510	68	950	47
Mackerel	750	87			10,150	855	9,000	740
Menhaden	774,000	1,360	450,300	843	774,000	1,360	450,300	843
Perch, white	300	15	200	10	300	15	200	10
Scup	1,100	55	1,500	70	1,100	55	1,500	70
Spanish mackerel	500	82	700	93	500	82	1,000	153
Squeteague	107,410	4,499	92,205	3,474	181,410	6,754	165,705	5,749
Striped bass	2,270	292	1,720	210	2,270	292	1,720	210
Sturgeon			68,800	4,118			68,800	4,118
Tautog	16	1	26	1	16	1	26	1
Caviar			4,200	2,620			4,200	2,620
Total	1,007,028	12,649	694,689	15,531	1,240,928	23,197	909,489	25,206
Shore fisheries:								
Alewives					206,040	2,210	253,880	2,760
Blue-fish	190,800	5,879	134,250	7,084	259,300	9,154	204,350	10,469
Bonito	350	14	200	8	350	14	200	8
Butter-fish	500	25	400	24	500	25	400	24
Carp							300	14
Cat-fish					5,800	418	6,500	485
Cod					450	15	780	17
Flounders	6,900	226	5,400	216	7,000	234	5,600	281
Mackerel	57,200	1,666	9,100	1,413	57,400	1,690	9,450	1,455
Menhaden	1,632,000	2,740	1,401,000	2,560	1,632,000	2,740	1,401,000	2,560
Perch					8,600	518	10,800	696
Pike			1,800	90			1,800	90
Scup	6,000	363	2,800	160	6,000	363	2,800	160
Sea bass	1,900	153	1,250	100	1,900	153	1,250	100
Shad					1,553,547	61,269	1,509,737	52,736
Spanish mackerel	1,150	244	1,050	200	1,450	324	1,250	240
Squeteague	157,300	5,671	143,550	5,206	202,300	7,066	185,550	6,476
Striped bass	2,600	314	3,000	326	24,020	2,834	8,550	982
Sturgeon	340,860	21,511	285,169	27,754	424,467	26,118	319,955	30,358
Suckers					1,300	52	2,700	168
Caviar			18,056	9,372			18,056	9,372
Total	2,397,560	38,806	2,002,025	54,513	4,892,424	105,197	3,939,908	119,401
Total of vessel and shore	3,404,588	51,455	2,696,714	70,044	5,633,352	128,394	4,849,397	144,607

Table showing, by counties, the yield of the pound-net fisheries of New York in 1897 and 1898.

Species.	Kings.				Queens.				Richmond.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Alewives	2,000	$20	1,200	$15	3,944	$86	.....	.....	.....	.....	.....	.....
Butter-fish	.....	.....	.....	.....	800	64	.....	.....	.....	.....	.....	.....
Flounders	3,000	90	9,630	305	.....	.....	.....	.....	.....	.....	.....	.....
Menhaden	6,752	48	14,700	98	.....	.....	.....	.....	.....	.....	.....	.....
Shad	16,325	496	10,526	337	7,635	742	2,100	$140	5,925	$221	5,400	$245
Squeteague	8,600	184	72,150	760	2,200	138	.....	.....	.....	.....	.....	.....
Striped bass	800	76	600	58	1,200	144	.....	.....	.....	.....	.....	.....
Sturgeon	.....	.....	.....	.....	.....	.....	.....	.....	800	22	640	21
Tautog	.....	.....	.....	.....	.....	.....	30	2	.....	.....	.....	.....
Total	87,477	909	108,706	1,573	15,779	1,174	2,130	142	6,725	243	6,040	266

Species.	Suffolk.				Total.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	48,210	$960	26,230	$524	54,154	$1,066	27,430	$539
Blue-fish	181,985	6,452	211,582	7,177	181,985	6,452	211,582	7,177
Bonito	34,760	1,807	55,104	1,472	34,760	1,807	55,104	1,472
Butter-fish	720,816	25,886	461,436	15,251	721,616	25,950	461,436	15,251
Cod	36,145	1,084	70,057	1,137	36,145	1,084	70,057	1,137
Flounders	627,272	18,961	430,306	13,062	630,272	19,051	439,836	13,367
Hake	20,200	504	27,131	560	20,200	504	27,131	560
King-fish	10,440	872	11,854	978	10,440	872	11,854	978
Mackerel	70,182	4,285	64,708	3,901	70,182	4,285	64,708	3,901
Menhaden	1,771,000	2,745	1,397,700	2,385	1,777,752	2,788	1,412,400	2,483
Pollock	3,000	90	4,635	130	3,000	90	4,635	130
Scup	676,290	14,553	536,532	11,348	676,290	14,553	536,532	11,348
Sea bass	150,410	7,580	86,286	4,395	150,410	7,580	86,286	4,395
Shad	20,040	864	5,223	233	49,925	2,323	28,249	955
Skates	150,000	100	127,500	85	150,000	100	127,500	85
Spanish mackerel	7,860	1,136	8,977	1,342	7,860	1,136	8,977	1,342
Squeteague	1,837,900	45,039	1,414,395	32,975	1,848,700	45,361	1,486,545	33,735
Squid	151,000	3,393	276,257	6,188	151,000	3,393	276,257	6,188
Striped bass	12,977	1,384	13,685	1,402	14,977	1,554	14,285	1,460
Sturgeon	.....	.....	.....	.....	800	22	640	21
Tautog	26,285	829	26,654	852	26,285	829	26,684	854
Whiting	9,000	250	15,473	449	9,000	250	15,473	445
Other fish	975,000	1,300	831,000	1,112	975,000	1,300	831,000	1,112
Total	7,540,762	140,024	6,102,725	106,958	7,600,743	142,350	6,219,601	108,939

Table showing, by counties, the yield of the fyke-net fisheries of New York in 1897 and 1898.

Species.	Greene.				Kings.				Orange.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Alewives	.....	.....	.....	.....	.....	.....	18,000	$540	.....	.....	.....	.....
Carp	50	$2	100	$5	.....	.....	.....	.....	200	$8	300	$12
Cat-fish	2,000	130	1,800	122	.....	.....	.....	.....	8,000	216	2,600	182
Eels	.....	.....	.....	.....	3,000	$270	2,200	198	250	15	200	12
Flounders	.....	.....	.....	.....	1,400	52	1,600	59	.....	.....	.....	.....
Perch, white	800	56	600	42	.....	.....	.....	.....	800	48	700	42
Shad	.....	.....	.....	.....	15,476	490	15,862	512	.....	.....	.....	.....
Squeteague	.....	.....	.....	.....	1,200	86	1,000	20	.....	.....	.....	.....
Striped bass	100	12	200	24	1,000	120	1,100	132	750	90	1,000	125
Suckers	600	80	500	25	.....	.....	.....	.....	500	22	500	22
Tomcod or frost-fish	.....	.....	.....	.....	200	10	.....	.....	.....	.....	.....	.....
Crabs, soft	.....	.....	.....	.....	680	102	480	114	.....	.....	.....	.....
Total	3,550	230	3,200	218	22,956	1,080	40,242	1,575	5,500	399	5,300	395

Table showing the yield of the fyke-net fisheries of New York in 1897 and 1898—Continued.

Species.	Albany.				Columbia.				Dutchess.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Carp	400	$20	420	$21	.....	.....	.....	.....	1,100	$44	1,350	$54
Cat-fish	2,500	200	2,200	176	5,400	$412	5,800	$464	5,000	380	5,200	379
Eels	.....	.....	50	4	.....	.....	.....	.....	.....	.....	.....	.....
Perch, white	800	48	700	56	.....	.....	.....	.....	2,400	84	2,350	94
Perch, yellow	.....	.....	.....	.....	3,000	115	3,000	115	.....	.....	.....	.....
Striped bass	600	82	800	98	200	30	260	32	100	12	180	24
Suckers	1,000	50	850	43	3,950	118	4,250	128	300	10	300	11
Total	5,300	400	5,020	398	12,550	675	13,310	739	8,900	530	9,380	562

Species.	Queens.				Rensselaer.				Richmond.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Alewives	.....	.....	.....	.....	.....	.....	.....	.....	3,520	$44	.....	.....
Carp	.....	.....	.....	.....	50	$3	80	$5	.....	.....	.....	.....
Cat-fish	.....	.....	.....	.....	1,800	126	1,500	105	400	31	.....	.....
Eels	1,280	$100	1,500	$120	.....	.....	.....	.....	380	21	.....	.....
Perch, white	.....	.....	.....	.....	650	39	500	30	260	15	.....	.....
Shad	.....	.....	.....	.....	.....	.....	.....	.....	29,587	1,012	19,268	$844
Striped bass	.....	.....	.....	.....	800	38	650	84	800	36	.....	.....
Suckers	.....	.....	.....	.....	800	46	550	80	.....	.....	.....	.....
Total	1,280	100	1,500	120	3,600	252	3,280	254	34,447	1,159	19,268	844

Species.	Rockland.				Westchester.				Ulster.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Carp	150	$6	220	$9	200	$8	300	$12	1,150	$56	1,800	$70
Cat-fish	2,200	132	2,000	120	6,050	508	7,160	590	8,500	590	12,200	976
Eels	600	42	500	35	1,500	90	2,100	130	.....	.....	400	40
Perch, white	800	48	700	42	900	45	800	40	4,000	200	4,900	260
Striped bass	600	72	1,000	120	5,870	704	4,300	517	300	45	300	45
Sturgeon	400	22	300	17	300	13	100	4	.....	.....	.....	.....
Suckers	300	15	320	15	800	32	600	24	3,000	120	3,300	142
Sun-fish	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000	100
Lobsters	.....	.....	.....	.....	3,000	420	2,730	410	.....	.....	.....	.....
Total	5,050	337	5,040	358	18,620	1,820	18,090	1,727	16,950	1,011	24,900	1,633

Species.	Suffolk.				Total.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	.....	.....	.....	.....	3,520	$44	18,000	$540
Blue-fish	5,000	$250	5,100	$238	5,000	250	5,100	238
Butter-fish	6,500	150	9,000	213	6,500	150	9,000	213
Carp	4,500	180	3,250	130	7,800	327	7,820	318
Cat-fish	32,800	1,709	39,050	1,557	69,650	4,434	79,510	4,671
Eels	5,000	278	3,700	230	12,010	816	10,650	769
Flounders	333,680	10,466	314,400	10,170	335,080	10,518	316,000	10,229
Menhaden	21,000	40	24,000	44	21,000	40	24,000	44
Perch, white	18,000	900	9,900	495	29,410	1,488	21,150	1,101
Perch, yellow	.....	.....	.....	.....	3,000	115	3,000	115
Scup	7,000	185	10,000	231	7,000	185	10,000	231
Sea bass	600	30	200	10	600	30	200	10
Shad	.....	.....	.....	.....	45,063	1,502	35,130	1,356
Squeteague	4,800	192	11,000	380	6,000	228	12,000	400
Striped bass	3,450	420	2,150	285	13,570	1,661	11,940	1,486
Sturgeon	.....	.....	.....	.....	700	35	400	21
Suckers	.....	.....	.....	.....	11,250	443	11,170	440
Sun-fish	.....	.....	.....	.....	.....	.....	2,000	100
Tautog	22,500	685	24,100	729	22,500	685	24,100	729
Tomcod or frost-fish	40,600	894	34,500	691	40,800	904	34,500	691
Crabs, soft	.....	.....	.....	.....	680	102	480	114
Lobsters	.....	.....	.....	.....	3,000	420	2,730	410
Total	505,430	16,379	490,350	15,403	644,133	24,372	638,880	24,226

Table showing, by counties, the catch of soft crabs by dip nets and hands in New York in 1897 and 1898.

Counties.	1897.		1898.	
	Lbs.	Value.	Lbs.	Value.
Shore fisheries:				
Queens	88,000	$1,770	86,280	$1,650
Suffolk	10,167	1,330	10,063	1,390
Total	98,167	3,100	96,343	3,040

The crabs in Queens County were caught without apparatus.

Table showing, by counties, the quantity and value of lobsters taken in pots in New York in 1897 and 1898.

Counties.	1897.		1898.	
	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:				
New York	230,420	$16,445	188,410	$15,073
Suffolk	54,190	4,962	44,150	4,242
Total	284,610	21,407	232,560	19,315
Shore fisheries:				
Kings	12,860	1,193	26,240	2,362
Richmond	43,200	4,268	39,968	4,053
Suffolk	18,250	1,552	14,330	1,441
Westchester	19,100	2,618	16,550	2,654
Total	93,410	9,631	97,088	10,510
Vessel and shore:				
Kings	12,860	1,193	26,240	2,362
New York	230,420	16,445	188,410	15,073
Richmond	43,200	4,268	39,968	4,053
Suffolk	72,440	6,514	58,480	5,683
Westchester	19,100	2,618	16,550	2,654
Grand total	378,020	31,038	329,648	29,825

Table showing, by counties, the yield of the line fisheries of New York in 1897 and 1898.

Species.	Queens.				Richmond.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	42,500	$2,125	44,000	$2,200	.....	.....	.....	.....
Cod	97,500	3,730	92,000	3,550	.....	.....	.....	.....
Haddock	11,000	350	11,500	390	.....	.....	.....	.....
Spanish mackerel	150	30	200	40	.....	.....	.....	.....
Squeteague	4,500	180	3,000	100	.....	.....	.....	.....
Total	155,650	6,365	150,700	6,280	.....	.....	.....	.....
Shore fisheries:								
Blue-fish	24,000	1,200	12,500	625	.....	.....	.....	.....
Cod	46,000	1,760	88,000	1,400	111,000	$3,370	19,650	$834
Haddock	800	32	1,000	35	.....	.....	.....	.....
Spanish mackerel	50	10	30	6	.....	.....	.....	.....
Squeteague	1,600	54	1,350	44	.....	.....	.....	.....
Total	72,450	3,056	52,880	2,110	111,000	3,370	19,650	834
Total vessel and shore	228,100	9,421	203,580	8,390	111,000	3,370	19,650	834

Table showing the yield of the line fisheries of New York in 1897 and 1898—Continued.

Species.	Kings.				New York.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	87,300	$4,406	93,770	$4,715	9,899,465	$336,059	10,222,689	$340,051
Bonito					4,703	139	5,856	159
Cod	120,740	3,285	111,500	3,018	1,182,410	38,300	1,265,150	42,712
Flounders	150	11	280	19	1,045	41	1,179	41
Haddock	3,650	103	3,400	94	78,870	2,637	75,383	2,548
Hake	400	15	300	9	1,000	20	1,190	28
Mackerel	1,080	83	1,200	96				
Scup					3,200	96	48,795	822
Sea bass	1,250	88	1,325	92	117,095	4,844	156,116	6,352
Sheepshead	300	18						
Snappers, red					92,000	3,680	76,000	3,040
Squeteague	6,500	312	6,750	324	*1,100	13	2,241	12
Striped bass	150	16	250	25				
Tautog	80	4	100	5				
Other fish							98	4
Total	221,600	8,341	218,875	8,397	11,380,888	385,829	11,854,697	395,769
Shore fisheries:								
Blue-fish	58,560	2,930	79,680	3,984				
Cod	71,000	2,135	85,250	2,520				
Flounders	3,700	170	3,400	148				
Haddock	3,000	75	4,000	100				
Sea bass	300	18	200	12				
Squeteague	5,000	240	6,400	310				
Striped bass	750	72	860	82				
Tautog	300	15	350	18				
Tomcod or frost-fish	200	8	200	8				
Total	142,810	5,663	180,340	7,182				
Total vessel and shore	364,410	14,004	399,215	15,579	11,380,888	385,829	11,854,697	395,769

Species.	Suffolk.				Total.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	110,612	$4,272	10,408	$535	10,139,877	$346,862	10,370,867	$347,501
Bonito	1,000	34	1,200	39	5,703	173	7,056	198
Cod	121,271	4,514			1,521,921	49,829	*1,468,650	49,280
Flounders	13,240	418	1,578	58	14,435	470	3,037	118
Haddock	6,000	210			99,520	3,300	90,283	3,032
Hake	150	5			1,550	40	1,490	37
Mackerel					1,080	83	1,200	96
Scup	33	1	510	11	3,233	97	49,305	833
Sea bass	23,886	854	9,308	524	142,231	5,786	166,749	6,968
Sheepshead					300	18		
Snappers, red					92,000	3,680	76,000	3,040
Spanish mackerel	450	78	420	72	600	103	620	112
Squeteague	9,617	289	5,889	194	21,717	744	17,880	630
Striped bass	98	11			248	27	250	25
Tautog					80	4	100	5
Other fish							98	4
Total	286,357	10,681	29,313	1,433	12,044,495	411,216	12,253,585	411,879
Shore fisheries:								
Blue-fish	15,500	775	21,000	1,050	98,060	4,905	113,180	5,659
Bonito	700	31	800	35	700	31	800	35
Cod	323,500	11,440	353,950	13,691	551,500	18,705	496,850	18,445
Flounders	3,000	150	3,200	160	6,700	320	6,600	308
Haddock	49,600	1,481	77,200	2,365	53,400	1,588	82,200	2,500
Hake	2,550	64	4,000	87	2,550	64	4,000	87
Mackerel	2,000	65			2,000	65		
Sea bass	10,000	684	11,000	740	10,300	702	11,260	752
Spanish mackerel	500	80	550	95	550	90	580	101
Squeteague	8,000	92	3,700	108	9,600	386	11,450	462
Striped bass					750	72	860	82
Tautog					800	15	350	18
Tomcod or frost-fish					200	8	200	8
Crabs, hard	140,000	1,038	102,500	675	140,000	1,038	102,500	675
Crabs, soft	5,000	300	4,000	240	5,000	300	4,000	240
Total	555,850	16,200	581,900	19,246	881,610	28,289	834,770	29,372
Total vessel and shore	841,707	26,881	611,213	20,679	12,926,105	439,505	13,088,355	441,251

Table showing, by counties, the yield of eel pots and spears in New York in 1897 and 1898.

Counties.	Vessel fisheries.		Shore fisheries.				Total.	
	Eels.		Eels.		Flounders.			
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
1897.								
Albany			400	$30			400	$30
Dutchess			600	48			600	48
Kings	23,100	$2,060	75,420	6,537	1,160	$62	99,680	8,659
Queens			88,430	6,255			88,430	6,255
Richmond			2,000	160			2,000	160
Rockland			1,200	84			1,200	84
Suffolk	29,500	1,605	164,780	9,906			194,280	11,511
Westchester			15,800	1,264			15,800	1,264
Total	52,600	3,665	348,630	24,284	1,160	62	402,390	28,011
1898..								
Albany			425	32			425	32
Dutchess			610	48			610	48
Kings	23,200	2,060	71,250	6,104	1,160	62	95,610	8,226
Queens			74,560	5,220			74,560	5,220
Richmond			2,100	168			2,100	168
Rockland			1,100	77			1,100	77
Suffolk	31,320	1,704	155,370	9,389			186,690	11,093
Westchester			14,750	1,180			14,750	1,180
Total	54,520	3,764	320,165	22,218	1,160	62	375,845	26,044

Table showing, by counties, the catch by dredges, tongs, rakes, etc., in New York in 1897 and 1898.

Species.	Queens.				Richmond.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Clams, hard	6,720	$990	2,800	$440	42,080	$4,785	27,860	$3,034
Oysters, market	464,100	68,060	601,818	94,870	1,593,060	216,173	1,258,705	176,980
Oysters, seed	83,160	6,763	98,420	8,747				
Total	553,980	75,813	703,038	104,057	1,635,140	220,958	1,286,065	180,014
Shore fisheries:								
Crabs, hard	26,667	240	21,333	180				
Clams, hard	428,800	64,000	432,032	65,227	66,840	7,840	60,520	7,199
Clams, soft	231,000	15,655	231,300	15,747				
Oysters, market	3,089,450	485,415	2,370,004	385,641	997,220	136,872	1,079,190	149,827
Oysters, seed	91,000	4,575	89,200	1,890	238,350	13,615	567,350	32,620
Scallops	9,000	750	12,000	1,000	20,400	2,210	22,800	2,470
Total	3,875,917	570,635	3,105,869	469,685	1,322,810	160,537	1,729,860	192,116
Total vessel and shore	4,429,897	646,448	3,808,907	573,742	2,957,950	381,495	3,015,925	372,130

Species.	Kings.				New York.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Oysters, market					528,500	$61,080	486,150	$54,162
Shore fisheries:								
Clams, hard	206,504	$24,980	214,240	$26,476				
Clams, soft	373,000	27,110	446,650	33,104				
Oysters, market	2,201,500	322,755	1,937,670	282,210				
Mussels	30,000	960						
Total	2,811,004	375,805	2,598,560	341,790	528,500	61,080	486,150	54,162

Table showing, by counties, the catch by dredges, tongs, rakes, etc., in New York in 1897 and 1898—Continued.

Species.	Suffolk.				Westchester.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Crabs, hard	129,333	$1,070	122,800	$938	.....	.....	.....	.....
Clams, hard	219,040	30,265	257,440	35,726	.....	.....	.....	.....
Oysters, market	3,065,300	432,401	3,681,650	518,350	88,550	$11,380	68,950	$7,685
Oysters, seed	556,500	52,460	636,405	62,205	16,800	1,180	11,200	680
Scallops	358,860	32,995	243,228	20,248	.....	.....	.....	.....
Shells	5,810,000	4,875	5,460,000	4,550	.....	.....	.....	.....
Total	9,639,033	554,066	10,401,523	642,017	105,350	12,560	80,150	8,365
Shore fisheries:								
Crabs, hard	13,333	125	.....	.....	.....	.....	.....	.....
Clams, hard	368,720	47,850	373,600	49,557	133,600	18,220	135,200	18,293
Clams, soft	106,000	7,348	105,350	7,384	37,000	4,840	34,500	4,562
Oysters, market	1,360,450	201,534	1,227,975	179,908	171,600	19,325	111,125	13,974
Oysters, seed	341,600	16,470	259,700	15,280	.....	.....	.....	.....
Scallops	497,700	44,167	375,150	29,712	.....	.....	.....	.....
Total	2,687,803	317,494	2,341,775	281,841	342,100	42,385	280,825	36,829
Total vessel and shore	12,326,836	871,560	12,748,298	923,858	447,450	54,945	360,975	45,194

SUMMARY.

Species.	1897.		1898.	
	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:				
Crabs, hard	129,333	$1,070	122,800	$938
Clams, hard	267,840	36,040	287,600	39,200
Oysters, market	5,739,510	789,094	6,097,273	852,047
Oysters, seed	656,460	60,403	746,025	71,632
Scallops	358,860	32,995	243,228	20,248
Shells	5,310,000	4,875	5,460,000	4,550
Total	12,462,003	924,477	12,956,926	988,615
Shore fisheries:				
Crabs, hard	40,000	365	21,333	180
Clams, hard	1,204,464	162,890	1,215,592	166,752
Clams, soft	747,000	54,953	817,800	60,797
Oysters, market	7,820,120	1,165,901	6,725,964	1,011,560
Oysters, seed	670,950	34,660	866,250	49,790
Mussels	30,000	960	.....	.....
Scallops	527,100	47,127	409,950	88,182
Total	11,039,634	1,466,856	10,056,889	1,822,261
Total vessel and shore	23,501,637	2,391,333	23,013,815	2,810,876

THE MENHADEN INDUSTRY.

In comparing the menhaden industry of New York in 1898 with that of previous years, a considerable difference is noticed, due to a consolidation of the principal menhaden plants on the coast. Several factories were closed and the facilities of those operated were greatly augmented. Most of the steamers on the North Atlantic were included in the consolidation, and as the home office of the association is in New York, all the vessels are reported from this State in 1898, though a very large portion of their catch was landed at factories in Delaware, Rhode Island, and Maine.

Table showing the extent of the menhaden industry of New York in 1897 and 1898.

Items.	1897.		1898.	
	No.	Value.	No.	Value.
Factories	7	$248,500	3	$503,500
Cash capital		147,500		101,600
Persons in factories	291		191	
Persons on vessels	326		822	
Menhaden pressed	119,326,400	169,114	78,691,670	116,728
Tons of dry scrap prepared	6,042	117,401	3,409	65,233
Tons of acidulated and crude scrap prepared	4,209	40,926	1,925	18,976
Gallons of oil made	763,531	169,133	529,919	106,611
Steam vessels fishing	14	154,500	*36	406,750
Tonnage	1,222		2,864	
Outfit		37,840		100,740
Purse seines	28	13,900	72	35,800
Sail vessels fishing	1	900		
Tonnage	20			
Outfit		50		
Purse seines	1	200		

*These steam vessels also supplied menhaden to factories in Delaware, Rhode Island, and Maine.

Table showing the extent of the wholesale trade in fishery products of New York City in 1898.

Items.	Fresh fish and lobster trade.	Salt fish trade.	Oyster trade.	Total.	Products.	
					Items.	Value.
Number of firms	41	11	25	77	Fresh fish and lobsters	$7,523,005
Number of persons engaged	488	243	693	1,419	Salted fish	3,376,923
Value of shore property	$1,203,506	$717,100	$128,050	$2,048,656	Oysters	2,047,563
Amount of cash capital	$1,439,200	$651,000	$779,000	$2,869,200	Clams	603,924
Amount paid for wages	$338,899	$140,900	$442,065	$921,864		13,551,415

FISHERIES OF NEW JERSEY.

Though New Jersey is comparatively small in area, its great length of coast line and favorable geographical position make it well adapted for the prosecution of extensive commercial fisheries.

The lower part of the Hudson River forms the eastern boundary between New York and New Jersey for about 22 miles, affording the citizens of the latter State an opportunity for sharing in the shad fisheries of that river to the extent of nearly 50 per cent of the value of the catch. The quantity of shad taken on the Hudson in 1897 was approximately 2,701,649 pounds, valued at $93,512. Of this quantity 1,195,600 pounds, valued at $44,159, represents the part belonging to New Jersey. In 1898 the total catch on the river was 2,745,590 pounds, valued at $92,228, of which 1,209,920 pounds, valued at $41,353, were taken by the New Jersey fishermen.

The other waters valuable for their fisheries which skirt the east side of the State north of Sandy Hook are New York Bay, Staten Island Sound, and Raritan and Princess bays. These are especially productive of oysters and clams, the two last named having considerable areas suitable for oyster cultivation. Sandy Hook Bay and the Navesink and Shrewsbury rivers inside of Sandy Hook also add materially

to the resources of the clam and oyster fisheries. The coast from Sandy Hook to Cape May lying directly on the Atlantic Ocean has long been noted for its pound-net and hand-line fisheries. The shallow bays throughout the part of this region from Bay Head southward, inclosed from the ocean by a series of sandy islands or bars, are also very productive in oysters, clams, and various species of fish.

The west side of the State is also highly favored in point of fishery resources, its entire length being traversed by the Delaware River and Bay. The three most important fisheries prosecuted in these waters are the shad, sturgeon, and oyster. The total yield of the river and bay for these three fisheries in 1897, as near as can be approximated, was 14,727,296 pounds of shad, valued at $378,476; 2,428,616 pounds of sturgeon (1,058,666 pounds after being dressed), having a value, including caviar, of $124,440, and 2,475,860 bushels of oysters, valued at $1,118,650; a total value of $1,621,566. The part of this output taken by the fishermen of New Jersey was 11,554,307 pounds of shad, valued at $285,125; 1,951,421 pounds of sturgeon, or 772,349 pounds after being dressed, valued, including the caviar, at $89,430, and 2,046,156 bushels of oysters, valued at $910,779; a total value of $1,285,334, or 79 per cent of the total value of the products of these three fisheries, the remainder being credited to Pennsylvania and Delaware. In 1898 the quantity of shad taken from this river and bay by New Jersey fishermen was 11,433,634 pounds, valued at $241,374; of sturgeon, 1,298,315 pounds, or about 513,847 pounds after being dressed, valued, including caviar, at $96,236, and of oysters about 1,535,397 bushels, valued at $947,638; a total value of $1,285,248.

Statistics of Pennsylvania and Delaware not being obtained for 1898, the proportion of the three leading products of the Delaware River and Bay taken by New Jersey in that year can not be shown, but the foregoing are sufficient to illustrate how largely this State is interested in the fisheries of the two important rivers, the Delaware and the Hudson, which separate it from adjacent States.

GENERAL STATISTICS.

In all important respects the fisheries of New Jersey in 1897 and 1898 show an increase over former years, except that the products, while greater in quantity, were less in value than in 1892. There has been an increase over each of the years from 1889 to 1892 in the number of persons and vessels employed, the value of fishing apparatus, and, with the exception noted, in the quantity and value of the products.

In 1897 the number of persons engaged in the fisheries of the State was 12,494. Of these, 2,484 were employed on vessels fishing and transporting fishery products, 9,400 in the shore or boat fisheries, and 610 in factories and other branches of shore industry connected with the fisheries.

The number of vessels fishing and transporting was 675, having a value, with their outfits, of $766,844; the number of boats in the shore fisheries was 6,365, valued at $485,059; the apparatus, consisting of seines, gill nets, pound nets and weirs, fyke nets, stop nets, hand and trawl lines, lobster and eel pots, oyster tongs, rakes and dredges, clam tongs, rakes and hoes, and various small apparatus, was valued at $381,958, $46,759 of this value being used on vessels and $335,199 on boats. The value of shore and accessory property was $563,992, and the amount of cash capital utilized was $173,400, a total investment, including the cash capital, of $2,371,253.

In 1898 the number of persons engaged was slightly less than in the former year, being 12,270—2,213 on vessels, 9,413 on boats, and 644 in shore industries. The number of vessels employed was 648, being 27 less than in 1897, and valued, with their outfits, at $746,575; the number of boats was 6,424, valued at $483,889; the fishing apparatus used was valued at $380,111; the shore and accessory property at $561,048; the cash capital was $165,800, and the total investment $2,337,423, being $33,830 less than in the preceding year.

The products of the fisheries in 1897 consisted of 72,429,539 pounds of fish, valued at $1,189,935; 200,155 pounds of caviar, valued at $67,592; 1,605,264 hard crabs in number, valued at $14,411; 780,639 soft crabs, valued at $25,658; 562,400 king crabs, valued at $4,495; 99,230 pounds of lobsters, valued at $8,573; 2,896 pounds of shrimp, valued at $1,565; 3,005,048 bushels of oysters, valued at $1,682,015; 591,272 bushels of hard clams, valued at $543,795; 74,500 bushels of soft clams, valued at $63,725; 12,000 bushels of scallops, valued at $4,000; 50,400 bushels of mussels, valued at $1,575; 13,528 pounds of terrapin, valued at $6,096, and 14,550 pounds of turtles, valued at $999; a total value of $3,614,434.

The value of all species classed as fish, including caviar, a product of the sturgeon, was $1,257,527; of the molluscan species, $2,295,110, and of the crustacean and reptilian species, $61,797. The species of fish taken in greatest quantity were alewives, 2,053,802 pounds, $9,529; blue-fish, 5,164,173 pounds, $148,257; cod, 3,481,890 pounds, $71,208; flounders, 1,225,725 pounds, $29,018; menhaden, 30,552,825 pounds, $70,056; sea bass, 2,131,480 pounds, $74,281; shad, 13,000,783 pounds, $342,931, and squeteague, 8,679,132 pounds, $180,989.

The molluscan fisheries surpass all others in value, the oysters alone having a greater value than all the species of fish combined. The most important crustaceans are the hard and soft crabs, although in weight the catch of king crabs exceeds all the other varieties. The yield of lobsters is not large, and shrimp are taken only in small quantities. The catch of shad in New Jersey is greater than in any other State, and comprises about one-fourth of the shad taken in the entire country.

In 1898 the value of all species classed as fish, including caviar, was $1,239,519; of the molluscan species, $2,264,833, and of the crustacean and reptilian species, $59,414—a total value of $3,563,766, being $50,668 less than in the previous year. There was no marked decrease in any single fishery, but a slight falling off in a number of species contributed to this result.

The three tables which follow show in a condensed form the number of persons engaged, the number and value of vessels, boats, and of the various kinds of apparatus employed, the value of shore and accessory property, and the amount of cash capital in the fisheries of New Jersey in 1897 and 1898:

Number of persons employed.

How engaged.	1897.	1898.
On vessels fishing	2,169	1,926
On vessels transporting	315	287
In shore or boat fisheries	9,400	9,413
Shoresmen	610	644
Total	12,494	12,270

Table of apparatus and capital.

Items.	1897.		1898.	
	No.	Value.	No.	Value.
Vessels fishing	542	$499,576	531	$465,875
Tonnage	6,185	.....	5,564	.....
Outfit	.....	96,501	.....	92,161
Vessels transporting	133	149,875	117	168,775
Tonnage	2,267	.....	2,019	.....
Outfit	.....	20,892	.....	19,764
Boats	6,365	485,059	6,424	483,889
Apparatus—vessel fisheries:				
Seines	17	5,268	16	4,588
Gill nets	6	640	13	900
Fyke nets	150	1,314	170	1,526
Stop nets	2	400	2	400
Lines	.....	984	.....	1,096
Pots	175	143	315	253
Oyster dredges and tongs	1,388	30,963	1,367	32,918
Clam tongs and rakes	584	6,435	564	6,468
Crab dredges	144	612	182	736
Apparatus—shore fisheries:				
Seines	505	34,626	527	34,509
Gill nets	4,136	123,518	4,291	126,842
Pound nets and weirs	180	98,995	172	88,885
Fyke nets	2,406	15,124	2,665	16,944
Stop nets	80	4,778	65	4,233
Lines	.....	5,401	.....	6,844
Pots	4,309	5,033	4,385	5,109
Oyster tongs, rakes, and dredges	4,823	26,722	4,908	27,094
Clam tongs, rakes, and hoes	8,463	19,846	8,523	20,529
Minor apparatus	.....	1,156	.....	737
Shore and accessory property	.....	563,992	.....	561,048
Cash capital	.....	178,400	.....	165,800
Total	.....	2,371,253	.....	2,337,423

Table of products.

Species.	1897.		1898.	
	Lbs.	Value.	Lbs.	Value.
Albacore	14,120	$294	16,550	$333
Alewives	2,053,802	9,529	1,609,947	8,707
Blue-fish	5,164,173	148,257	5,077,085	163,620
Bonito	358,700	9,605	376,822	9,943
Butter-fish	217,057	5,867	262,627	8,080
Carp	785,409	39,370	245,983	13,884
Cat-fish	221,985	11,114	229,648	11,688
Cod	3,481,890	71,208	2,582,990	82,374
Croakers	280,800	5,021	412,320	7,375
Drum	82,900	842	82,644	822
Eels	749,405	35,862	799,488	38,309
Flounders	1,225,725	29,018	1,383,735	32,659
Haddock	167,375	3,060	240,050	7,806
Hake	69,735	1,538	98,042	2,359
Hickory shad	8,719	229	3,500	220
King-fish	43,027	3,766	44,002	3,935
Mackerel	24,300	1,628	16,480	1,322
Menhaden	30,552,825	70,056	22,193,530	53,726
Mullet, fresh	21,275	497	27,500	667
Mullet, salted	800	40	500	25
Perch, white	596,917	37,924	631,522	39,381
Perch, yellow	5,960	297	4,810	239
Pike and pickerel	2,770	152	2,560	150
Salmon	2,202	731	1,116	389
Scup	757,450	13,816	622,165	13,572
Sea bass	2,131,480	74,281	2,189,533	79,889
Shad	13,000,783	342,931	12,844,432	293,173
Sheepshead	49,835	8,565	42,735	7,273
Skates	11,650	291	12,750	319
Spanish mackerel	108,030	11,539	83,125	9,726
Spots	20,700	682	22,350	788
Squeteague, fresh	8,662,232	180,018	9,884,453	202,457
Squeteague, salted	16,900	971	16,750	962
Striped bass	287,189	31,978	274,353	28,695
Sturgeon	813,449	26,464	719,024	21,273
Suckers	142,130	6,720	155,511	7,383
Tautog	289,400	5,513	314,748	6,029
Miscellaneous fish	11,440	261	11,360	274
Caviar	200,165	67,592	149,302	79,693
Crabs, hard	[1] 535,088	14,411	[2] 614,785	15,826
Crabs, soft	[3] 260,213	25,658	[4] 269,078	25,805
King crabs	[5] 1,124,800	4,495	[6] 1,062,190	4,343
Lobsters	99,230	8,573	123,876	11,097
Shrimp	2,896	1,565	2,685	1,465
Oysters, market	[7] 9,545,361	1,453,369	[8] 9,394,147	1,309,411
Oysters, seed	[9] 11,489,980	228,646	[10] 7,970,592	359,913
Clams, hard	[11] 4,730,177	543,795	[12] 4,495,073	524,339
Clams, soft	[13] 745,000	63,725	[14] 795,000	66,345
Scallops	[15] 72,000	4,000	[16] 55,800	3,100
Mussels	[17] 2,520,000	1,575	[18] 2,365,000	1,725
Terrapin	13,528	6,096	.....	.....
Turtles	14,550	999	12,850	878
Total	103,782,517	3,614,434	90,297,118	3,563,766

[1] 1,605,264 in number.
[2] 1,844,355 in number.
[3] 780,639 in number.
[4] 807,234 in number.
[5] 562,400 in number.
[6] 531,095 in number.
[7] 1,363,623 bushels.
[8] 1,342,021 bushels.
[9] 1,641,425 bushels.
[10] 1,138,656 bushels.
[11] 591,272 bushels.
[12] 561,884 bushels.
[13] 74,500 bushels.
[14] 79,500 bushels.
[15] 12,000 bushels.
[16] 9,300 bushels.
[17] 50,400 bushels.
[18] 47,700 bushels

Some of the products shown above in pounds are exhibited in the following supplementary table in number or bushels, the unit of measure by which they are usually sold:

Products.	1897.		1898.	
	No.	Value.	No.	Value.
Crabs, hard ..... number	1,605,264	$14,411	1,844,355	$15,826
Crabs, soft ..... do	780,639	25,658	807,234	25,805
King crabs ..... do	562,400	4,495	531,095	4,343
Clams, hard ..... bushels	591,272	543,795	561,884	524,339
Clams, soft ..... do	74,500	63,725	79,500	66,345
Oysters, market ..... do	1,363,623	1,453,369	1,342,021	1,309,411
Oysters, seed ..... do	1,641,425	228,646	1,138,656	359,913
Mussels ..... do	50,400	1,575	47,700	1,725
Scallops ..... do	12,000	4,000	9,300	3,100

STATISTICS OF THE FISHERIES BY COUNTIES.

There are 21 counties in New Jersey, 18 of which are interested to a greater or less extent in the fishery industry. Essex County is interested only in respect to the fishery trade which is carried on at Newark, but the remaining 17 counties are directly engaged in fisheries. Seven of these counties, Bergen, Hudson, Union, Middlesex, Monmouth, Ocean, and Atlantic, and the east side of Burlington and Cape May, are on the eastern side of the State, prosecuting their fisheries mainly in the Atlantic Ocean and tributary bays and rivers, while the remaining counties, Sussex, Warren, Hunterdon, Mercer, Camden, Gloucester, Salem, Cumberland, and the west side of Burlington and and Cape May, are on the Delaware River and Bay.

The county having the most extensive fisheries, as determined by the value of the products, is Monmouth. The number of persons engaged in the fisheries of this county in 1897 was 2,209. Of these, 403 were employed on vessels, 1,689 on boats, and 117 were shoresmen. The investment in vessels, boats, fishing apparatus, shore property, and cash capital amounted to $545,445. The products, consisting of a large variety of species, were valued at $977,683.

In 1898 the number of persons engaged in all branches of fisheries in the county was 2,279; the amount of capital invested was $563,774, and the value of the products $971,418. The species taken in greatest abundance in 1897 were blue-fish, 4,264,400 pounds, $113,197; cod, 2,222,000 pounds, $32,620; menhaden, 20,223,800 pounds, $50,266; squeteague, 5,499,919 pounds, $97,653; oysters, 188,487 bushels, $186,090; hard clams, 267,861 bushels, $290,654; and soft clams, 70,300 bushels, $61,625. In 1898 blue-fish aggregated 4,163,070 pounds, $125,548; cod, 1,200,200 pounds, $34,920; menhaden, 16,413,500 pounds, $43,078; squeteague, 6,279,603 pounds, $118,845; oysters, 148,239 bushels, $147,224; hard clams, 258,546 bushels, $282,348; and soft clams, 75,500 bushels, $64,345. In addition to these there were more than thirty other varieties, many of which are important food species and are taken in comparatively large quantities.

Cumberland County, which ranks next in the value of its fishery products, exceeded Monmouth in the number of persons employed and capital invested in 1897, but only in the investment in 1898. The number of persons engaged in the fisheries of this county in 1897 was 1,420 on vessels, 709 in shore or boat fisheries, and 263 on shore; a total of 2,392. The amount of capital invested was $678,788, and the products, consisting largely of oysters, were valued at $859,950.

In 1898 the fisheries of this county employed 2,111 persons, the amount of capital invested was $645,680, and the value of the products was $867,549. The excess of capital in this county as compared with Monmouth is due to the employment of a much larger number of vessels.

The principal species taken in this county in 1897 were shad, 593,230 pounds, $17,509; sturgeon, including caviar, 307,685 pounds, $27,493; and oysters, 1,847,458 bushels, $801,386. In 1898 the yield of shad was 668,300 pounds, $17,150; of sturgeon and caviar, 362,806 pounds, $31,605; and of oysters, 1,316,738 bushels, $806,177.

Other counties having important fisheries are Atlantic, Ocean, Cape May and Salem. The fisheries of Atlantic County in 1897 employed 1,143 persons; the amount of capital invested was $156,965, and the value of the products was $447,942. In 1898 there were 1,170 persons employed, $160,843 invested, and the products were valued at $435,320. Ocean County, which ranks next in the extent of its fisheries to Monmouth and Cumberland, in 1897 had 1,620 persons employed, $257,164 invested, and its products were valued at $424,194. In 1898 it had 1,638 persons employed, $254,923 invested, and the products were valued at $350,681. The fisheries of Cape May County in 1897 employed 1,004 persons, the investment was $99,427, and the value of the products $234,926. In 1898 the number of persons employed was 985, the investment $92,916, and the value of the products $237,615. Salem County had, in 1897, 1,488 persons engaged in its fisheries, an investment of $227,181, and products valued at $232,096. In 1898 there were 1,382 persons employed, $230,909 invested, and the value of the products was $209,315. In the remaining counties the fisheries were less extensive, the largest number of persons employed in any of them for either year being 624 in Burlington, the largest amount of capital invested being $110,064, and the greatest value of products $142,431, in Camden.

The three tables which follow show the extent of the fisheries in each county of New Jersey in 1897 and 1898:

Table showing, by counties, the number of persons employed in the fisheries of New Jersey in 1897 and 1898.

Counties.	In vessel fisheries.		On vessels transporting.		In shore or boat fisheries.		Shoresmen.		Total.	
	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.
Atlantic	142	156	44	40	943	960	14	14	1,143	1,170
Bergen	.....	.....	.....	.....	98	98	7	7	105	105
Burlington	8	8	15	15	569	559	32	32	624	614
Camden	154	171	14	.....	381	357	14	10	563	538
Cape May	110	100	16	13	876	870	2	2	1,004	985
Cumberland	1,377	1,115	43	52	709	683	263	261	2,392	2,111
Essex	.....	.....	.....	.....	.....	.....	60	61	60	61
Gloucester	3	3	4	6	315	315	8	8	330	332
Hudson	10	12	3	.....	185	215	5	5	203	232
Hunterdon	.....	.....	.....	.....	91	91	.....	.....	91	91
Warren	.....	.....	.....	.....	105	101	.....	.....	105	101
Mercer	.....	.....	.....	.....	223	230	.....	.....	223	230
Middlesex	3	7	13	16	184	204	4	4	204	231
Monmouth	318	311	85	73	1,689	1,744	117	151	2,209	2,279
Ocean	39	37	35	26	1,520	1,546	26	29	1,620	1,638
Salem	5	6	43	46	1,388	1,276	52	54	1,488	1,382
Sussex	.....	.....	.....	.....	14	14	.....	.....	14	14
Union	.....	.....	.....	.....	110	150	6	6	116	156
Total	2,169	1,926	315	287	9,400	9,413	610	644	12,494	12,270

Table showing, by counties, the vessels, boats, and apparatus employed in the fisheries of New Jersey in 1897 and 1898.

Designation.	Atlantic.				Bergen.				Burlington.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	46	$44,475	50	$48,775	....	.....	....	.....	2	$1,350	2	$1,350
Tonnage	391	.....	436	.....	....	.....	....	.....	24	.....	24	.....
Outfit	....	7,549	....	8,319	....	.....	....	.....	....	95	....	95
Vessels transporting	19	17,050	17	15,300	....	.....	....	.....	6	3,600	6	3,600
Tonnage	296	.....	278	.....	....	.....	....	.....	124	.....	124	.....
Outfit	....	2,625	....	2,440	....	.....	....	.....	....	555	....	580
Boats	853	56,555	858	57,119	69	$2,920	68	$3,015	283	27,028	280	27,058
Apparatus—vessel fisheries:												
Seines	3	1,070	3	1,070	....	.....	....	.....	3	258	3	258
Fyke nets	4	100	5	150	....	.....	....	.....	8	260	8	260
Lines, hand and trawl	....	865	....	967	....	.....	....	.....	....	.....	....	.....
Oyster dredges and tongs	89	680	93	696	....	.....	....	.....	6	21	6	21
Clam tongs and rakes	46	302	39	291	....	.....	....	.....	....	.....	....	.....
Apparatus—shore fisheries:												
Seines	76	3,135	79	3,135	....	.....	....	.....	46	5,635	46	5,570
Gill nets	113	568	110	535	665	9,224	700	9,103	168	4,968	170	4,972
Pound nets and weirs	3	2,500	3	2,500	....	.....	....	.....	....	.....	....	.....
Fyke nets	51	930	70	875	....	.....	....	.....	340	2,040	344	2,100
Stop nets	4	45	....	.....	....	.....	....	.....	....	.....	....	.....
Lines, hand and trawl	....	738	....	738	....	.....	....	.....	....	8	....	8
Pots, eel and lobster	18	15	18	15	94	141	100	109	....	.....	....	.....
Oyster tongs, rakes, and dredges	716	3,193	716	3,193	....	.....	....	.....	133	709	144	799
Clam tongs, rakes, and hoes	823	4,975	836	5,160	....	.....	....	.....	1	22	1	22
Minor apparatus	....	145	....	115	....	.....	....	.....	....	3	....	.....
Shore and accessory property	....	9,450	....	9,450	....	4,032	....	3,979	....	14,349	....	14,314
Total	....	156,965	....	160,843	....	16,317	....	16,206	....	60,896	....	61,002

Designation.	Camden.				Cape May.				Cumberland.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	25	$30,450	28	$31,700	30	$38,100	32	$33,275	296	$291,101	274	$268,175
Tonnage	421	.....	416	.....	305	.....	308	.....	3,575	.....	2,895	.....
Outfit	....	5,969	....	7,288	....	5,027	....	5,318	....	52,410	....	45,188
Vessels transporting	7	6,700	....	.....	5	5,700	5	3,900	23	37,750	23	37,750
Tonnage	91	.....	....	.....	128	.....	100	.....	264	.....	264	.....
Outfit	....	644	....	.....	....	700	....	670	....	3,034	....	3,034
Boats	170	15,893	168	14,675	657	23,777	664	24,397	357	44,048	340	39,588
Apparatus—vessel fisheries:												
Seines	....	.....	....	.....	2	580	1	30	....	.....	....	.....
Fyke nets	....	.....	....	.....	36	36	36	36	....	.....	....	.....
Stop nets	....	.....	....	.....	1	100	1	100	....	.....	....	.....
Lines, hand and trawl	....	17	....	17	....	90	....	80	....	.....	....	25
Pots, eel and lobster	....	.....	....	.....	35	28	35	28	....	.....	....	.....
Oyster dredges and tongs	92	2,140	112	2,760	64	1,190	74	1,462	1,082	23,825	1,016	25,405
Clam tongs and rakes	....	.....	....	.....	2	19	2	19	28	146	2	16
Apparatus—shore fisheries:												
Seines	15	3,825	15	2,745	85	2,122	93	2,353	26	810	21	670
Gill nets	112	3,611	112	3,611	25	1,645	23	1,470	161	13,080	171	13,465
Pound nets and weirs	....	.....	....	.....	111	6,945	109	6,085	....	.....	....	.....
Fyke nets	172	225	172	225	12	310	20	505	256	250	250	244
Stop nets	10	470	10	470	....	.....	....	.....	6	300	5	200
Lines, hand and trawl	....	5	....	5	....	1,073	....	1,310	....	7	....	7
Pots, eel and lobster	....	.....	....	.....	30	10	30	10	....	.....	....	.....
Oyster tongs, rakes, and dredges	....	.....	....	.....	122	618	124	540	308	3,904	277	3,690
Clam tongs, rakes, and hoes	....	.....	....	.....	332	2,543	324	2,561	....	.....	....	.....
Minor apparatus	....	.....	....	.....	....	214	....	32	....	.....	....	.....
Shore and accessory property	....	40,115	....	24,625	....	8,650	....	8,835	....	194,623	....	194,723
Cash capital	....	.....	....	.....	....	.....	....	.....	....	13,500	....	13,500
Total	....	110,064	....	88,121	....	99,427	....	92,916	....	678,788	....	645,680

Table showing, by counties, the vessels, boats, and apparatus employed in the fisheries of New Jersey in 1897 and 1898—Continued.

Designation.	Essex.		Gloucester.				Hudson.			
	1897.	1898.	1897.		1898.		1897.		1898.	
	Value.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing			1	$300	1	$300	3	$13,000	4	$13,600
Tonnage			6		6		143		154	
Outfit				162		120		2,085		2,090
Vessels transporting			2	950	3	1,950	1	3,000		
Tonnage			19		36		27			
Outfit				110		180		225		
Boats			150	14,715	159	15,290	102	5,575	118	6,375
Apparatus—vessel fisheries:										
Seines			1	100	1	100				
Stop nets			1	300	1	300				
Pots, eel and lobster							50	70	100	135
Oyster dredges and tongs							12	1,190	12	1,190
Crab dredges							10	60		
Apparatus—shore fisheries:										
Seines			9	1,145	9	1,145				
Gill nets			96	11,030	96	11,030	634	6,530	634	6,530
Fyke nets			520	825	520	825	248	3,635	253	3,593
Stop nets			24	2,063	24	2,063				
Pots, eel and lobster							240	305	280	345
Oyster tongs, rakes, and dredges							70	350	100	500
Minor apparatus				36		36				
Shore and accessory property	$26,000	$26,000		8,485		8,500		8,020		8,025
Cash capital	24,500	24,500								
Total	50,500	50,500		40,221		41,839		44,045		42,383

Designation.	Hunterdon.				Mercer.				Middlesex.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing									2	$750	4	$1,400
Tonnage									15		26	
Outfit										170		441
Vessels transporting									4	6,200	5	6,700
Tonnage									65		76	
Outfit										780		1,165
Boats	26	$707	26	$707	92	$2,323	96	$2,433	120	6,388	135	6,740
Apparatus—vessel fisheries:												
Clam tongs and rakes									5	60	17	204
Apparatus—shore fisheries:												
Seines	21	1,740	21	1,740	30	2,970	33	3,135	5	3,150	6	3,350
Gill nets					51	940	51	940	15	90	15	90
Pound nets and weirs									1	300		
Fyke nets					380	760	380	760	14	580	15	570
Lines, hand and trawl		18		18						2		2
Pots, eel and lobster									112	141	172	216
Oyster tongs, rakes, and dredges									154	828	169	903
Clam tongs, rakes, and hoes									9	103	9	103
Shore and accessory property		7,670		7,670		7,490		7,665		10,938		10,938
Cash capital										19,600		19,700
Total		10,135		10,135		14,483		14,933		50,030		52,522

Designation.	Union.				Warren.			
	1897.		1898.		1897.		1898.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Boats	55	$2,750	75	$3,750	29	$475	28	$460
Apparatus—shore fisheries:								
Seines					23	957	22	917
Oyster tongs, rakes, and dredges	110	550	150	750				
Minor apparatus						120		120
Shore and accessory property		500		500		3,245		3,245
Cash capital		500		500				
Total		4,300		5,500		4,797		4,742

Table showing, by counties, the vessels, boats, and apparatus employed in the fisheries of New Jersey in 1897 and 1898—Continued.

Designation.	Monmouth.				Ocean.			
	1897.		1898.		1897.		1898.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	125	$68,850	123	$59,100	10	$10,300	11	$7,300
Tonnage	1,159	.....	1,159	.....	120	.....	115	.....
Outfit	.....	19,675	.....	19,592	.....	3,152	.....	3,382
Vessels transporting	34	3,600	29	34,700	16	10,925	12	8,525
Tonnage	501	.....	417	.....	183	.....	125	.....
Outfit	.....	6,162	.....	5,853	.....	1,687	.....	1,467
Boats	1,254	61,572	1,322	64,183	1,369	131,933	1,891	128,329
Apparatus—vessel fisheries:								
Seines	7	2,810	7	2,680	1	500	1	450
Gill nets	4	400	10	580	2	240	3	320
Fyke nets	102	918	120	1,080	.....	.....	.....	.....
Lines, hand and trawl	.....	10	.....	5	.....	.....	.....	.....
Pots, eel and lobster	.....	.....	.....	.....	90	45	180	90
Oyster dredges and tongs	43	1,917	50	1,312	.....	.....	.....	.....
Clam tongs and rakes	460	5,735	461	5,765	43	173	43	173
Crab dredges	134	552	182	736	.....	.....	.....	.....
Apparatus—shore fisheries:								
Seines	17	815	21	1,060	117	5,532	126	5,899
Gill nets	836	7,062	760	6,922	690	7,375	861	9,459
Pound nets and weirs	63	85,300	59	77,800	2	3,950	1	2,500
Fyke nets	273	4,385	272	4,365	140	1,234	369	2,882
Lines, hand and trawl	.....	3,273	.....	3,642	.....	278	.....	615
Pots, eel and lobster	1,910	3,046	1,974	3,180	1,905	1,375	1,811	1,234
Oyster tongs, rakes, and dredges	415	2,602	423	2,695	2,795	13,968	2,805	14,024
Clam tongs, rakes, and hoes	1,484	8,177	1,536	8,582	814	4,026	817	4,101
Minor apparatus	.....	139	.....	133	.....	246	.....	248
Shore and accessory property	.....	161,445	.....	170,609	.....	45,225	.....	48,925
Cash capital	.....	97,000	.....	89,200	.....	15,000	.....	15,000
Total	.....	545,445	.....	563,774	.....	257,164	.....	254,923

Designation.	Salem.				Sussex.			
	1897.		1898.		1897.		1898.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	2	$900	2	$900	.....	.....	.....	.....
Tonnage	26	.....	26	.....	.....	.....	.....	.....
Outfit	.....	207	.....	328	.....	.....	.....	.....
Vessels transporting	16	54,400	17	56,350	.....	.....	.....	.....
Tonnage	574	.....	599	.....	.....	.....	.....	.....
Outfit	.....	4,370	.....	4,475	.....	.....	.....	.....
Boats	776	88,340	703	89,710	3	$60	3	$60
Apparatus—vessel fisheries:								
Lines, hand and trawl	.....	2	.....	2	.....	.....	.....	.....
Oyster dredges and tongs	.....	.....	4	72	.....	.....	.....	.....
Apparatus—shore fisheries:								
Seines	32	2,680	32	2,680	3	110	3	110
Gill nets	570	57,395	588	58,715	.....	.....	.....	.....
Stop nets	36	1,900	26	1,500	.....	.....	.....	.....
Lines, hand and trawl	.....	4	.....	4	.....	.....	.....	.....
Minor apparatus	.....	253	.....	53	.....	.....	.....	.....
Shore and accessory property	.....	13,430	.....	12,720	.....	325	.....	325
Cash capital	.....	3,300	.....	3,400	.....	.....	.....	.....
Total	.....	227,181	.....	230,909	.....	495	.....	495

Table showing, by counties, the yield of the fisheries of New Jersey in 1897 and 1898.

Species.	Atlantic.				Burlington.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	15,600	$78	32,780	$142	520,500	$1,785	78,000	$315
Blue-fish	136,200	5,783	143,700	6,103				
Butter-fish	10,000	500	10,000	500				
Carp					74,900	3,956	27,050	1,431
Cat-fish	500	35	800	48	48,870	2,230	49,626	2,254
Cod	1,056,500	33,768	1,002,500	35,668				
Croakers	40,600	581	39,870	615				
Drum	3,400	34	3,400	34				
Eels	159,131	6,945	160,466	6,975	24,999	1,338	24,373	1,276
Flounders	263,310	6,748	248,320	6,351	980	49	900	45
Haddock	11,525	687	11,825	722				
Hake	9,700	398	9,900	407				
King-fish	21,280	1,086	21,600	1,099				
Menhaden	5,225,625	10,887	3,104,130	6,467				
Mullet, fresh	1,600	88	1,300	73				
Mullet, salted	800	40	500	25				
Perch, white	149,215	10,499	120,480	8,512	80,420	5,103	64,105	3,846
Perch, yellow					2,060	106	1,500	78
Pike and pickerel	510	23	485	21	500	30	375	23
Salmon					48	12	31	12
Scup	55,000	1,145	61,950	1,310				
Sea bass	369,050	14,459	384,300	15,038				
Shad	1,000	74	200	15	1,164,660	29,762	957,948	21,514
Sheepshead	39,735	7,161	32,780	5,862				
Spots	1,750	30	1,750	30				
Squeteague, fresh	1,155,700	34,651	1,278,225	37,737	13,700	685	18,800	940
Striped bass	46,880	5,888	28,207	3,550	21,320	2,768	17,585	2,169
Sturgeon					15,960	827	7,790	459
Suckers	1,100	32	2,100	77	55,031	2,597	57,352	2,629
Tautog	700	32	700	32				
Caviar					6,060	2,290	2,625	1,687
Crabs, hard	154,000	4,650	154,000	4,650				
Crabs, soft	6,000	775	6,000	775				
Shrimp	600	200	600	200				
Oysters, market	1,230,845	187,866	1,197,280	182,842	186,410	20,974	165,550	18,641
Oysters, seed	350,455	14,554	324,835	15,196	24,500	1,200	24,500	1,200
Clams, hard	913,667	96,008	850,116	92,709	81,700	7,821	76,200	7,294
Mussels	2,520,000	1,575	2,360,000	1,475				
Terrapin	1,103	626			2,431	309		
Turtles	600	36	1,000	60	400	34		
Total	13,953,631	447,942	11,696,099	435,320	2,325,349	83,876	1,574,310	65,813

Species.	Bergen.				Camden.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives					490,200	$1,602	202,250	$823
Blue-fish					7,500	300	6,000	240
Carp					73,558	4,382	25,488	1,521
Cat-fish					25,164	1,258	25,291	1,264
Eels	10,666	$775	18,066	$991	13,466	808	11,598	696
Flounders					5,200	130	5,000	125
Perch, white					1,846	81	1,523	65
Perch, yellow					1,125	58	780	40
Salmon					794	264		
Scup					6,000	150	7,200	180
Sea bass					120,000	4,800	112,000	4,480
Shad	460,800	17,934	519,420	18,510	1,404,515	33,434	1,014,330	17,328
Striped bass	11,000	970	21,750	1,895	9,000	900	2,900	290
Sturgeon					1,000	25	450	12
Suckers					11,330	591	9,426	495
Oysters, market					409,626	71,958	637,903	85,462
Oysters, seed					777,700	11,346	686,288	29,410
Total	482,466	19,679	559,236	21,396	3,358,024	132,087	2,748,377	142,431

Table showing the yield of the fisheries of New Jersey in 1897 and 1898—Cont'd.

Species.	Cape May.				Cumberland.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore	5,970	$150	6,800	$176				
Alewives	69,700	1,316	67,050	1,376	46,700	$277	63,600	$336
Blue-fish	244,188	10,991	327,450	14,873				
Bonito	3,700	165	4,700	209				
Butter-fish	44,657	1,637	41,867	1,500				
Carp	10,300	309	2,914	87	41,065	1,297	16,525	517
Cat-fish	3,205	194	8,815	231	38,354	2,083	39,170	2,111
Cod	170,840	4,134	208,450	5,506				
Croakers	167,700	3,032	225,300	4,050			6,000	150
Drum	77,000	780	77,200	767				
Eels	104,364	4,993	96,930	4,655	7,733	324	6,100	352
Flounders	70,510	2,111	80,800	2,429				
Hake	16,935	458	24,200	515				
Hickory shad	2,000	160	2,000	160				
King-fish	14,392	1,719	15,419	1,907				
Menhaden	306,000	808	80,000	538				
Mullet, fresh	19,575	403	21,700	464				
Perch, white	31,680	2,415	32,655	2,482	15,392	744	15,832	761
Perch, yellow	650	39	570	34				
Pompano	40	10	40	10				
Salmon							22	10
Scup	166,650	4,798	223,665	6,403			200	5
Sea bass	468,365	17,545	582,950	21,900			3,000	120
Shad	3,882	174	3,480	154	593,230	17,509	668,300	17,150
Sheepshead	2,450	468	2,520	478				
Spanish mackerel	4,280	738	7,500	1,175				
Spots	14,250	516	14,800	550				
Squeteague, fresh	1,004,668	25,121	1,161,285	28,397	80,330	3,458	78,940	3,193
Squeteague, salted	16,700	961	16,650	957				
Striped bass	50,453	5,091	47,463	3,701	59,716	4,338	60,103	4,344
Sturgeon	33,250	1,647	16,710	756	243,925	6,240	315,083	5,088
Suckers	500	15	600	18	5,840	210	5,043	185
Tautog	400	12	400	12				
Tomcod or frost-fish	200	6	200	6				
Caviar	7,020	2,844	2,340	1,482	63,760	21,253	47,723	26,517
Crabs, hard	29,587	868	31,096	920				
King crabs	976,800	4,125	946,190	4,053	148,000	370	116,000	290
Oysters, market	462,616	66,906	505,981	71,625	3,787,896	654,245	4,037,782	586,427
Oysters, seed	221,900	4,471	19,775	860	9,144,310	147,141	5,179,384	219,750
Clams, hard	701,262	58,901	615,997	52,149	2,000	250	600	75
Terrapin	7,613	3,820						
Turtles	1,500	75	1,200	60	2,700	216	2,100	168
Total	5,537,752	234,926	5,520,662	237,615	14,280,951	859,950	10,661,507	867,549

Species.	Mercer.				Middlesex.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	7,500	$55	6,000	$45	48,000	$80	6,000	$12
Blue-fish					12,300	440	12,800	448
Carp	3,810	200	2,718	138				
Cat-fish	29,630	1,398	30,664	1,659				
Eels	15,756	945	16,946	1,017	14,399	864	15,733	960
Flounders					3,000	160	3,200	172
Menhaden					564,400	907	658,400	1,113
Perch, white	800	32	600	24	100	10	2,100	110
Perch, yellow	200	8	250	10				
Salmon	47	12	7	1				
Shad	311,600	12,131	242,040	12,630	11,176	624	13,102	623
Squeteague, fresh					15,800	493	16,500	730
Striped bass	8,460	333	4,455	402	1,300	86	2,000	174
Sturgeon			60	4				
Suckers	22,120	1,073	23,505	1,129				
Crabs, hard							1,200	45
Oysters, market					151,480	21,758	826,550	45,298
Oysters, seed					380,700	20,515	559,720	30,036
Clams, hard					12,816	1,720	25,480	3,110
Scallops					5,400	300	5,400	300
Total	894,928	16,185	327,245	17,059	1,220,871	47,957	1,648,185	83,121

Table showing the yield of the fisheries of New Jersey in 1897 and 1898—Cont'd.

Species.	Gloucester.				Hudson.				Hunterdon.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Alewives	54,390	$227	55,255	$232								
Black bass									150	$12	100	$8
Carp	189,326	9,646	74,800	4,488					1,350	25	1,088	20
Cat-fish	40,341	2,104	40,393	2,104					550	26	510	23
Eels	22,177	1,331	23,866	1,432	5,000	$285	8,333	$470	133	10	133	10
Perch, white	434	20	575	25								
Perch, yellow	925	46	910	45								
Salmon	24	12							151	20		
Shad	1,468,920	33,189	1,571,450	30,418	734,800	26,225	690,500	22,843	108,400	6,349	77,616	4,590
Striped bass	800	80	1,200	120	1,450	163	990	105	1,195	120	2,055	206
Suckers	7,034	322	8,331	386					8 800	397	8,050	364
Crabs, hard					26,667	800						
Lobsters					31,200	2,190	41,250	3,340				
Oysters, market					385,000	28,750	420,000	32,500				
Oysters, seed					161,000	8,650	392,000	23,000				
Total	1,784,371	46,977	1,776,780	39,250	1,345,117	67,063	1,553,073	82,258	120,729	6,959	89,552	5,221

Species.	Monmouth.				Ocean.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore	7,150	$134	9,750	$157	1,000	$10		
Alewives	35,112	606	27,362	426	713,100	3,250	1,011,650	$4,600
Blue-fish	4,264,400	113,197	4,163,070	125,548	499,585	17,546	424,065	16,408
Bonito	336,800	9,011	332,422	8,784	18,200	429	39,700	950
Butter-fish	152,900	3,535	170,060	4,061	9,500	195	40,700	2,019
Cat-fish					500	45	1,000	75
Cero	4,950	154	5,170	159	150	6	500	20
Cod	2,222,000	32,620	1,200,200	34,920	32,550	686	171,840	6,280
Croakers	60,800	1,174	130,810	2,356	11,700	234	10,840	204
Drum	2,500	28	2,044	21				
Eels	216,732	11,149	239,729	12,515	149,783	5,663	172,549	6,586
Flounders	746,975	15,426	823,625	17,768	135,750	4,394	171,890	5,769
Haddock	154,400	2,347	214,400	6,547	1,450	26	13,825	537
Hake	41,300	646	56,942	1,163	1,800	36	7,000	274
Hickory shad	1,719	69	1,500	60				
King-fish	6,650	864	6,108	808	705	97	875	121
Mackerel	24,300	1,628	16,480	1,322				
Menhaden	20,223,800	50,266	16,413,500	43,078	4,233,000	7,188	1,937,500	2,530
Mullet, fresh	100	6	3,500	110			1,000	30
Perch, white	7,450	467	5,950	363	307,855	18,484	385,682	23,113
Pike and pickerel					1,760	99	1,700	106
Pollock	300	9	300	9				
Salmon	1,021	358	1,025	360				
Scup	514,300	7,406	316,150	5,411	15,500	317	13,000	263
Sea bass	997,600	31,716	902,618	31,166	176,465	5,761	204,665	7,185
Shad	167,300	8,996	123,676	6,428	71,400	3,953	65,900	3,540
Sheepshead	7,050	867	7,265	910	600	69	170	23
Skates	11,650	291	12,750	319				
Spanish mackerel	96,600	9,997	67,400	7,107	7,150	804	8,225	1,444
Spots	2,300	43	3,000	96	2,400	93	2,800	112
Squeteague, fresh	5,499,919	97,653	6,279,608	118,845	864,215	16,399	523,600	11,068
Squeteague, salted					200	10	100	5
Striped bass	4,800	451	7,800	663	52,215	3,375	54,395	8,781
Sturgeon	19,358	936	22,473	1,163	4,150	221	2,600	150
Suckers	1,000	30	3,000	115	1,300	30	8,200	491
Tautog	287,700	5,457	313,548	5,980	600	12	100	5
Tomcod or frost-fish	1,650	14	1,950	15				
Whiting	4,000	50	3,100	47				
Caviar	600	300	1,373	575			1,045	570
Crabs, hard	188,467	4,634	388,090	9,511	136,367	3,459	40,899	700
Crabs, soft	180,000	17,075	196,000	17,950	74,213	7,808	67,078	7,080
Lobsters	63,600	6,004	79,500	7,615	4,430	379	3,126	142
Shrimp					2,296	1,365	2,085	1,265
Oysters, market	1,819,409	186,090	1,034,873	147,064	1,612,079	214,822	1,065,316	139,052
Oysters, seed			2,800	160	236,915	9,769	256,340	10,301
Clams, hard	2,142,888	290,654	2,068,368	282,348	875,844	88,441	858,312	86,654
Clams, soft	703,000	61,625	755,000	64,345	42,000	2,100	40,000	2,000
Scallops	66,600	3,700	50,400	2,800				
Mussels			5,000	250				
Terrapin					2,381	1,841		
Turtles					3,350	278	3,350	278
Total	40,790,650	977,683	36,469,684	971,418	10,304,458	424,194	7,612,622	350,681

Table showing the yield of the fisheries of New Jersey in 1897 and 1898—Cont'd.

Species.	Salem.				Sussex.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	53,000	$253	60,000	$400				
Carp	391,100	19,555	95,400	5,682				
Cat-fish	34,871	1,743	38,379	1,919				
Perch, white	1,725	69	2,020	80				
Perch, yellow	1,000	40	800	32				
Salmon	117	53						
Shad	6,436,400	148,050	6,839,550	133,394	8,800	$660	6,800	$510
Squeteague, fresh	27,900	1,563	27,500	1,547				
Striped bass	24,150	2,415	23,450	2,345				
Sturgeon	495,806	16,568	353,858	13,641				
Suckers	13,045	522	15,019	601				
Caviar	122,715	40,905	94,196	48,862				
Oysters, market			2,912	500				
Turtle	6,000	360	5,200	312				
Total	7,607,829	282,096	7,558,284	209,315	8,800	660	6,800	510

Species.	Union.				Warren.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Eels					5,066	$432	4,666	$384
Salmon							31	6
Shad					54,000	3,867	50,120	3,526
Suckers					15,030	901	14,885	893
Oysters, seed	192,500	$11,000	525,000	$30,000				
Total	192,500	11,000	525,000	30,000	74,096	5,200	69,702	4,809

The shad fishery of New Jersey exceeds in value that of any other species of fish proper taken in the State. About 89 per cent of the catch is from the Delaware River, a little over 9 per cent from the Hudson River, and less than 2 per cent from other waters. Nearly half of the catch is credited to Salem County. An interesting feature in connection with this fishery on the Delaware River is the recent introduction of naphtha motors for propelling shad gill-net boats. At Bridgeport, N. J., one boat used naphtha in 1898, and four in 1899.

Table showing the number of shad taken in each county of New Jersey in 1897 and 1898.

Counties.	1897.		1898.	
	No.	Value.	No.	Value.
Atlantic	250	$74	50	$15
Bergen	115,200	17,934	129,855	18,510
Burlington	283,492	29,762	224,347	21,514
Camden	351,863	33,434	237,010	17,328
Cape May	970	174	870	154
Cumberland	119,846	17,509	135,150	17,150
Gloucester	314,740	33,189	342,600	30,418
Hudson	183,700	26,225	172,625	22,843
Hunterdon	27,100	6,349	19,404	4,590
Mercer	67,625	12,131	51,800	12,630
Middlesex	2,469	624	3,038	623
Monmouth	33,325	8,996	25,419	6,428
Ocean	17,850	3,953	16,475	3,540
Salem	1,294,800	148,050	1,376,850	133,394
Sussex	2,200	660	1,700	510
Warren	13,500	3,867	12,530	3,526
Total	[1]2,828,930	342,931	[2]2,749,723	293,173

[1] 13,000,783 pounds.

[2] 12,844,432 pounds.

THE PRODUCTS BY APPARATUS.

The products of the vessel fisheries of New Jersey in 1897 were valued at $1,167,553, and those of the shore fisheries at $2,446,881. In 1898 the vessel fisheries yielded $1,192,723, and the shore fisheries $2,371,043. The more important forms of apparatus are used on both vessels and boats, but pound nets, weirs, and a variety of smaller apparatus are employed exclusively in the shore fisheries.

Seines are used on vessels chiefly for capturing menhaden, and occasionally for other species. In shore fisheries they are more widely distributed than any other apparatus, taking principally alewives, carp, cat-fish, eels, flounders, menhaden, white perch, shad, squeteague, striped bass, suckers, and soft crabs. The catch taken with them by vessels and boats in 1897 aggregated 31,398,546 pounds, valued at $235,745, and in 1898, 23,403,012 pounds, valued at $193,457.

Gill nets were used extensively in the shore fisheries, but on vessels to a limited extent only, in Monmouth and Ocean counties. They are especially important in the capture of shad and sturgeon. In 1897 they took 11,161,755 pounds of shad, valued at $277,529, and 989,096 pounds of sturgeon, including caviar, valued at $92,682; and in 1898, 11,447,220 pounds of shad, valued at $248,867, and 847,740 pounds of sturgeon products, valued at $99,720. In addition to this there were large quantities of other species taken, the more important being blue-fish, white perch, and squeteague. The yield of the gill-net fisheries in 1897 was 12,875,038 pounds, valued at $400,459, and in 1898 12,980,292 pounds, valued at $378,997.

Pound nets are employed to a greater or less extent in five counties, but principally in Monmouth and Cape May. The more important localities in Monmouth County in which they are used are Keansburg, Port Monmouth and vicinity, and along the ocean shore from Sandy Hook to Manasquan. The remaining pound nets on the eastern side of the State are in Middlesex, Ocean, Atlantic, and Cape May counties. In Cape May County a large number of small pound nets are set in various localities on the Delaware Bay shore for fish and king crabs, and a considerable number of weirs are fished exclusively for king crabs. In 1897 the catch of all species in pound nets and weirs was 16,013,724 pounds, valued at $214,068; and in 1898 14,070,839 pounds, valued at $216,455. The species taken in greatest abundance were blue-fish, bonito, butter-fish, cod, croakers, flounders, menhaden, scup, sea bass, shad, Spanish mackerel, squeteague, tautog, and king crabs. Squeteague was the most important species, and comprised about one-half the quantity and value of the entire catch. Cod were also abundant, especially as compared with former years.

Fyke nets and stop nets are used to a limited extent in the vessel and shore fisheries, the value of the catch by fyke nets in 1897 being $38,929 and in 1898 $36,412; and by stop nets $20,617 and $7,471 for each year, respectively. Stop nets are set at high tide across the

entrance of creeks and at other convenient places to prevent fish (chiefly carp) from escaping when the tide recedes.

The products of the hand, trawl, and trot line fisheries by vessels and boats in 1897 aggregated 11,604,721 pounds, valued at $335,715, and in 1898, 12,263,640 pounds, valued at $395,781; the most important species being blue-fish, cod, sea bass, and squeteague.

The group of apparatus yielding the largest returns, in both the vessel and shore fisheries, included oyster tongs and dredges, crab dredges, clam tongs, rakes, and hoes. The products of these in 1897 were valued at $2,303,383. The most important items in this value were oysters and clams, the former being valued at $1,682,015 and the latter at $607,520. The catch by these forms of apparatus in 1898 was worth $2,274,594, the value of the oyster fishery being $1,669,324, and of the clam fishery $590,684. Other products secured in considerable quantities each year were hard crabs, scallops and mussels.

Pots for lobsters and eels were operated to a limited extent, the catch being worth $22,978 in 1897, and $27,166 in 1898.

The products taken with minor forms of apparatus employed in the shore fisheries were worth $42,540 in 1897, and $33,433 in 1898.

The following tables show the quantity and value of the products by counties and apparatus for the years 1897 and 1898:

Table showing, by counties, the yield of the seine fisheries of New Jersey in 1897 and 1898.

Species.	Atlantic.				Burlington.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Menhaden	5,225,625	$10,887	3,104,130	$6,467				
Perch, white	665	65	500	50	1,530	$111	645	$49
Squeteague					3,000	150	3,000	150
Striped bass	5,350	960	4,000	720	320	54	130	27
Total	5,231,640	11,912	3,108,630	7,237	4,850	315	3,775	226
Shore fisheries:								
Alewives	14,200	65	29,880	107	520,500	1,785	78,000	315
Blue-fish	4,250	210	4,150	205				
Carp					74,900	3,956	27,050	1,431
Cat-fish					26,565	1,231	25,669	1,184
Drum	1,000	10	1,000	10				
Eels	38,999	1,899	45,600	2,149				
Flounders	74,010	2,119	68,500	1,852	300	15	200	10
King-fish	2,230	147	2,300	146				
Mullet, fresh	1,600	88	1,300	73				
Mullet, salted	800	40	500	25				
Perch, white	85,800	6,263	66,150	4,849	36,375	2,200	27,550	1,565
Perch, yellow					2,060	106	1,500	78
Pike and pickerel	75	6	50	4	500	30	375	23
Salmon					37	8	8	4
Scup	100	2	100	2				
Sea bass	700	14	700	14				
Shad	100	10	100	10	406,600	10,900	323,898	7,658
Sheepshead	9,000	1,670	6,000	1,080				
Spots	1,300	18	1,300	18				
Squeteague	349,200	10,937	374,500	11,705	3,000	150	3,000	150
Striped bass	27,435	3,169	17,715	2,086	12,373	1,489	11,662	1,310
Sturgeon					300	8	450	20
Suckers	200	5	200	5	44,431	2,173	45,952	2,173
Terrapin	1,103	626						
Total	612,102	27,298	620,045	24,340	1,127,941	24,051	545,214	15,921
Grand total	5,843,742	39,210	3,728,675	31,577	1,132,791	24,366	548,989	16,147

Table showing the yield of the seine fisheries of New Jersey, etc.—Continued.

Species.	Camden.				Cape May.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Alewives					7,000	$70	4,000	$40
Blue-fish					500	15		
Carp					2,300	69	914	27
Cat-fish					380	22	515	31
Croakers					1,500	30		
Flounders					500	15		
Perch, white					1,500	75	1,800	90
Scup					1,000	30		
Sea bass					2,000	60		
Squeteague					4,700	158	2,000	80
Striped bass					1,743	122	1,305	91
Suckers					500	15	600	18
Total					23,623	681	11,134	377
Shore fisheries:								
Alewives	490,200	$1,602	202,250	$823	61,500	1,222	61,850	1,312
Blue-fish					1,600	80	2,150	103
Butter-fish					3,300	150	3,250	150
Carp	38,913	2,303	12,300	780				
Cat-fish	18,664	933	17,391	869				
Drum					725	8	600	6
Eels					48,933	2,358	37,466	1,843
Flounders					19,150	696	18,476	693
King-fish					3,700	224	3,545	223
Mullet, fresh					19,325	398	21,600	452
Perch, white	1,500	67	1,223	53	18,695	1,492	18,910	1,501
Perch, yellow	1,125	58	780	40	650	39	570	34
Salmon	746	237						
Sea bass							285	10
Shad	532,200	15,988	256,080	5,196				
Spots					4,500	210	5,000	240
Squeteague					220,250	7,177	202,650	6,824
Striped bass	6,900	690	1,300	130	24,180	2,512	25,058	1,495
Sturgeon	1,000	25	450	12				
Suckers	11,330	591	9,426	495				
Total	1,102,578	22,494	501,200	8,348	426,508	16,566	401,409	14,886
Total vessel and shore	1,102,578	22,494	501,200	8,348	450,131	17,247	412,543	15,263

Species.	Cumberland.				Gloucester.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Carp					2,900	$125	1,400	$84
Cat-fish					1,845	92	2,000	100
Perch, white					145	7	100	5
Perch, yellow					300	15	250	12
Suckers					1,600	80	2,200	110
Total					6,790	319	5,950	311
Shore fisheries:								
Alewives	45,500	$265	61,600	$315	54,390	227	55,255	232
Carp	25,565	767	10,440	313	31,026	1,571	9,100	546
Cat-fish	18,054	973	21,225	1,135	9,396	474	11,660	596
Perch, white	12,692	609	12,832	611	289	13	475	20
Perch, yellow					625	31	660	33
Salmon					24	12		
Shad	7,800	430	10,500	575	158,920	4,809	214,450	4,970
Squeteague	44,530	1,966	42,840	1,718				
Striped bass	49,766	3,545	49,003	3,500	800	80	1,200	120
Sturgeon	1,050	15	700	10				
Suckers	5,840	210	5,043	185	5,434	242	6,131	276
Total	210,797	8,780	214,083	8,362	260,904	7,459	298,931	6,793
Total vessel and shore	210,797	8,780	214,083	8,362	267,694	7,778	304,881	7,104

Table showing the yield of the seine fisheries of New Jersey, etc.—Continued.

Species.	Middlesex.				Monmouth.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Flounders							450	$12
Menhaden					15,120,000	$37,950	12,720,000	34,226
Squeteague							400	8
Striped bass							4,000	280
Total					15,120,000	37,950	12,724,850	34,526
Shore fisheries:								
Alewives	48,000	$80	6,000	$12	8,112	66	10,112	81
Blue-fish	10,300	340	10,800	348	1,800	80	6,000	250
Bonito					200	8	100	4
Eels	2,666	160	666	40	5,000	200	15,666	700
Flounders	1,000	60	1,200	72	2,500	65	2,500	80
Menhaden	444,400	707	658,400	1,113	640,000	1,000	240,000	375
Perch, white	100	10	100	10	2,000	110	1,600	88
Shad	3,476	174	7,152	278	3,400	200	2,800	160
Squeteague	13,500	375	16,000	700	25,500	520	29,250	545
Striped bass	300	26	800	78	500	46	1,000	84
Suckers					1,000	30	3,000	115
Crabs, soft					12,000	900	18,000	1,350
Total	523,742	1,932	701,118	2,651	702,012	3,225	330,028	3,882
Total vessel and shore	523,742	1,932	701,118	2,651	15,822,012	41,175	13,054,878	38,358

Species.	Ocean.				Salem.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Menhaden	4,200,000	$7,000	1,920,000	$2,400				
Shore fisheries:								
Alewives	697,500	3,130	980,300	4,280	53,000	$253	60,000	$400
Blue-fish	4,100	160	1,100	40				
Carp					129,100	6,455	38,100	2,286
Cat-fish	500	45	1,000	75	27,261	1,362	32,914	1,646
Cod	50	2	40	2				
Eels			2,666	120				
Flounders	4,000	106	3,000	162				
Kingfish	20	5	40	10				
Menhaden	12,000	100	13,500	105				
Mullet, fresh			1,000	80				
Perch, white	265,275	15,107	317,240	17,713	1,525	61	1,720	68
Perch, yellow					1,000	40	800	32
Pike and pickerel	300	24	300	24				
Scup	2,700	72	200	2				
Sea bass	100	5	100	5				
Shad	1,400	95	1,400	95	66,900	2,175	80,550	2,299
Sheepshead	150	23						
Spots	2,300	92	2,300	92				
Squeteague	98,615	2,441	57,450	1,204				
Striped bass	46,760	7,644	49,950	8,126	24,100	2,410	23,300	2,330
Suckers	100	6	8,200	491	13,045	522	15,019	601
Tautog	100	5	100	5				
Crabs, hard	3,400	102	3,333	100				
Crabs, soft	40,757	4,134	45,901	4,695				
Terrapin	184	110						
Total	1,180,311	33,408	1,489,120	37,376	315,931	13,278	252,403	9,662
Total vessel and shore	5,380,311	40,408	3,409,120	39,776	315,931	13,278	252,403	9,662

Species.	Sussex.				Warren.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Scup							31	$6
Sheepshead	8,800	$660	6,800	$510	54,000	$3,867	50,120	3,526
Tautog					15,030	901	14,885	893
Total	8,800	660	6,800	510	69,030	4,768	65,036	4,425

Table showing the yield of the seine fisheries of New Jersey, etc.—Continued.

Species.	Hunterdon.				Mercer.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives					7,500	$55	6,000	$45
Carp	1,350	$25	1,088	$20	8,810	200	2,718	138
Cat-fish	150	6	210	8	7,715	389	8,232	463
Perch, white					800	32	600	24
Perch, yellow					200	8	250	10
Salmon	151	20			36	9	7	1
Shad	108,400	6,349	77,616	4,590	106,100	4,713	70,040	4,030
Striped bass	395	40	455	46	3,460	333	4,455	402
Sturgeon							60	4
Suckers	8,800	397	8,050	364	22,120	1,073	23,505	1,129
Total	119,246	6,837	87,419	5,028	151,741	6,812	115,867	6,246

SUMMARY.

Species.	1897.		1898.	
	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:				
Alewives	7,000	$70	4,000	$40
Blue-fish	500	15		
Carp	5,200	194	2,314	111
Cat-fish	2,225	114	2,516	131
Croakers	1,500	30		
Flounders	500	15	450	12
Menhaden	24,545,625	55,837	17,744,130	43,093
Perch, white	3,840	258	8,045	194
Perch, yellow	300	15	250	12
Scup	1,000	30		
Sea bass	2,000	60		
Squeteague	7,700	308	5,400	238
Striped bass	7,413	1,136	9,435	1,118
Suckers	2,100	95	2,800	128
Total	24,586,903	58,177	17,774,339	45,077
Shore fisheries:				
Alewives	2,000,402	8,750	1,551,147	7,922
Blue-fish	22,050	870	24,200	946
Bonito	200	8	100	4
Butter-fish	3,300	150	3,250	150
Carp	304,664	15,277	100,796	5,464
Cat-fish	108,305	5,418	118,301	5,976
Cod	50	2	40	2
Drum	1,725	18	1,600	16
Eels	95,598	4,617	102,064	4,852
Flounders	100,960	3,061	93,875	2,869
King-fish	5,950	376	5,885	379
Menhaden	1,096,400	1,807	911,900	1,593
Mullet, fresh	20,925	486	23,900	565
Mullet, salted	800	40	500	25
Perch, white	425,051	25,964	448,400	26,502
Perch, yellow	5,660	282	4,560	227
Pike and pickerel	875	60	725	51
Salmon	994	286	46	11
Scup	2,800	74	300	4
Sea bass	800	19	1,085	29
Shad	1,458,096	50,870	1,101,506	33,897
Sheepshead	9,150	1,693	6,000	1,080
Spots	8,100	320	8,600	350
Squeteague	754,595	23,566	725,690	22,846
Striped bass	196,969	21,984	185,798	19,707
Sturgeon	2,350	48	1,660	46
Suckers	127,330	6,150	139,411	6,727
Tautog	100	5	100	5
Crabs, hard	3,400	102	3,333	100
Crabs, soft	52,757	5,034	63,901	6,045
Terrapin	1,287	736		
Total	6,811,643	177,568	5,628,673	148,380
Total vessel and shore	31,398,546	235,745	23,403,012	193,457

Table showing, by counties, the yield of the gill-net fisheries of New Jersey in 1897 and 1898.

Species.	Atlantic.				Bergen.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	1,400	$13	2,900	$35	.....	.....	.....	.....
Blue-fish	3,800	190	3,800	190	.....	.....	.....	.....
Cat-fish	500	35	600	38	.....	.....	.....	.....
Flounders	6,400	128	3,200	64	.....	.....	.....	.....
King-fish	250	13	250	13	.....	.....	.....	.....
Perch, white	36,350	2,933	28,750	2,401	.....	.....	.....	.....
Pike and pickerel	435	17	435	17	.....	.....	.....	.....
Shad	750	55	.....	.....	460,800	$17,934	519,420	$18,510
Spots	250	4	250	4	.....	.....	.....	.....
Squeteague	20,300	438	20,400	456	.....	.....	.....	.....
Striped bass	2,335	847	1,190	172	11,000	970	21,750	1,895
Suckers	900	27	1,900	72	.....	.....	.....	.....
Tautog	100	2	100	2	.....	.....	.....	.....
Total	73,770	4,202	63,775	3,464	471,800	18,904	541,170	20,405

Species.	Burlington.				Camden.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Perch, white	1,000	$50	1,000	$50	.....	.....	.....	.....
Salmon	11	4	23	8	48	$27	.....	.....
Shad	757,960	18,862	634,050	13,856	872,315	17,446	758,250	$12,132
Squeteague	4,200	210	9,300	465	.....	.....	.....	.....
Sturgeon	15,660	819	7,840	439	.....	.....	.....	.....
Suckers	10,600	424	11,400	456	.....	.....	.....	.....
Caviar	6,060	2,290	2,625	1,687	.....	.....	.....	.....
Total	795,491	22,659	665,738	16,961	872,363	17,473	758,250	12,132

Species.	Gloucester.				Hudson.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Carp	2,200	$110	1,800	$108	.....	.....	.....	.....
Shad	1,310,000	28,380	1,357,000	25,448	448,800	$15,820	467,600	$15,938
Total	1,312,200	28,490	1,358,800	25,556	448,800	15,820	467,600	15,938

Species.	Middlesex.				Monmouth.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	.....	.....	.....	.....	.....	.....	200	$10
Butter-fish	.....	.....	.....	.....	.....	.....	400	32
Cod	.....	.....	.....	.....	.....	.....	250	10
Croakers	.....	.....	.....	.....	.....	.....	5,000	50
Shad	.....	.....	.....	.....	9,500	$360	12,000	390
Squeteague	.....	.....	.....	.....	.....	.....	6,000	120
Total	.....	.....	.....	.....	9,500	360	23,850	612
Shore fisheries:								
Blue-fish	.....	.....	.....	.....	119,700	3,660	70,000	2,190
Bonito	.....	.....	.....	.....	1,100	33	1,100	33
Croakers	.....	.....	.....	.....	3,000	60	2,800	56
Flounders	.....	.....	.....	.....	800	16	700	14
Shad	1,200	$60	1,200	$60	71,600	4,440	45,600	2,863
Spanish mackerel	.....	.....	.....	.....	11,000	1,350	6,000	750
Squeteague	.....	.....	.....	.....	25,500	510	26,000	520
Sturgeon	.....	.....	.....	.....	.....	.....	6,750	405
Caviar	.....	.....	.....	.....	.....	.....	770	308
Total	1,200	60	1,200	60	232,700	10,069	159,720	7,189
Total vessel and shore	1,200	60	1,200	60	242,200	10,429	183,570	7,751

Table showing the yield of the gill-net fisheries of New Jersey in 1897 and 1898—Continued.

Species.	Cape May.				Cumberland.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	1,200	$24	1,200	$24	1,200	$12	2,100	$21
Blue-fish	80	5	800	8				
Butter-fish	100	5						
Croakers			800	12				
Drum	10,000	100	10,000	100				
King-fish			50	2				
Perch, white	2,600	234	2,600	234	2,700	135	3,000	150
Salmon							22	10
Shad					585,430	17,079	657,800	16,575
Squeteague	1,200	40			6,300	252	5,000	200
Striped bass					9,950	793	11,100	844
Sturgeon	31,750	1,587	15,210	696	242,875	6,225	314,383	5,078
Caviar	7,020	2,844	2,340	1,482	63,760	21,253	47,723	26,517
Total	53,950	4,839	32,500	2,558	912,215	45,749	1,041,128	49,395

Species.	Mercer.				Salem.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Carp					5,900	$295	4,000	$240
Salmon	11	$3			117	53		
Shad	205,500	7,418	172,000	$8,600	6,369,500	145,875	6,759,000	131,095
Striped bass					50	5	150	15
Sturgeon					495,806	16,568	853,858	13,641
Caviar					122,715	40,905	94,196	48,862
Total	205,511	7,421	172,000	8,600	6,994,088	203,701	7,211,204	193,853

Species.	Ocean.				Total for State.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish							200	$10
Butter-fish							400	32
Cod							250	10
Croakers							5,000	50
Shad	8,000	$350	8,000	$350	17,500	$710	20,000	740
Squeteague							6,000	120
Sturgeon	3,400	188	1,600	80	3,400	188	1,600	80
Caviar			945	525			945	525
Total	11,400	538	10,545	955	20,900	898	34,395	1,567
Shore fisheries:								
Alewives	15,600	120	30,600	305	19,400	169	36,800	385
Blue-fish	189,820	9,022	168,165	8,523	312,900	12,877	242,265	10,911
Bonito	2,200	54	500	19	3,300	87	1,600	52
Butter-fish	500	15	700	19	600	20	700	19
Carp					8,100	405	5,800	348
Cat-fish					500	35	600	38
Cod	2,500	38	100	2	2,500	38	100	2
Croakers	5,700	114	4,340	84	8,700	174	7,940	152
Drum					10,000	100	10,000	100
Flounders	200	10	500	13	7,400	154	4,400	91
King-fish	85	13	85	13	335	26	885	28
Menhaden			4,000	25			4,000	25
Perch, white	36,825	2,973	62,347	4,983	79,475	6,325	97,697	7,818
Pike and pickerel	1,460	75	1,400	82	1,895	92	1,835	99
Salmon					187	87	45	18
Scup			300	9			300	9
Sea bass	5,000	87	2,500	87	5,000	87	2,500	87
Shad	60,400	3,450	55,300	3,050	11,144,255	276,819	11,427,220	248,127
Spanish mackerel	1,650	254	5,225	694	12,660	1,604	11,225	1,444
Spots					250	4	250	4
Squeteague	155,800	3,691	135,450	3,251	213,300	5,141	196,150	4,892
Striped bass	1,560	231	1,300	210	24,895	2,346	35,490	3,136
Sturgeon	50	3			786,141	25,202	697,541	20,259
Suckers	1,200	24			12,700	475	13,300	528
Tautog					100	2	100	2
Caviar					199,555	67,292	147,654	78,856
Total	480,050	20,174	472,812	21,369	12,854,138	399,561	12,945,897	377,430
Grand total	491,450	20,712	483,357	22,324	12,875,038	400,459	12,980,292	378,997

Table showing the yield of the stop-net fisheries of New Jersey in 1897 and 1898.

Species.	Atlantic.				Camden.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Carp					34,645	$2,079	13,188	$791
Perch, white	665	$40						
Striped bass	445	80						
Total	1,110	120			34,645	2,079	13,188	791

Species.	Cape May.				Cumberland.				Gloucester.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Vessel fisheries:												
Carp	8,000	$240	2,000	$60					8,100	$405	4,200	$252
Shore fisheries:												
Carp					15,500	$530	6,085	$204	134,700	6,915	56,300	3,378
Total vessel and shore	8,000	240	2,000	60	15,500	530	6,085	204	142,800	7,320	60,500	3,630

Species.	Salem.				Total.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Carp					16,100	$645	6,200	$312
Shore fisheries:								
Carp	199,800	$9,990	43,600	$2,574	384,645	19,514	119,173	6,947
Cat-fish	6,600	330	4,000	200	6,600	330	4,000	200
Perch, white	200	8	300	12	865	48	300	12
Striped bass					445	80		
Total	206,600	10,328	47,900	2,786	392,555	19,972	123,473	7,159
Total vessel and shore	206,600	10,328	47,900	2,786	408,655	20,617	129,673	7,471

Table showing the yield of the pound-net and weir fisheries of New Jersey in 1897 and 1898.

Species.	Atlantic.				Cape May.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Albacore					4,000	$80	4,000	$80
Blue-fish	100	$5	100	$5	8,283	339	8,320	342
Butter-fish	10,000	500	10,000	500	41,257	1,482	38,617	1,350
Cod	12,000	180	9,000	180	8,000	160	8,000	160
Croakers					12,000	240	12,000	240
Drum	200	2	200	2	2,575	38	3,100	30
Eels	1,000	30	1,000	30	11,066	581	6,266	329
Flounders	15,000	300	11,200	224	14,500	385	10,800	301
Hake					5,100	210	3,400	108
Hickory shad					2,000	160	2,000	160
King-fish	6,000	300	6,000	300	4,617	655	4,434	635
Menhaden					306,000	808	80,000	538
Mullet					250	5	100	2
Perch, white	1,500	120	1,000	80	7,800	544	5,010	327
Pompano					40	10	40	10
Scup					40,000	1,200	40,000	1,200
Shad	150	9	100	5	3,882	174	3,480	154
Sheepshead	100	10	80	8	2,000	400	2,000	400
Spanish mackerel					3,000	600	2,400	480
Spots					8,550	186	8,600	190
Squeteague	80,000	900	112,000	1,000	479,168	10,172	585,335	12,200
Striped bass	3,000	300	2,000	200	21,280	2,127	14,300	1,435
Sturgeon					1,500	60	1,500	60
Tautog					400	12	400	12
Crabs, hard					29,587	868	31,096	920
King crabs					926,800	3,912	906,190	3,873
Total	129,050	2,656	152,680	2,534	1,943,605	25,408	1,781,888	25,536

Table showing the yield of the pound-net and weir fisheries of New Jersey in 1897 and 1898—Continued.

Species.	Middlesex.				Ocean.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Albacore					1,000	$10		
Blue-fish					2,000	60	20,000	$1,000
Bonito					8,000	240	30,000	750
Butter-fish					9,000	180	40,000	2,000
Cero					150	6	500	20
Cod					1,000	30	20,000	400
Croakers					6,000	120	6,000	120
Flounders					15,000	300	25,000	500
King-fish					250	29	400	48
Menhaden	120,000	$200			21,000	88		
Scup					12,000	229	10,000	200
Sea bass					9,000	160	1,000	30
Shad					1,600	58	1,200	45
Sheepshead					50	6	120	18
Spanish mackerel					5,500	550	3,000	750
Spots					100	1	500	20
Squeteague	2,000	100			550,000	7,750	270,000	4,050
Sturgeon					700	30	1,000	70
Tautog					500	7		
Caviar							100	45
Total	122,000	300			642,850	9,854	428,820	10,066

Species.	Monmouth.				Total.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Albacore	7,150	$134	9,750	$157	12,150	$224	13,750	$287
Alewives	26,000	520	16,250	325	26,000	520	16,250	325
Blue-fish	61,100	2,107	66,470	2,238	71,483	2,511	94,890	3,580
Bonito	270,000	6,970	245,722	6,152	278,000	7,210	275,722	6,902
Butter-fish	152,900	3,535	169,660	4,029	213,157	5,697	258,277	7,879
Cero	4,950	154	5,170	159	5,100	160	5,670	179
Cod	1,170,000	14,425	243,000	4,850	1,191,000	14,795	280,000	5,590
Croakers	57,800	1,114	128,010	2,250	76,800	1,474	141,010	2,610
Drum	2,500	28	2,044	21	5,275	68	5,344	53
Eels	300	11	230	6	12,366	622	7,496	365
Flounders	435,600	7,982	490,800	9,505	480,100	8,967	537,800	10,530
Haddock	100	3	100	3	100	3	100	3
Hake	14,600	161	15,442	173	19,700	371	18,842	281
Hickory shad	1,719	69	1,500	60	3,719	229	3,500	220
King-fish	6,530	842	5,988	781	17,397	1,826	16,822	1,764
Mackerel	24,300	1,628	16,480	1,322	24,300	1,628	16,480	1,322
Menhaden	4,446,300	11,283	3,425,500	8,427	4,893,300	12,379	3,505,500	8,965
Mullet			2,500	50	250	5	2,600	52
Perch, white					9,300	664	6,010	407
Pollock	300	9	300	9	300	9	300	9
Pompano					40	10	40	10
Salmon	1,021	358	1,025	360	1,021	358	1,025	360
Scup	499,100	7,002	289,150	4,626	551,100	8,431	339,150	6,026
Sea bass	328,400	5,958	186,468	3,577	337,400	6,118	187,468	3,607
Shad	82,672	3,988	63,100	3,003	88,304	4,229	67,880	3,207
Sheepshead	7,050	867	7,265	910	9,200	1,283	9,465	1,336
Skates	7,650	191	6,750	169	7,650	191	6,750	169
Spanish mackerel	85,500	8,637	61,800	6,347	94,000	9,787	66,700	7,577
Spots	2,300	48	3,000	96	10,950	230	12,100	306
Squeteague	5,400,019	95,427	6,161,953	116,307	6,511,187	114,349	7,129,288	133,557
Striped bass					24,230	2,427	16,300	1,635
Sturgeon	19,358	936	15,723	758	21,558	1,026	18,223	888
Tautog	59,400	1,163	70,348	1,380	60,300	1,182	70,748	1,392
Tomcod or frost-fish	1,000	5	1,350	7	1,000	5	1,350	7
Crabs, hard					29,587	868	31,096	920
King crabs					926,800	8,912	906,190	3,873
Caviar	600	300	603	267	600	300	703	312
Total	18,176,219	175,850	11,707,951	178,319	16,013,724	214,068	14,070,889	216,455

Table showing, by counties, the yield of the fyke-net fisheries of New Jersey in 1897 and 1898.

Species.	Atlantic.				Burlington.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Perch, white	1,500	$90	4,100	$246	3,930	$255	2,045	$132
Striped bass	1,500	225	130	20	620	84	315	42
Total	3,000	315	4,230	266	4,550	339	2,360	174
Shore fisheries:								
Cat-fish			200	10	22,305	999	23,957	1,070
Eels			267	10	24,999	1,838	24,373	1,276
Flounders					680	34	700	35
Perch, white	22,735	988	19,980	886	37,085	2,462	32,365	2,025
Striped bass	6,765	807	3,172	352	8,007	1,141	5,578	790
Turtles	600	36	1,000	60				
Total	30,100	1,831	24,619	1,318	93,076	5,974	86,973	5,196
Total vessel and shore	33,100	2,146	28,849	1,584	97,626	6,313	89,333	5,370

Species.	Gloucester.				Hudson.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Cat-fish	29,100	$1,538	26,733	$1,408				
Eels	22,177	1,331	23,866	1,432	1,000	$85	2,333	$170
Shad					286,000	10,405	222,900	6,905
Striped bass					1,450	168	990	105
Total	51,277	2,869	50,599	2,840	288,450	10,653	226,223	7,180

Species.	Mercer.				Middlesex.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Cat-fish	21,915	$1,007	22,432	$1,196				
Eels	15,756	945	16,946	1,017				
Flounders					2,000	$100	2,000	$100
Perch, white							2,000	100
Shad					6,500	390	4,750	285
Squeteague					300	18	500	30
Striped bass					1,000	60	1,200	96
Crabs, hard							1,200	45
Total	37,671	1,952	39,378	2,213	9,800	568	11,650	656

Species.	Cape May.				Ocean.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Cat-fish	2,700	$162	3,200	$192				
Eels	2,533	95	2,000	75				
Total	5,233	257	5,200	267				
Shore fisheries:								
Alewives							750	$15
Cat-fish	125	10	100	8				
Eels	7,466	656	18,666	1,012				
Flounders	1,100	55	1,400	64	74,400	$3,045	89,040	3,977
Perch, white	1,085	70	4,335	330	5,155	368	5,945	408
Striped bass	3,200	320	6,650	665	1,625	175	1,495	162
Total	12,976	1,111	31,151	2,079	81,180	3,588	97,280	4,562
Total vessel and shore	18,209	1,368	36,351	2,346	81,180	3,588	97,280	4,562

Table showing the yield of the fyke-net fisheries of New Jersey in 1897 and 1898—Cont'd.

Species.	Camden.				Cumberland.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Cat-fish	2,400	$120	4,900	$245	20,300	$1,110	17,945	$976
Eels	12,400	744	10,132	608	7,733	324	6,100	352
Turtles					2,700	216	2,100	168
Total	14,800	864	15,032	853	30,733	1,650	26,145	1,496

Species.	Monmouth.				Total.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Cat-fish					2,700	$162	3,200	$192
Eels					2,533	95	2,000	75
Flounders	16,000	$640	8,000	$480	16,000	640	8,000	480
Perch, white					5,430	345	6,145	378
Striped bass					2,120	309	445	62
Total	16,000	640	8,000	480	28,783	1,551	19,790	1,187
Shore fisheries:								
Alewives	1,000	20	1,000	20	1,000	20	1,750	35
Blue-fish	1,300	65	1,400	70	1,300	65	1,400	70
Cat-fish					96,145	4,784	96,267	4,913
Eels	52,900	2,578	55,000	2,605	144,431	8,001	157,683	8,482
Flounders	50,975	1,901	57,675	2,407	129,155	5,135	150,815	6,583
King-fish	120	22	120	27	120	22	120	27
Menhaden	17,500	33	28,000	50	17,500	33	28,000	50
Mullet	100	6	1,000	60	100	6	1,000	60
Perch, white	5,450	357	4,350	275	71,510	4,245	68,975	4,024
Scup			1,000	15			1,000	15
Shad	128	8	176	12	292,628	10,803	227,826	7,202
Squeteague	16,600	350	19,500	405	16,900	368	20,000	435
Striped bass	3,800	405	2,800	299	25,847	3,071	21,885	2,469
Tautog	25,800	514	27,600	532	25,800	514	27,600	532
Tomcod or frost-fish	650	9	600	8	650	9	600	8
Whiting	4,000	50	3,100	47	4,000	50	3,100	47
Crabs, hard							1,200	45
Turtles					3,300	252	3,100	228
Total	180,323	6,318	203,321	6,832	830,386	37,378	812,821	35,225
Total vessel and shore	196,323	6,958	211,321	7,312	859,169	38,929	832,111	36,412

Table showing, by counties, the yield of the line fisheries of New Jersey in 1897 and 1898.

Species.	Middlesex.				Burlington.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Blue-fish	2,000	$100	2,000	$100				
Perch, white					500	$25	500	$25
Squeteague, fresh					3,500	175	3,500	175
Total	2,000	100	2,000	100	4,000	200	4,000	200

Table showing the yield of the line fisheries of New Jersey in 1897 and 1898—Continued.

Species.	Atlantic.				Monmouth.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	29,800	$1,241	36,400	$1,509	1,000	$50		
Cod	753,000	24,850	722,000	27,350				
Croakers	10,100	149	12,370	185				
Flounders	24,550	734	25,020	723				
Haddock	9,525	667	9,825	602				
Hake	6,700	278	6,900	287				
King-fish	1,100	44	1,125	45				
Scup	24,200	561	31,000	717				
Sea bass	213,000	8,185	242,300	9,307	12,000	360	4,000	$100
Sheepshead	4,100	788	5,100	918				
Squeteague	44,500	1,191	47,125	1,261				
Total	1,120,575	38,538	1,139,165	42,904	13,000	410	4,000	100
Shore fisheries:								
Blue-fish	98,250	4,137	99,250	4,194	4,079,500	107,235	4,019,000	120,795
Bonito					65,500	2,000	85,500	2,595
Cod	291,500	8,738	271,500	8,138	1,052,000	18,195	956,950	30,060
Croakers	30,500	432	27,500	430				
Drum	2,200	22	2,200	22				
Eels	4,266	164	4,533	176	2,000	60	3,000	90
Flounders	143,350	3,467	140,400	3,488	241,100	4,822	263,500	5,270
Haddock	2,000	120	2,000	120	154,300	2,344	214,300	6,544
Hake	3,000	120	3,000	120	26,700	485	41,500	990
King-fish	11,700	582	11,925	595				
Scup	30,700	582	30,850	591	15,200	404	26,000	770
Sea bass	155,350	6,260	141,300	5,717	657,200	26,398	712,150	27,489
Sheepshead	26,535	4,743	21,600	3,856				
Skates					4,000	100	6,000	150
Spanish mackerel					100	10	100	10
Spots	200	8	200	8				
Squeteague, fresh	661,700	21,185	724,200	23,315	32,300	846	36,500	940
Tautog	600	30	600	30	202,500	3,780	215,600	4,068
Crabs, hard	64,000	2,500	64,000	2,500				
Total	1,525,851	53,090	1,545,058	53,300	6,532,400	165,679	6,580,100	199,771
Total vessel and shore	2,646,426	91,628	2,684,223	96,204	6,545,400	166,089	6,584,100	199,871

Species.	Cumberland.				Hunterdon.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Croakers			6,000	$150				
Scup			200	5				
Sea bass			3,000	120				
Squeteague			5,000	150				
Total			14,200	425				
Shore fisheries:								
Black bass					150	$12	100	$8
Cat-fish					400	20	300	15
Eels					133	10	133	10
Squeteague, fresh	29,500	$1,235	26,100	1,125				
Striped bass					800	80	1,600	160
Total	29,500	1,235	26,100	1,125	1,483	122	2,133	193
Total vessel and shore	29,500	1,235	40,300	1,550	1,483	122	2,133	193

Table showing the yield of the line fisheries of New Jersey in 1897 and 1898—Continued.

Species.	Camden.				Cape May.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	7,500	$300	6,000	$240	3,650	$110	1,840	$55
Cod					10,300	258	600	16
Croakers					15,300	306	16,700	334
Drum					600	6	800	8
Flounders	5,200	130	5,000	125	3,200	96	2,725	87
King-fish					75	19	90	22
Scup	6,000	150	7,200	180	5,650	170	9,165	275
Sea bass	120,000	4,800	112,000	4,480	33,765	957	33,665	1,010
Sheepshead							20	3
Squeteague					20,000	400	21,700	434
Total	138,700	5,380	130,200	5,025	92,540	2,322	87,305	2,244
Shore fisheries:								
Albacore					1,970	70	2,800	96
Blue-fish					230,075	10,442	314,840	14,365
Bonito					3,700	165	4,700	209
Cat-fish	4,100	205	3,000	150				
Cod					152,540	3,716	199,850	5,330
Croakers					138,900	2,456	195,800	3,464
Drum					63,100	628	62,700	628
Eels	1,066	64	1,466	88	2,100	103	3,333	176
Flounders					32,060	864	47,400	1,284
Hake					11,835	248	20,800	407
King-fish					6,000	821	7,300	1,025
Perch, white	346	14	300	12				
Scup					120,000	3,398	174,500	4,928
Sea bass					432,600	16,528	549,000	20,880
Sheepshead					450	68	500	75
Spanish mackerel					1,280	138	5,100	695
Spots					1,200	120	1,200	120
Squeteague, fresh					279,350	7,174	349,600	8,859
Squeteague, salted					16,700	961	16,650	957
Striped bass	2,100	210	1,600	160	100	10	150	15
Tomcod or frost-fish					200	6	200	6
Total	7,612	493	6,366	410	1,494,160	47,916	1,956,428	63,513
Total vessel and shore	146,312	5,873	136,566	5,435	1,586,700	50,238	2,043,728	65,757

Species.	Ocean.				Salem.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Squeteague					9,900	$558	12,500	$706
Shore fisheries:								
Blue-fish	304,165	$8,304	234,800	$6,845				
Bonito	8,000	135	9,200	181				
Cod	29,000	616	151,700	5,876				
Flounders	42,150	933	54,850	1,117				
Haddock	1,450	26	13,825	537				
Hake	1,800	36	7,000	274				
King-fish	350	50	350	50				
Perch, white	600	36	150	9				
Scup	800	16	2,500	52				
Sea bass	162,365	5,509	201,065	7,063				
Sheepshead	400	40	50	5				
Squeteague, fresh	59,800	2,517	60,700	2,563	18,000	1,005	15,000	841
Squeteague, salted	200	10	100	5				
Striped bass	2,270	325	1,650	233				
Turtles	1,650	114	1,650	114				
Total	615,000	18,067	739,090	24,924	18,000	1,005	15,000	841
Total vessel and shore	615,000	18,667	739,090	24,924	27,900	1,563	27,500	1,547

Summary of the yield of the line fisheries of New Jersey in 1897 and 1898.

Species.	1897.		1898.	
	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:				
Blue-fish	41,950	$1,701	44,240	$1,804
Cod	763,300	25,108	722,600	27,366
Croakers	25,400	455	35,070	669
Drum	600	6	800	8
Flounders	32,950	960	32,745	935
Haddock	9,525	567	9,825	602
Hake	6,700	278	6,900	287
King-fish	1,175	63	1,215	67
Scup	35,850	881	47,565	1,177
Sea bass	378,765	14,302	394,965	15,017
Sheepshead	4,100	738	5,120	921
Squeteague	74,400	2,149	86,325	2,551
Total	1,374,715	47,208	1,387,370	51,404
Shore fisheries:				
Albacore	1,970	70	2,800	96
Black bass	150	12	100	8
Blue-fish	4,713,990	130,218	4,669,890	146,299
Bonito	77,200	2,800	99,400	2,985
Cat-fish	4,500	225	3,300	165
Cod	1,525,040	31,265	1,580,000	49,404
Croakers	169,400	2,888	223,300	3,894
Drum	65,300	650	64,900	645
Eels	9,565	401	12,4[illegible]	539
Flounders	458,660	10,086	505,65[illegible]	11,159
Haddock	157,750	2,490	230,125	7,201
Hake	43,335	889	72,300	1,791
King-fish	18,050	1,453	19,575	1,670
Perch, white	1,446	75	950	46
Scup	166,700	4,400	233,850	6,341
Sea bass	1,407,515	53,695	1,603,515	61,149
Sheepshead	27,385	4,851	22,150	3,936
Skates	4,000	100	6,000	150
Spanish mackerel	1,380	148	5,200	705
Spots	1,400	128	1,400	128
Squeteague, fresh	1,084,150	34,137	1,215,600	37,818
Squeteague, salted	16,900	971	16,750	962
Striped bass	5,270	625	5,000	568
Tautog	203,100	8,810	216,200	4,098
Tomcod or frost-fish	200	6	200	6
Crabs, hard	64,000	2,500	64,000	2,500
Turtles	1,650	114	1,650	114
Total	10,230,006	288,507	10,876,270	344,377
Total vessel and shore	11,604,721	335,715	12,263,640	395,781

Table showing the catch of eels and lobsters by pots in New Jersey in 1897 and 1898.

Counties.	Vessel fisheries.				Shore fisheries.				Total.	
	Eels.		Lobsters.		Eels.		Lobsters.		Lbs.	Value.
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.		
1897.										
Atlantic					8,800	$352			8,800	$352
Bergen					10,666	775			10,666	775
Cape May	20,000	$600			1,866	56			21,866	656
Hudson			5,000	$400	4,000	200	26,200	$1,790	35,200	2,390
Middlesex					11,733	704			11,733	704
Monmouth					136,266	7,200	63,600	6,004	199,866	13,204
Ocean	4,000	120			120,050	4,398	4,430	379	128,480	4,897
Total	24,000	720	5,000	400	293,381	13,685	94,230	8,173	416,611	22,978
1898.										
Atlantic					8,666	345			8,666	345
Bergen					18,066	991			18,066	991
Cape May	17,333	650			1,866	56			19,199	706
Hudson			10,000	800	6,000	300	31,250	2,540	47,250	3,640
Middlesex					15,067	910			15,067	910
Monmouth					143,333	7,494	79,500	7,615	222,833	15,109
Ocean	6,667	240			187,883	5,088	8,126	142	147,676	5,465
Total	24,000	890	10,000	800	380,881	15,179	118,876	10,297	478,757	27,166

Table showing the catch by dredges, tongs, rakes, etc., in New Jersey in 1897 and 1898.

Species.	Atlantic.				Burlington.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Oysters, market	35,840	$4,139	39,970	$4,507	2,800	$320	2,800	$320
Oysters, seed	41,755	1,836	39,410	1,801	.....	.....	.....	.....
Clams, hard	56,947	5,806	53,300	5,622	.....	.....	.....	.....
Total	134,542	11,781	132,680	11,930	2,800	320	2,800	320
Shore fisheries:								
Crabs, hard	10,000	150	10,000	150	.....	.....	.....	.....
Oysters, market	1,195,005	183,727	1,157,310	178,335	183,610	20,654	162,750	18,321
Oysters, seed	308,700	12,718	285,425	13,395	24,500	1,200	24,500	1,200
Clams, hard	856,720	90,202	796,816	87,087	81,700	7,821	76,200	7,294
Mussels	2,520,000	1,575	2,360,000	1,475	.....	.....	.....	.....
Total	4,890,425	288,372	4,609,551	280,442	289,810	29,675	263,450	26,815
Total vessel and shore	5,024,967	300,153	4,742,231	292,372	292,610	29,995	266,250	27,135

Species.	Camden.				Cape May.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Oysters, market	409,626	$71,958	637,903	$85,462	108,031	$18,725	152,215	$22,124
Oysters, seed	777,700	11,346	686,238	29,410	221,900	4,471	19,775	860
Clams, hard	.....	.....	.....	.....	3,022	262	2,844	200
Total	1,187,326	83,304	1,324,141	114,872	332,953	23,458	174,834	23,184
Shore fisheries:								
Oysters, market	.....	.....	.....	.....	354,585	48,181	353,766	49,501
Clams, soft	.....	.....	.....	.....	698,240	58,639	613,153	51,949
Total	.....	.....	.....	.....	1,052,825	106,820	966,919	101,450
Total vessel and shore	1,187,326	83,304	1,324,141	114,872	1,385,778	130,278	1,141,753	124,634

Species.	Cumberland.				Hudson.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Crabs, hard	.....	.....	.....	.....	26,667	$800	.....	.....
Oysters, market	3,710,056	$641,037	3,978,345	$578,261	385,000	28,750	420,000	$32,500
Oysters, seed	8,564,990	128,744	4,677,302	200,555	38,500	1,650	42,000	3,000
Clams, hard	2,000	250	600	75	.....	.....	.....	.....
Total	12,277,046	770,031	8,656,247	778,891	450,167	31,200	462,000	35,500
Shore fisheries:								
Oysters, market	77,840	13,208	59,437	8,166	.....	.....	.....	.....
Oysters, seed	579,320	18,397	502,082	19,195	122,500	7,000	350,000	20,000
Total	657,160	31,605	561,519	27,361	122,500	7,000	350,000	20,000
Total vessel and shore	12,934,206	801,636	9,217,766	806,252	572,667	38,200	812,000	55,500

Table showing the catch by dredges, tongs, rakes, etc., in New Jersey in 1897 and 1898— Continued.

Species.	Middlesex.				Monmouth.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Crabs, hard	.....	.....	.....	.....	169,667	$4,070	374,090	$9,091
Oysters, market	.....	.....	.....	.....	319,900	40,100	215,670	29,492
Oysters, seed	1,400	$80	.....	.....	.....	.....	2,800	160
Clams, hard	800	80	13,280	$1,460	706,544	87,185	647,232	80,266
Scallops	5,400	300	5,400	300	66,600	3,700	50,400	2,800
Mussels	.....	.....	.....	.....	.....	.....	5,000	250
Total	7,600	460	18,680	1,760	1,262,711	135,055	1,295,192	122,059
Shore fisheries:								
Oysters, market	151,480	21,758	326,550	45,298	999,509	145,990	819,203	117,572
Oysters, seed	379,300	20,435	559,720	30,036	.....	.....	.....	.....
Clams, hard	12,016	1,640	12,200	1,650	1,436,344	203,469	1,421,136	202,082
Clams, soft	.....	.....	.....	.....	703,000	61,625	755,000	64,345
Total	542,796	43,833	898,470	76,984	3,138,853	411,084	2,995,339	383,999
Total vessel and shore	550,396	44,293	917,150	78,744	4,401,564	546,139	4,290,531	506,058

Species.	Ocean.				Salem.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Oysters, market	.....	.....	.....	.....	.....	.....	2,912	$500
Clams, hard	22,440	$2,345	24,040	$2,470	.....	.....	.....	.....
Total	22,440	2,345	24,040	2,470	.....	.....	2,912	500
Shore fisheries:								
Crabs, hard	129,101	3,283	34,066	520	.....	.....	.....	.....
Oysters, market	1,612,079	214,822	1,065,316	139,052	.....	.....	.....	.....
Oysters, seed	236,915	9,769	256,340	10,301	.....	.....	.....	.....
Clams, hard	853,404	86,096	834,272	84,184	.....	.....	.....	.....
Clams, soft	42,000	2,100	40,000	2,000	.....	.....	.....	.....
Total	2,873,499	316,040	2,229,994	236,057	.....	.....	.....	.....
Total vessel and shore	2,895,939	318,385	2,254,034	238,527	.....	.....	2,912	500

Species.	Union.				Total for State.			
	1897.		1898.		1897.		1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Crabs, hard	.....	.....	.....	.....	196,334	$4,870	374,090	$9,091
Oysters, market	.....	.....	.....	.....	4,971,253	805,029	5,449,815	753,166
Oysters, seed	.....	.....	.....	.....	9,646,245	148,127	5,467,525	235,786
Clams, hard	.....	.....	.....	.....	791,753	95,928	741,296	90,093
Scallops	.....	.....	.....	.....	72,000	4,000	55,800	3,100
Mussels	.....	.....	.....	.....	.....	.....	5,000	250
Total	.....	.....	.....	.....	15,677,585	1,057,954	12,093,526	1,091,486
Shore fisheries:								
Crabs, hard	.....	.....	.....	.....	139,101	3,403	44,066	670
Oysters, market	.....	.....	.....	.....	4,574,108	648,340	3,944,332	556,245
Oysters, seed	192,500	$11,000	525,000	$30,000	1,843,735	80,519	2,503,067	124,127
Clams, hard	.....	.....	.....	.....	3,938,424	447,867	3,753,777	434,248
Clams, soft	.....	.....	.....	.....	745,000	63,725	795,000	66,345
Mussels	.....	.....	.....	.....	2,520,000	1,575	2,360,000	1,475
Total	192,500	11,000	525,000	30,000	13,760,368	1,245,429	13,400,242	1,183,108
Total vessel and shore	192,500	11,000	525,000	30,000	29,437,953	2,303,383	25,493,768	2,274,594

Table showing the catch by minor apparatus in New Jersey in 1897 and 1898.

Species.	Atlantic.				Burlington.				Cape May.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Eels	106,066	$4,500	100,400	$4,265	.....	.....	.....	.....	10,400	$544	10,000	$515
Crabs, hard	80,000	2,000	80,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....
Crabs, soft	6,000	775	6,000	775	.....	.....	.....	.....	.....	.....	.....	.....
King crabs	.....	.....	.....	.....	.....	.....	.....	.....	50,000	213	40,000	180
Shrimp	600	200	600	200	.....	.....	.....	.....	.....	.....	.....	.....
Terrapin	.....	.....	.....	.....	2,431	$309	.....	.....	7,613	3,820	.....	.....
Turtles	.....	.....	.....	.....	400	34	.....	.....	1,500	75	1,200	60
Total	192,666	7,475	187,000	7,240	2,831	343	.....	.....	69,513	4,652	51,200	755

Species.	Cumberland.				Gloucester.				Monmouth.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Carp	.....	.....	.....	.....	10,400	$520	2,000	$120	.....	.....	.....	.....
Eels	.....	.....	.....	.....	.....	.....	.....	.....	20,266	$1,100	22,500	$1,620
Crabs, hard	.....	.....	.....	.....	.....	.....	.....	.....	18,800	564	14,000	420
Crabs, soft	.....	.....	.....	.....	.....	.....	.....	.....	168,000	16,175	178,000	16,600
King crabs	148,000	$370	116,000	$290	.....	.....	.....	.....	.....	.....	.....	.....
Total	148,000	370	116,000	290	10,400	520	2,000	120	207,066	17,839	214,500	18,640

Species.	Ocean.				Salem.				Warren.			
	1897.		1898.		1897.		1898.		1897.		1898.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Carp	.....	.....	.....	.....	56,300	$2,815	9,700	$582	.....	.....	.....	.....
Cat-fish	.....	.....	.....	.....	1,010	51	1,465	73	.....	.....	.....	.....
Eels	25,733	$1,145	25,338	$1,143	.....	.....	.....	.....	5,066	$432	4,666	$384
Crabs, hard	3,866	104	3,000	80	.....	.....	.....	.....	.....	.....	.....	.....
Crabs, soft	33,456	3,674	21,177	2,385	.....	.....	.....	.....	.....	.....	.....	.....
Shrimp	2,296	1,365	2,085	1,265	.....	.....	.....	.....	.....	.....	.....	.....
Terrapin	2,197	1,231	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Turtles	1,700	164	1,700	164	6,000	360	5,200	312	.....	.....	.....	.....
Total	69,248	7,683	53,295	5,037	63,310	3,226	16,365	967	5,066	432	4,666	384

SUMMARY.

Species.	1897.		1898.	
	Lbs.	Value.	Lbs.	Value.
Shore fisheries:				
Carp	66,700	$3,335	11,700	$702
Cat-fish	1,010	51	1,465	73
Eels	167,531	7,721	162,899	7,927
Crabs, hard	102,666	2,668	97,000	2,500
Crabs, soft	207,456	20,624	205,177	19,760
King crabs	198,000	583	156,000	470
Shrimp	2,896	1,565	2,685	1,465
Terrapin	12,241	5,360	.....	.....
Turtles	9,600	633	8,100	586
Total	768,100	42,540	645,026	33,483

THE MENHADEN INDUSTRY.

New Jersey maintains a small menhaden industry. In 1897 there were 4 factories in operation, valued at $43,045. These were located as follows: 1 at Leesburg, Cumberland County; 2 at Port Monmouth, Monmouth County; and 1 at Tuckerton, Ocean County. In 1898 there were 6 factories, valued at $57,995. Their location was the same as in the previous year, the 2 additional factories being in Monmouth County—1 at Keansburg and the other at Port Monmouth. The number of persons employed in 1897 was 53 in the factories and 128 on vessels; and in 1898, 92 in the factories and 112 on vessels. The total amount of the investment, including cash capital, was $115,038 and $137,110 each year, respectively.

The number of menhaden caught by the vessels in this fishery in 1897 was 39,709,375, valued at $55,837; and in 1898, 29,573,550, valued at $43,093. A large portion of these, together with considerable quantities of menhaden taken by pound nets in the shore fisheries, were pressed at the factories, the remainder of the vessel catch being sold chiefly for bait.

The number of menhaden utilized by the factories in 1897 was 19,279,375, costing $21,567; and in 1898, 15,907,350, costing $16,395. The products, consisting of oil and fertilizer, prepared in the former year were valued at $31,816, and in the latter at $34,910.

The following table shows in detail the extent of the menhaden industry of this State in 1897 and 1898:

Table showing the extent of the menhaden industry of New Jersey in 1897 and 1898.

Items.	1897.		1898.	
	No.	Value.	No.	Value.
Factories	4	$43,045	6	$57,995
Cash capital	.....	31,000	.....	42,500
Wages paid factory employees	.....	7,272	.....	9,400
Persons in factories	53	.....	92	.....
Persons on vessels	128	.....	112	.....
Menhaden pressed	19,279,375	21,567	15,907,350	16,395
Menhaden caught by vessels	39,709,375	55,837	29,573,550	43,093
Tons of dry scrap prepared	566	12,661	745	18,173
Tons of acidulated and crude scrap prepared	505	5,340	193	2,028
Gallons of oil made	68,510	13,815	70,165	14,709
Steam vessels fishing	2	12,000	2	9,000
Tonnage	77	.....	72	.....
Outfit	.....	3,971	.....	3,716
Purse seines	3	1,500	3	1,450
Sail vessels fishing	7	6,400	6	5,400
Tonnage	163	.....	186	.....
Outfit	.....	3,500	.....	3,300
Purse seines	7	2,810	6	2,610
Sail vessels transporting	14	9,250	12	9,650
Tonnage	171	.....	145	.....
Outfit	.....	1,572	.....	1,489

THE WHOLESALE FISHERY TRADE.

The wholesale trade in fishery products in New Jersey is of minor consequence, the greater part of the products of all branches of the fisheries being shipped to dealers in New York and Philadelphia. Of the 14 firms handling oysters, clams, and fish at wholesale, 5 are located at Newark, 1 at Elizabethport, 1 at Belford, and 7 at Seaside. The following table exhibits the extent of this trade in 1897 and 1898:

Table showing the wholesale trade in fishery products of New Jersey in 1897 and 1898.

Items.	1897.		1898.	
	No.	Value.	No.	Value.
Establishments	14	$34,025	14	$34,025
Cash capital	.....	27,200	.....	27,200
Wages paid	.....	37,020	.....	37,744
Persons engaged	96	.....	96	.....
	Lbs.	Value.	Lbs.	Value.
Products sold:				
Alewives	13,000	$520	13,000	$520
Blue-fish	180,000	7,800	145,000	8,700
Bonito	4,000	320	4,000	320
Butter-fish	12,500	1,000	11,500	920
Cisco	30,000	1,200	31,500	1,260
Cod	347,000	17,350	355,000	17,750
Croakers and spots	55,000	3,300	55,000	8,800
Cusk	3,200	96	3,500	105
Eels	88,500	3,465	48,000	4,320
Flounders	28,500	1,140	32,000	1,280
Haddock, fresh	36,000	1,080	44,000	1,320
Haddock, smoked	13,500	1,080	13,500	1,080
Hake	7,500	300	9,500	380
Halibut	170,000	18,700	177,000	19,470
Herring	155,000	6,200	155,000	6,200
Mackerel	9,000	900	9,500	950
Perch, white and yellow	4,000	280	4,000	280
Pike and pickerel	2,400	216	3,200	288
Pollock	1,000	40	1,000	40
Pompano	800	120	800	120
Red snappers	7,000	700	7,000	700
Scup	392,500	19,625	425,000	21,250
Sea bass	34,000	2,380	44,000	3,080
Shad	487,500	39,000	525,000	42,000
Smelt	170,000	10,200	160,000	9,600
Spanish mackerel	8,500	1,275	9,500	1,425
Squeteague	149,500	5,980	156,000	6,240
Striped buss	20,000	2,400	26,000	3,120
White bass	3,500	280	4,000	320
Crabs, hard	[1]66,667	4,000	[2]66,667	4,000
Crabs, soft	[3]26,000	4,550	[4]26,000	4,550
Lobsters	60,800	4,864	47,500	3,800
Oysters	[5]560,000	113,000	[6]469,931	96,025
Clams, hard	[7]185,000	23,850	[8]221,200	38,213
Clams, soft	[9]115,800	9,580	[10]156,800	13,820
Clams, soft, opened	[11]900,000	56,250	[12]889,000	55,000
Total	4,197,667	363,041	4,340,598	371,746

[1] 200,000 in number.
[2] 200,000 in number.
[3] 78,000 in number.
[4] 78,000 in number.
[5] 80,000 bushels.
[6] 67,133 bushels.
[7] 16,875 bushels.
[8] 27,650 bushels.
[9] 15,680 bushels.
[10] 11,580 bushels.
[11] 90,000 bushels.
[12] 88,000 bushels.

FISHERIES OF PENNSYLVANIA.

Pennsylvania is the only State in the Middle Atlantic region which has no frontage on the ocean. By means of a small fleet of vessels, however, there is carried on a line fishery for salt-water species in the ocean, and also a large fishery for oysters in Delaware Bay. The principal other coast fisheries of the State are those of the Delaware and Susquehanna rivers. The statistics here presented relate to coast fisheries and therefore do not cover that part of the State bordering on Lake Erie, nor the Susquehanna River and tributaries above York and Lancaster counties, though since the break in the dam at Columbia shad have ascended the Susquehanna River as far as Duncannon and the Juniata River as far as Newport.

The most important fisheries are those with seines and gill nets for shad on the Delaware and Susquehanna rivers and the vessel fishery for oysters in Delaware Bay. A considerable part of the oyster industry of New Jersey and Delaware and some of the largest seine fisheries in New Jersey are controlled in Pennsylvania.

The number of persons engaged in the coast fisheries of the State was 1,898, of whom 318 were on vessels fishing and transporting, 1,143 in the shore fisheries, and 437 were shoresmen. The number of vessels fishing and transporting fishery products was 40, having a value, with their outfits, of $91,755; the number of the boats in the shore fisheries was 504, valued at $21,485; the apparatus of capture used on vessels was valued at $2,591, and on boats, $25,021; the value of the shore and accessory property was $828,576, and the amount of cash capital utilized, $632,100; a total investment, including the cash capital, of $1,601,528.

The products of the fisheries comprised 3,740,801 pounds of fish, having a value of $125,341; 265,934 bushels of oysters, valued at $143,974; and 1,924 pounds of terrapins, turtles, and frogs, worth $192; the total value of products being $269,507.

The three tables which follow show in detail the extent of the coast fisheries of Pennsylvania in 1897:

Table of persons employed.

How engaged.	No.
On vessels fishing	302
On vessels transporting	16
On boats in shore fisheries	1,143
Shoresmen	437
Total	1,898

Table of apparatus and capital.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	36	$62,800	Apparatus—shore fisheries:		
Tonnage	639	.....	Seines (total length 23,617 yards)	125	$12,921
Outfit	.....	19,690	Gill nets (total length 65,337 yards)	177	9,711
Vessels transporting	4	8,400	Fyke nets	1,120	1,508
Tonnage	118	.....	Lines	.....	81
Outfit	.....	865	Eel pots	125	90
Boats	504	21,485	Dip nets	110	320
Apparatus—vessel fisheries:			Other apparatus	.....	390
Lines	.....	91	Shore and accessory property	.....	828,576
Dredges	83	2,500	Cash capital	.....	632,100
			Total	.....	1,601,528

Table of products.

Species.	Lbs.	Value.	Species.	Lbs.	Value.
Alewives, fresh	143,503	$1,297	Striped bass	9,556	$991
Alewives, salted	278,832	1,586	Sturgeon	9,945	260
Black bass	4,103	418	Suckers	25,250	1,244
Blue-fish	12,800	321	Sun-fish	1,010	26
Carp	114,950	6,695	Wall-eyed pike	528	66
Cat-fish	120,096	6,985	Oysters	*1,861,588	143,974
Eels	51,794	4,273	Terrapins	825	98
Flounders	31,545	792	Turtles	1,021	78
Salmon	414	81	Frogs	78	16
Scup	29,150	719			
Sea bass	900,000	36,000	Total	5,604,263	269,507
Shad	2,007,325	63,587			

* Represents 265,934 bushels.

THE FISHERIES BY COUNTIES.

There are eight counties in the eastern part of Pennsylvania which maintain fisheries: Lancaster and York counties on the Susquehanna River, and Pike, Monroe, Northampton, Bucks, Philadelphia, and Delaware counties on the Delaware River. In the counties on the Susquehanna River 346 persons were employed; the investment was $8,610, and the products, principally shad, were valued at $15,872; while in the counties bordering on the Delaware River 1,552 persons were employed, $1,592,918 invested, and the products were valued at $253,635. The species in the counties on the Delaware River having the greatest value were sea bass, shad, and oysters.

The fisheries of Philadelphia County are the most extensive. They gave employment to 952 persons, a larger number than were employed in all the other counties combined. The amount of capital invested was $1,499,948, and the products aggregated 3,443,772 pounds, valued at $200,776. The whole of the vessel fisheries of this section of the State and a considerable part of the shore fisheries are centered in this county. The large investment, as compared with other counties, is due chiefly to the extensive wholesale trade of the city of Philadelphia.

The fisheries of Bucks County are next in importance. The number of persons employed was 378, the investment was $65,655, and the

products amounted to 1,313,388 pounds, valued at $37,349. The species taken in greatest quantity and value were shad and alewives.

The relative importance of the fisheries of each county in 1897 is exhibited in the three following tables:

Table showing, by counties, the number of persons employed in the fisheries of Pennsylvania in 1897.

Counties.	In vessel fisheries.	On vessels transporting.	In shore or boat fisheries.	Shoremen.	Total.
Bucks			361	17	378
Delaware			134	24	158
Lancaster			191		191
Monroe			21		21
Northampton			20		20
Philadelphia	302	16	238	396	952
Pike			23		23
York			155		155
Total	302	16	1,143	437	1,898

Table showing, by counties, the vessels, boats, apparatus, and shore property employed in the fisheries of Pennsylvania in 1897.

Items.	Bucks.		Delaware.		Lancaster.		Monroe.		Northampton.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Boats	137	$5,566	72	$5,990	94	$2,080	4	$70	4	$76
Apparatus—shore fisheries:										
Seines	42	7,051	7	940	25	1,320	4	170	4	235
Gill nets	42	1,425	64	5,999						
Fyke nets			175	175	18	18				
Lines		12		10		51				
Eel pots			55	55						
Dip nets					75	204				
Other apparatus						180				
Shore and accessory property		51,601		8,400		1,515		500		360
Cash capital				3,200						
Total		65,655		24,769		5,368		740		671

Items.	Philadelphia.		Pike.		York.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	36	$62,800					36	$62,800
Tonnage	639						639	
Outfit		19,690						19,690
Vessels transporting	4	8,400					4	8,400
Tonnage	118						118	
Outfit		865						865
Boats	108	6,670	5	$100	80	$933	504	21,485
Apparatus—vessel fisheries:								
Dredges	83	2,500					83	2,500
Lines		91						91
Apparatus—shore fisheries:								
Seines	19	2,050	5	250	19	905	125	12,921
Gill nets	71	2,287					177	9,711
Fyke nets	892	1,278			35	37	1,120	1,508
Lines						8		81
Eel pots	70	35					125	90
Dip nets	7	32			28	84	110	320
Other apparatus						210		390
Shore and accessory property		764,350		785		1,065		828,576
Cash capital		628,900						632,100
Total		1,499,948		1,185		3,242		1,601,528

Table showing, by counties and species, the yield of the fisheries of Pennsylvania in 1897.

Species.	Bucks.		Delaware.		Lancaster.		Monroe.		Northampton.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	91,670	$755	29,500	$383	.....	.....	.....	.....	.....	.....
Alewives, salted	278,832	1,586	.....	.....	.....	.....	.....	.....	.....	.....
Black bass	100	13	.....	.....	3,265	$330	.....	.....	.....	.....
Carp	27,655	1,399	18,075	1,103	12,000	520	.....	.....	.....	.....
Cat-fish	8,930	451	9,600	632	14,507	1,040	.....	.....	.....	.....
Eels	1,130	113	7,000	502	11,711	910	.....	.....	.....	.....
Salmon	354	68	36	8	.....	.....	.....	.....	.....	.....
Shad	883,585	31,733	445,690	9,063	151,532	8,178	17,400	$1,150	7,640	$529
Striped bass	1,786	168	5,170	515	200	20	.....	.....	.....	.....
Sturgeon	985	53	8,960	207	.....	.....	.....	.....	.....	.....
Suckers	17,400	939	.....	.....	4,900	182	.....	.....	.....	.....
Sun-fish	110	5	.....	.....	100	5	.....	.....	.....	.....
Wall-eyed pike	.....	.....	.....	.....	528	66	.....	.....	.....	.....
Terrapins	.....	.....	.....	.....	825	98	.....	.....	.....	.....
Turtles	901	66	.....	.....	120	12	.....	.....	.....	.....
Frogs	.....	.....	.....	.....	42	7	.....	.....	.....	.....
Total	1,313,388	37,349	524,031	12,413	199,730	11,368	17,400	1,150	7,640	529

Species.	Philadelphia.		Pike.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	22,333	$159	.....	.....	.....	.....	143,503	$1,297
Alewives, salted	.....	.....	.....	.....	.....	.....	278,832	1,586
Black bass	.....	.....	.....	.....	738	$75	4,103	418
Blue-fish	12,800	321	.....	.....	.....	.....	12,800	321
Carp	56,370	3,631	.....	.....	850	42	114,960	6,695
Cat-fish	82,637	4,498	.....	.....	4,422	364	120,096	6,985
Eels	17,475	1,562	.....	.....	14,478	1,186	51,794	4,273
Flounders	31,545	792	.....	.....	.....	.....	31,545	792
Salmon	24	5	.....	.....	.....	.....	414	81
Scup	29,150	719	.....	.....	.....	.....	29,150	719
Sea bass	900,000	36,000	.....	.....	.....	.....	900,000	36,000
Shad	425,400	8,741	24,960	$1,418	51,168	2,775	2,007,325	63,587
Striped bass	2,400	288	.....	.....	.....	.....	9,556	991
Sturgeon	.....	.....	.....	.....	.....	.....	9,945	260
Suckers	1,300	70	.....	.....	1,650	53	25,250	1,244
Sun-fish	800	16	.....	.....	.....	.....	1,010	26
Wall-eyed pike	.....	.....	.....	.....	.....	.....	528	66
Oysters	1,861,538	143,974	.....	.....	.....	.....	1,861,538	143,974
Terrapins	.....	.....	.....	.....	.....	.....	825	98
Turtles	.....	.....	.....	.....	.....	.....	1,021	78
Frogs	.....	.....	.....	.....	36	9	78	16
Total	3,443,772	200,776	24,960	1,418	73,342	4,504	5,604,263	269,507

THE CATCH OF SHAD.

The following supplementary table shows in number, instead of pounds, the catch of shad, and the value, in each county of Pennsylvania on the Delaware and Susquehanna rivers in 1897:

Counties.	No.	Value.
Bucks	220,884	$31,733
Delaware	111,423	9,063
Lancaster	37,883	8,178
Monroe	4,350	1,150
Northampton	1,910	529
Philadelphia	106,350	8,741
Pike	6,240	1,418
York	12,792	2,775
Total	*501,832	63,587

*2,007,325 pounds.

THE FISHERIES, BY APPARATUS.

In the vessel fisheries lines and oyster dredges are the only apparatus of capture. The principal species in the line fishery are sea bass and flounders. This fishery is prosecuted in the ocean during the summer months by vessels which are engaged in the oyster fishery or the coasting trade the rest of the year. The line catch amounted to 973,495 pounds, valued at $37,832. The oyster fishery is carried on entirely in the waters of New Jersey and Delaware, principally the latter, where most of the planted beds owned directly by Pennsylvanians are located. The catch of oysters amounted to 1,861,538 pounds, or 265,934 bushels, valued at $143,974. The total catch in the vessel fisheries was 2,835,033 pounds, valued at $181,806.

In the shore fisheries seines are the most important apparatus employed. The quantity of products taken by them was 1,479,834 pounds, valued at $50,177, the principal species being shad and alewives. This is the oldest method of fishing on the Delaware River, and some of these seine fisheries have been in operation since before the beginning of the present century. The yield of gill nets was 1,065,581 pounds, valued at $23,522, more shad being taken in them than in any other form of apparatus. Fyke nets and dip nets produced respectively 86,117 pounds, valued at $5,429, and 82,713 pounds, valued at $4,247. Lines, pots, and minor apparatus secured 2,769,230 pounds, valued at $87,701.

The two tables which follow show the quantity and value of products in the vessel and shore fisheries by each form of apparatus:

Table showing the yield of the vessel fisheries of Pennsylvania in 1897.

Apparatus and species.	Philadelphia County.	
	Lbs.	Value.
Lines:		
Blue-fish	12,800	$321
Flounders	31,645	792
Scup	29,150	719
Sea bass	900,000	36,000
Total	973,495	37,832
Dredges:		
Oysters	1,861,538	143,974
Grand total	2,835,033	181,806

Table showing, by counties and apparatus of capture, the yield of the shore fisheries of Pennsylvania in 1897.

Species.	Bucks.		Delaware.		Lancaster.		Philadelphia.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Seines:								
Alewives, fresh	91,670	$755	500	$8			18,667	$137
Alewives, salted	278,832	1,586						
Carp	27,655	1,399	18,075	1,103	12,000	$520	55,160	3,510
Cat-fish	7,600	380	300	15			27,100	1,526
Eels							3,900	252
Salmon	314	63						
Shad	694,440	26,112	240	6	83,932	4,778	41,200	1,030
Striped bass	1,786	168	60	4			2,400	288
Sturgeon	985	53						
Suckers	17,400	939			4,000	155	1,300	70
Sun-fish							800	16
Wall-eyed pike					100	12		
Total	1,120,682	31,455	19,175	1,136	100,032	5,465	150,527	6,829
Gill nets:								
Alewives			29,000	375			3,666	22
Salmon	40	5	36	8			24	5
Shad	189,095	5,621	445,450	9,057			384,200	7,711
Striped bass			5,110	511				
Sturgeon			8,960	207				
Total	189,135	5,626	488,556	10,158			387,890	7,738
Fyke nets:								
Cat-fish			8,800	592	10,000	700	54,737	2,932
Eels			300	24			10,630	1,015
Total			9,100	616	10,000	700	65,367	3,947
Dip nets:								
Carp							1,210	121
Cat-fish							800	40
Shad					67,600	3,400		
Terrapins					225	38		
Frogs					42	7		
Total					67,867	3,445	2,010	161
Lines:								
Black bass	100	13			3,265	330		
Cat-fish	1,330	71	500	25	2,007	160		
Eels	1,130	113	900	72	1,211	110		
Striped bass					200	20		
Sun-fish	110	5			100	5		
Wall-eyed pike					428	64		
Terrapins					600	60		
Turtles	901	66			120	12		
Total	3,571	268	1,400	97	7,931	751		
Pots:								
Eels			5,800	406			2,945	295
Other apparatus:								
Cat-fish					2,500	180		
Eels					10,500	800		
Suckers					900	27		
Total					13,900	1,007		
Grand total	1,313,388	37,349	524,031	12,413	199,730	11,368	608,739	18,970

Table showing, by counties and apparatus of capture, the yield of the shore fisheries of Pennsylvania in 1897—Continued.

Species.	Monroe.		Northampton.		Pike.		York.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Seines:								
Carp							850	$42
Shad	17,400	$1,150	7,640	$529	24,960	$1,418	38,368	2,143
Suckers							200	10
Total	17,400	1,150	7,640	529	24,960	1,418	39,418	2,195
Fyke nets:								
Cat-fish							800	96
Eels							700	66
Suckers							150	4
Total							1,650	166
Dip nets:								
Shad							12,800	632
Frogs							36	9
Total							12,836	641
Lines:								
Black bass							738	75
Cat-fish							622	48
Eels							2,778	300
Total							4,138	423
Other apparatus:								
Cat-fish							3,000	220
Eels							11,000	820
Suckers							1,300	39
Total							15,300	1,079
Grand total	17,400	1,150	7,640	529	24,960	1,418	73,342	4,504

SUMMARY.

Species.	Pounds.	Value.	Species.	Pounds.	Value.
Seines:			Dip nets:		
Alewives, fresh	110,837	$900	Carp	1,210	$121
Alewives, salted	278,832	1,586	Cat-fish	800	40
Carp	113,740	6,574	Shad	80,400	4,032
Cat-fish	35,000	1,921	Terrapins	225	38
Eels	3,900	252	Frogs	78	16
Salmon	314	63	Total	82,713	4,247
Shad	908,180	37,166	Lines:		
Striped bass	4,246	460	Black bass	4,103	418
Sturgeon	985	58	Cat-fish	4,459	304
Suckers	22,900	1,174	Eels	6,019	595
Sun-fish	800	16	Striped bass	200	20
Wall-eyed pike	100	12	Sun-fish	210	10
Total	1,479,834	50,177	Wall-eyed pike	428	54
Gill nets:			Terrapins	600	60
Alewives	32,666	397	Turtles	1,021	78
Salmon	100	18	Total	17,040	1,539
Shad	1,018,745	22,389	Pots:		
Striped bass	5,110	511	Eels	8,745	701
Sturgeon	8,960	207	Other apparatus:		
Total	1,065,581	23,522	Cat-fish	5,500	400
Fyke nets:			Eels	21,500	1,620
Cat-fish	74,337	4,320	Suckers	2,200	66
Eels	11,630	1,105	Total	29,200	2,086
Suckers	150	*4			
Total	86,117	5,429	Grand total	2,769,230	87,701

THE WHOLESALE FISHERY TRADE OF PHILADELPHIA AND CHESTER.

The wholesale fish and oyster dealers of Philadelphia handle a great part of the fishery products taken on the Delaware River and Bay, and also considerable quantities from other sections of the country. Since 1897, the year covered by the present investigation, a large wholesale fresh-fish market has been built, taking the place of the former small market. The trade in oysters and fresh, salted, and smoked fish is extensive. Among the fresh-water species there is a large quantity of carp. There were 76 firms in the wholesale trade of Philadelphia, in which 396 persons were employed, and the investment, including cash capital, but exclusive of wages, amounted to $1,391,601. The products were valued at $3,937,686.

At Chester there were six wholesale firms, having 24 persons engaged, and an investment of $11,050. The products, consisting largely of shad, were valued at $60,046.

The extent of the wholesale fishery trade of Philadelphia and Chester in 1897 is presented in the following table:

Table showing the extent of the wholesale trade in fishery products of Philadelphia and Chester, Pa., in 1897.

Items.	Philadelphia.		Chester.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Establishments	76	$762,701	6	$7,850	82	$770,551
Cash capital	.....	628,900	.....	3,200	.....	632,100
Wages paid	.....	137,295	.....	1,478	.....	138,773
Persons engaged	396	.....	24	.....	420	.....
Products handled.						
Oysters opened.....gallons..	60,001	51,500	.....	.....	60,001	51,500
Oysters in shell.....bushels..	938,111	1,084,172	12,450	18,390	950,561	1,102,562
Clams.....number..	36,232,000	90,580	160,000	560	36,392,000	91,140
Lobsters.....pounds..	130,000	19,950	.....	.....	130,000	19,950
Crabs.....number..	701,090	7,517	.....	.....	701,090	7,517
Crab meat.....gallons..	5,000	5,000	.....	.....	5,000	5,000
Salmon, canned.....cases..	22,000	99,000	.....	.....	22,000	99,000
Terrapin.....number..	6,260	13,244	.....	.....	6,260	13,244
Fish, fresh.....pounds..	35,095,901	1,418,248	1,693,993	41,046	36,789,894	1,459,294
Fish, dried, salted, and smoked, pounds	18,901,820	1,148,475	.....	.....	18,901,820	1,148,475
Caviar.....pounds..	.....	.....	130	50	130	50
Value of products	.....	3,937,686	.....	60,046	.....	3,997,732

FISHERIES OF DELAWARE.

The fisheries of this State are prosecuted in the Delaware River and Bay and the Atlantic Ocean, and to a small extent in the Nanticoke River, a tributary of Chesapeake Bay.

The number of persons engaged in the fisheries in 1897 was 2,392, of whom 120 were on fishing and transporting vessels; 1,888 on boats in the shore fisheries, and 384 in fishery industries on shore.

The number of vessels fishing and transporting was 42, valued with their outfits at $37,854. The number of boats in the shore fisheries was 953, valued at $39,349.

The value of apparatus connected with the vessel fisheries, consisting almost entirely of oyster dredges, was $2,886, while in the shore fisheries numerous forms of apparatus were employed having an aggregate value of $43,156. The more important of these were gill nets, valued at $31,037; seines, $8,676; fyke nets, $1,125; and pound nets, $625. The value of shore property and cash capital amounted to $284,574, the total investment being $407,819.

The products of the fisheries aggregated 8,647,897 pounds, worth $252,123. The most important species in value were shad, worth $47,962; squeteague, $25,149; perch, $19,128; striped bass, $12,033; and alewives, $11,910. The yield of the oyster fishery was valued at $63,897, and of the sturgeon fishery $34,750. Of the latter amount, $25,736 represents the value of the caviar.

The three tables which follow show by counties the number and value of vessels, boats, and fishing apparatus, the number of persons employed; the value of the shore and accessory property, the amount of cash capital, and the quantity and value of the products of the fisheries of Delaware in the year 1897:

Table showing, by counties, the vessels, boats, apparatus, and shore property employed in the fisheries of Delaware in 1897.

Items.	Kent.		Newcastle.		Sussex.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	24	$20,625	.....	.....	.....	.....	24	$20,625
Tonnage	211	.....	.....	.....	.....	.....	211	.....
Outfit	.....	3,900	.....	.....	.....	.....	.....	3,900
Vessels transporting	3	1,650	5	$4,300	10	$5,800	18	11,750
Tonnage	55	.....	110	.....	178	.....	343	.....
Outfit	.....	50	.....	265	.....	1,264	.....	1,579
Boats	820	11,145	272	23,209	861	4,995	953	39,349
Apparatus—vessel fisheries:								
Dredges	72	2,880	.....	.....	.....	.....	72	2,880
Lines	.....	6	.....	.....	.....	.....	.....	6
Apparatus—shore fisheries:								
Pound nets	.....	.....	4	150	4	475	8	625
Seines (total length 22,101 yards)	41	2,330	23	1,378	112	4,968	176	8,676
Gill nets (total length 246,345 yards)	226	6,691	242	20,742	515	3,604	983	31,037
Fyke nets	260	305	170	261	226	559	656	1,125
Minor nets	54	180	1	2	98	121	153	303
Lines	.....	17	.....	41	.....	37	.....	95
Eel pots and spears	72	18	50	45	558	196	680	259
Lobster pots	.....	.....	.....	.....	100	100	100	100
Tongs	95	682	.....	.....	22	163	117	845
Other apparatus	.....	7	.....	27	.....	57	.....	91
Shore and accessory property	.....	9,835	.....	19,694	.....	166,845	.....	196,374
Cash capital	.....	1,500	.....	4,200	.....	82,500	.....	88,200
Total	.....	61,821	.....	74,314	.....	271,684	.....	407,819

Table showing, by counties, the number of persons employed in the fisheries of Delaware in 1897.

Items.	Kent.	Newcastle.	Sussex.	Total.
On vessels fishing	87	.....	.....	87
On vessels transporting	.....	10	23	33
On boats, in shore fisheries	576	496	816	1,888
Shoresmen	7	46	331	384
Total	670	552	1,170	2,892

Table showing, by counties and species, the yield of the fisheries of Delaware in 1897.

Species.	Kent.		Newcastle.		Sussex.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	35,400	$550	350,000	$1,647	1,537,207	$9,668	1,922,607	$11,865
Alewives, salted	.....	.....	2,000	45	.....	.....	2,000	45
Carp	28,300	1,442	83,000	3,750	.....	.....	111,300	5,192
Cat-fish	22,300	1,488	25,340	1,573	20,650	786	68,290	3,847
Croakers	215,000	1,470	.....	.....	82,600	1,084	297,600	2,554
Eels	7,410	516	29,800	1,394	91,600	4,442	128,810	6,352
Flounders	.....	.....	.....	.....	2,000	85	2,000	85
Mullet, fresh	.....	.....	.....	.....	34,700	804	34,700	804
Mullet, salted	.....	.....	.....	.....	3,000	40	3,000	40
Perch	87,800	4,060	41,500	3,276	270,000	11,792	399,300	19,128
Pike	10,600	781	.....	.....	30,650	1,246	41,250	2,027
Sea bass	.....	.....	.....	.....	1,900	95	1,900	95
Shad	247,332	7,932	974,216	26,926	398,816	13,104	1,620,364	47,962
Squeteague	631,100	9,087	400	16	809,380	16,046	1,440,880	25,149
Striped bass	38,410	3,160	25,500	2,365	64,860	6,508	128,770	12,033
Sturgeon	85,860	2,905	187,380	5,638	7,110	471	280,350	9,014
Suckers	29,900	1,300	.....	.....	5,300	243	35,200	1,543
Tautog	.....	.....	.....	.....	4,800	240	4,800	240
Crabs, soft	.....	.....	.....	.....	155,000	5,133	[1] 155,000	5,133
Crabs, hard	7,800	136	.....	.....	6,000	120	[2] 13,800	256
King-crabs	675,000	2,025	.....	.....	.....	.....	[3] 675,000	2,025
Shrimp	.....	.....	320	160	.....	.....	320	160
Lobsters	.....	.....	.....	.....	5,095	459	5,095	459
Oysters, market	411,600	32,502	.....	.....	232,960	13,472	[4] 644,560	45,974
Oysters, seed	501,830	17,923	.....	.....	.....	.....	[5] 501,830	17,923
Clams	640	150	.....	.....	6,160	1,380	[6] 6,800	1,530
Turtle	14,800	780	5,400	293	24,870	1,373	44,570	2,396
Terrapin	3,135	725	1,156	139	4,031	1,692	8,322	2,556
Caviar	21,870	8,100	46,103	17,075	1,506	561	69,479	25,736
Total	3,076,087	96,982	1,772,115	64,297	3,799,695	90,844	8,647,897	252,123

[1] 465,000 in number.
[2] 41,400 in number.
[3] 337,500 in number.
[4] 92,080 bushels.
[5] 71,690 bushels.
[6] 850 bushels.

THE SHAD FISHERY.

The shad fishery of Delaware is prosecuted chiefly in the Delaware and Nanticoke rivers. In the former the yield was 1,368,364 pounds, valued at $40,717, and in the latter 252,000 pounds, valued at $7,245.

The following table shows the quantity of shad taken in each county of the State, in number instead of pounds, for the year 1897:

Counties.	No.	Value.
Kent	65,955	$7,932
Newcastle	259,791	26,926
Sussex	106,351	13,104
Total	[1] 432,097	47,962

[1] 1,620,364 pounds.

FISHERIES BY APPARATUS.

The vessel fisheries of this State are confined to Kent County, the catch consisting almost entirely of oysters, of which 339,990 pounds (48,570 bushels), valued at $24,707, were secured. Some squeteague were taken on lines by vessels which carry out pleasure parties during the summer season. At Lewes, in Sussex County, a few steamers land part of their fish at the menhaden factories, but as these steamers belong in other States their catch has not been credited to Delaware.

In the shore fisheries, so far as the quantity of fish secured is concerned, seines rank first, they having taken 3,677,291 pounds, valued at $64,498, but in value of catch gill nets are first, having taken 2,577,114 pounds, valued at $98,598. The principal species taken in seines are alewives, squeteague, and shad, while in gill nets the principal species are shad, sturgeon, and squeteague. The yield by oyster tongs is next in importance, its value being $39,190. Fyke nets caught 157,310 pounds, valued at $6,469, and pound nets 93,770 pounds, valued at $2,197. Lines, pots, spears, miscellaneous nets, and other minor forms of apparatus were also used. A small lobster fishery, with pots, is carried on at Lewes. This is the southernmost point on the Atlantic seaboard where the lobster fishery is prosecuted.

The two tables which follow show the products of the vessel and shore fisheries, by each form of apparatus, for the year 1897:

Table showing the yield of the vessel fisheries of Delaware in 1897.

Apparatus and species.	Kent County.	
	Lbs.	Value.
Lines:		
Squeteague	9,400	$188
Dredges:		
Oysters, market	167,160	18,534
Oysters, seed	172,830	6,173
Total	339,990	24,707
Grand total	349,390	24,895

Table showing, by counties and apparatus of capture, the yield of the shore fisheries of Delaware in 1897.

Apparatus and species.	Kent.		Newcastle.		Sussex.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Gill nets:								
Alewives	8,600	$60	52,800	$440	15,500	$90	71,900	$590
Carp	.....	.....	20,000	600	.....	.....	20,000	600
Cat-fish	.....	.....	.....	.....	600	32	600	32
Croakers	88,000	440	.....	.....	38,000	190	126,000	630
Mullet	.....	.....	.....	.....	1,200	24	1,200	24
Perch	48,000	2,542	40,400	3,232	78,700	3,633	167,100	9,407
Pike	8,500	627	.....	.....	6,700	396	15,200	1,023
Shad	219,644	6,672	970,176	26,804	197,476	6,027	1,387,296	39,503
Squeteague	197,200	3,534	.....	.....	164,700	3,354	361,900	6,888
Striped bass	26,210	1,940	6,100	814	15,000	1,120	47,310	3,874
Sturgeon	85,860	2,905	187,380	5,638	7,010	468	280,250	9,011
Suckers	23,600	1,048	.....	.....	5,300	243	28,900	1,291
Caviar	21,870	8,100	46,103	17,075	1,485	550	69,458	25,725
Total	722,484	27,868	1,322,959	54,603	531,671	16,127	2,577,114	98,598

Table showing the yield of the shore fisheries of Delaware in 1897—Continued.

Apparatus and species.	Kent.		Newcastle.		Sussex.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Pound nets:								
Alewives					22,000	$225	22,000	$225
Cat-fish			600	$60	1,300	65	1,900	125
Croakers					25,000	125	25,000	125
Eels					100	8	100	8
Perch			300	12	15,650	803	15,950	815
Shad					4,040	182	4,040	182
Squeteague			400	16	23,200	528	23,600	544
Striped bass			600	60	460	46	1,060	106
Terrapin			120	67			120	67
Total			2,020	215	91,750	1,982	93,770	2,197
Seines:								
Alewives, fresh	31,800	$490	297,200	1,207	1,459,707	9,173	1,788,707	10,870
Alewives, salted			2,000	45			2,000	45
Carp	21,000	1,050	63,000	3,150			84,000	4,200
Cat-fish	1,000	40	10,840	636	18,750	689	30,590	1,365
Croakers	127,000	1,030			16,600	649	143,600	1,679
Eels					54,000	2,270	54,000	2,270
Flounders					2,000	85	2,000	85
Mullet, fresh					33,500	780	33,500	780
Mullet, salted					3,000	40	3,000	40
Perch	32,800	1,224	800	32	156,350	6,704	189,950	7,960
Pike					17,950	550	17,950	550
Shad	22,888	1,044	4,040	122	193,700	6,760	220,628	7,926
Squeteague	397,000	4,830			612,380	11,821	1,009,380	16,651
Striped bass	12,200	1,220	18,800	1,491	49,400	5,342	80,400	8,053
Sturgeon					100	3	100	3
Terrapin	3,090	710	36	12	3,489	1,072	6,615	1,794
Crabs, hard	4,800	96			6,000	120	10,800	216
Caviar					21	11	21	11
Total	653,578	11,734	396,716	6,695	2,626,947	46,069	3,677,241	64,498
Fyke nets:								
Alewives					40,000	180	40,000	180
Cat-fish	20,300	1,398	13,900	877			34,200	2,275
Eels	2,910	246	15,000	722	500	20	18,410	988
Perch	4,600	190			19,300	652	23,900	842
Pike	2,100	154					2,100	154
Suckers	6,300	252					6,300	252
Turtle	14,400	714			18,000	1,064	32,400	1,778
Total	50,610	2,954	28,900	1,599	77,800	1,916	157,310	6,469
Minor nets:								
Carp	7,800	392					7,300	392
Cat-fish	1,000	50					1,000	50
Perch	2,400	104					2,400	104
Shad	4,800	216			3,600	135	8,400	351
Shrimp			320	160			320	160
Crabs, soft					155,000	5,133	155,000	5,133
Turtle					3,200	160	3,200	160
Total	15,500	762	320	160	161,800	5,428	177,620	6,350
Lines:								
Croakers					3,000	120	3,000	120
Pike					6,000	300	6,000	300
Sea bass					1,900	95	1,900	95
Squeteague	27,500	535			9,100	343	36,600	878
Tautog					4,800	240	4,800	240
Crabs, hard	3,000	40					3,000	40
Total	30,500	575			24,800	1,098	55,300	1,673
Pots and spears:								
Eels	4,500	270	14,800	672	37,000	2,144	56,300	3,086
Lobsters					5,095	459	5,095	459
Total	4,500	270	14,800	672	42,095	2,603	61,395	3,545
Tongs:								
Oysters, market	244,440	13,968			232,960	13,472	477,400	27,440
Oysters, seed	329,000	11,750					329,000	11,750
Total	573,440	25,718			232,960	13,472	806,400	39,190
Other apparatus:								
Clams	640	150			6,160	1,380	6,800	1,530
King crabs	675,000	2,025					675,000	2,025
Turtle	400	16	5,400	293	3,170	149	8,970	458
Terrapin	45	15	1,000	60	542	620	1,587	695
Total	676,085	2,206	6,400	353	9,872	2,149	692,357	4,708
Grand total	2,726,697	72,087	1,772,115	64,297	3,799,695	90,844	8,298,507	227,228

THE MENHADEN INDUSTRY.

The menhaden factories in Delaware are located at Lewes, in Sussex County. After the season of 1897 had closed they were purchased by the American Fisheries Company. In 1897 there were three factories in operation, valued at $150,000, in which 105 persons were engaged. The amount of cash capital employed was $50,000. The vessels supplying the factories with fish were owned in other States, and have therefore not been included in the following table showing the extent of the industry in Delaware:

Items.	No.	Value.
Factories	3	$150,000
Cash capital	.....	50,000
Persons in factories	105	.....
Menhaden utilized	100,000,000	125,000
Tons of dry and acidulated scrap	7,700	92,850
Gallons of oil made	316,800	69,300

THE KING-CRAB INDUSTRY.

The preparation of fertilizer from king-crabs in Delaware is carried on in Kent County. The property used in the business is valued at $3,000, and six persons only are employed. Six hundred and seventy-five thousand king crabs, costing $4,050, were utilized to make 225 tons of fertilizer, worth $6,975.

THE WHOLESALE FISHERY TRADE.

The wholesale trade in fishery products in Delaware is centered chiefly at Wilmington and Seaford. At the former place the trade is principally in fresh fish, shad being the most important species, and at the latter oysters are the most important product. There are a number of shucking houses at Seaford where the greater part of the oysters are opened before shipment to market. At various other localities in the State shad, sturgeon, and other species are handled in small quantities. The following table shows the extent of the wholesale trade at Wilmington and Seaford in 1897:

Items.	Wilmington.		Seaford.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Establishments	6	$15,800	6	$11,000	12	$26,300
Cash capital	.....	4,200	.....	32,500	.....	86,700
Persons engaged	18	.....	226	.....	244	.....
Products handled.						
Oysters opened.....gallons..	.....	.....	178,500	145,556	178,500	145,556
Oysters in shell.....bushels..	12,120	10,296	.....	.....	12,120	10,296
Clams	384,000	1,283	.....	.....	384,000	1,283
Crabs, hard	165,000	1,650	.....	.....	165,000	1,650
Fish, fresh.....pounds..	859,930	32,718	173,750	6,320	1,033,680	39,038
Value of products	.....	45,947	.....	151,876	.....	197,823

FISHERIES OF MARYLAND.

The fisheries of Maryland are prosecuted chiefly on the Chesapeake Bay and its tributaries. This bay, the greater part of which is within the jurisdiction of Maryland, is the largest on the coast of the United States, and may properly be regarded as the world's greatest natural oyster-producing area. In addition to the great output of oysters, for which it has long been remarkable, it also produces large quantities of fish of various species, crabs, shrimp, clams (*Venus mercenaria*), terrapin, and turtles.

The rivers flowing into the Chesapeake, some of which are of considerable importance to navigation, also contribute very largely to the fishery resources of the State. The more important of these are the Potomac, which forms the boundary between Maryland and Virginia on the west and south, the Patuxent, Susquehanna, Chester, Choptank, Nanticoke, Wicomico, and Pocomoke. All of these rivers have fisheries of greater or less importance, the larger ones being especially noted for their abundant yield of shad.

The principal localities or fishing centers of the State are Baltimore, Annapolis, and Havre de Grace, on the western shore, and St. Michaels, Oxford, Cambridge, and Crisfield, on the eastern shore. The fishing operations are, however, not confined to these localities, but are prosecuted more or less extensively at almost every village or settlement along the shores.

Considering that only one county of Maryland reaches the seacoast, and that all the others are located on the Chesapeake Bay and its tributaries, the fisheries of the State are very extensive. They surpass, in value of products, those of any other State in the Middle Atlantic region.

The number of persons employed on vessels fishing and transporting fishery products in 1897 was 8,087; on boats used in various branches of shore fisheries, 18,540; in oyster canneries, shucking and packing houses, 16,185; a total of 42,812.

The fishing fleet comprised 1,419 vessels, engaged in fishing and transporting, having a net register of 23,670 tons and valued at $1,078,560. Their outfits, consisting chiefly of provisions, were valued at $265,982. In the shore fisheries there were 10,077 boats used, having a value of $562,455.

The various forms of apparatus of capture used on vessels were oyster and crab dredges, oyster tongs, seines, lines, and eel pots, the value of which was $67,537. The apparatus used in the shore or boat fisheries consisted principally of seines, gill nets, pound nets, trap nets, weirs, fyke nets, trammel nets, lines, eel pots, spears, oyster and crab dredges, and oyster tongs, valued at $328,122; the total value of apparatus being $395,659.

The value of oyster canneries, oyster and crab houses, wholesale fish establishments, and all other shore property connected with the fisheries was $1,878,669, the amount of cash or working capital required in conducting the various branches of trade in fishery products was $1,640,285, and the total investment in the fisheries and related industries, including vessels, outfits, boats, apparatus of capture, shore and accessory property, and cash capital, amounted to $5,821,610.

The products taken by all kinds of apparatus consisted of 28,213,744 pounds of fish, fresh and salted, valued at $500,745; soft crabs 12,347,637 in number, valued at $177,637; hard crabs 15,999,948 in number, valued at $39,949; shrimp, 1,020 pounds, valued at $510; crawfish, 2,908 pounds, valued at $262; oysters, 7,254,934 bushels, valued at $2,885,202; clams, 15,286 bushels, valued at $8,842; turtles, 5,465 pounds, valued at $289, and terrapin, principally diamond-back, 7,266 pounds, valued at $3,226; the total value, including 1,594 pounds of caviar, valued at $644, being $3,617,306.

Oysters were taken in greater abundance than any other species, the catch comprising nearly 80 per cent of the value of the entire product. The crab catch is next in importance, aggregating in number of soft and hard crabs 28,347,585, and in value $217,586. The shad is also an important species; the quantity taken and sold fresh was 5,779,563 pounds, valued at $158,865, besides which 20,000 pounds, valued at $500, were sold in a salted condition. Alewives are also very abundant, the quantity sold fresh being 11,727,199 pounds, valued at $72,657, and salted 5,408,900 pounds, valued at $50,676. Various other species, as blue-fish, butter-fish, carp, cat-fish, croakers, eels, menhaden, white and yellow perch, pike, squeteague, striped bass, sturgeon, and suckers, are also taken in considerable quantities. The diamond-back terrapin, which has heretofore been a prominent species in this section, has largely decreased in abundance. The catch of menhaden is also not so large as it has been in previous years, chiefly from the fact that while a number of vessels belonging to Maryland were engaged in this fishery they were chartered in Virginia and their catch has been properly credited to that State.

The three following tables exhibit the number of persons, the number and value of vessels, boats, and apparatus of capture, the value of the shore and accessory property, the amount of cash capital employed, and the quantity and value of the products of the fisheries of Maryland in 1897:

Persons employed.

How engaged.	No.
On vessels fishing	6,962
On vessels transporting	1,125
In shore or boat fisheries	18,540
Shoresmen	16,185
Total	42,812

Table of apparatus and capital.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	1,067	$650,275	Apparatus—shore fisheries—continued.		
Tonnage	13,162		Pound nets	839	$80,340
Outfit		218,044	Trap nets and weirs	17	775
Vessels transporting	332	428,285	Fyke nets	7,117	23,108
Tonnage	10,508		Trammel nets (total length, 6,504 yards)	31	2,320
Outfit		47,938	Minor nets	833	1,915
Boats	10,077	562,455	Lines		2,233
Apparatus—vessel fisheries:			Eel pots	3,360	1,770
Oyster dredges or scrapes	3,877	65,306	Spears	50	113
Crab dredges or scrapes	119	475	Oyster dredges or scrapes	1,837	23,511
Tongs	72	560	Crab dredges or scrapes	2,687	9,819
Seines	2	415	Tongs	11,119	66,087
Lines		5	Shore and accessory property		1,878,669
Eel pots	1,550	776	Cash capital		1,640,285
Apparatus—shore fisheries:					
Seines (total length, 73,866 yards)	328	38,867	Total		5,821,610
Gill nets (total length, 938,888 yards)	8,464	77,264			

Table of products.

Species.	Lbs.	Value.	Species.	Lbs.	Value.
Alewives, fresh	11,727,199	$72,657	Sea bass	16,200	$690
Alewives, salted	5,408,900	50,676	Shad, fresh	5,779,563	158,865
Alewives, smoked	3,360	120	Shad, salted	20,000	500
Black bass	6,765	613	Sheepshead	200	12
Blue-fish	186,708	7,156	Spanish mackerel	9,762	833
Bonito	1,000	50	Spots	2,928	139
Butter-fish	87,040	2,348	Squeteague	597,179	14,792
Carp	110,925	3,825	Striped bass	935,347	70,045
Cat-fish	578,021	19,644	Sturgeon	145,569	5,008
Cero	1,000	50	Suckers	83,030	1,801
Croakers	236,295	2,889	Sun-fish	4,000	152
Drum	43,000	386	Crabs, soft	[1] 4,115,879	177,637
Eels	406,744	14,684	Crabs, hard	[2] 5,833,316	89,949
Flounders	27,357	1,097	Shrimp	1,020	510
Hickory shad	8,752	58	Craw-fish	2,908	262
King-fish	1,000	35	Oysters	[3] 50,784,538	2,885,202
Menhaden	353,100	365	Clams	[4] 122,288	8,842
Mullet	1,500	60	Turtles	5,465	289
Perch, white	925,545	49,968	Terrapins	7,266	8,226
Perch, yellow	395,735	12,283	Caviar	1,594	644
Pike	114,710	8,919			
Pompano	310	35	Total	88,588,018	3,617,306

[1] 12,347,637 in number. [2] 15,999,948 in number. [3] 7,254,934 bushels. [4] 15,286 bushels.

The catch of hard and soft crabs, clams, and oysters in Maryland for 1897, which, for purposes of comparison, have been shown in the general products tables in pounds, are presented in the following table in number and bushels:

Products.	No.	Value.
Crabs, hard ..... number..	15,999,948	$39,949
Crabs, soft ..... do....	12,347,637	177,637
Clams ..... bushels..	15,286	8,842
Oysters ..... do....	7,254,934	2,885,202

THE FISHERIES BY COUNTIES.

The State is divided by the Chesapeake Bay and the Susquehanna River, which flows into its head waters, into two great sections. In the eastern part of the State there are 9 counties, all of which are interested in the fisheries. These are Cecil, Kent, Queen Anne, Talbot, Caroline, Dorchester, Wicomico, Somerset, and Worcester. They

are all located on the Chesapeake except Worcester, which borders on the Atlantic Ocean and has a coast line about 35 miles long. Of the 14 counties in the western part of the State, 7 have fishery interests. These are Harford, Baltimore, Anne Arundel, and Calvert, on the bay; Prince George and Charles, on the Potomac River, and St. Mary, bordering the Potomac and Patuxent rivers and the bay.

The counties having the most important fisheries were Anne Arundel, Baltimore, Dorchester, Somerset, and Talbot. The number of persons employed in the industry in Anne Arundel County was 2,893, the amount of capital invested $160,370, and the value of the products $263,366. In Baltimore County the number of persons employed was 13,823, capital invested $3,422,885, and the value of the products $254,887. The large number of persons employed and amount of capital invested in this county are chiefly due to the extensive oyster-canning industry and opened-oyster trade of the city of Baltimore. The products of the fisheries proper do not equal those of Anne Arundel County. The fisheries of Dorchester County gave employment to 5,963 persons, the capital invested amounted to $570,911, and the value of the products to $684,847. The number of persons employed in Somerset County was 7,069, capital invested $755,420, and the products were valued at $671,365. Talbot county had 3,011 persons employed, $262,069 invested, and the value of the products was $384,383. These counties were also the most prominent ones in the vessel fisheries. The largest number of vessels was in Somerset and Dorchester, the former having 433 and the latter 394. The fisheries of Worcester County were also important, the value of its products amounting to $307,030, being surpassed in this respect only by Dorchester, Somerset, and Talbot counties. The oyster fisheries were of greatest importance in Dorchester County, the crab fisheries in Somerset, and, in value, the shad fisheries in Talbot.

The three following tables show the extent of the fisheries in each county of Maryland in 1897:

Table showing the number of persons employed in the fisheries of Maryland in 1897.

Counties.	In vessel fisheries.	On transporting vessels.	In shore or boat fisheries.	Shoresmen.	Total.
Anne Arundel	105	77	2,352	359	2,893
Baltimore	1,581	395	161	11,686	13,823
Calvert	180	52	1,217	73	1,522
Caroline	.....	.....	361	.....	361
Cecil	.....	.....	633	32	665
Charles	15	11	658	30	714
Dorchester	2,006	186	2,741	1,030	5,963
Harford	.....	11	570	275	856
Kent	13	41	1,260	.....	1,314
Prince George	.....	.....	142	.....	142
Queen Anne	.....	27	1,135	.....	1,162
St. Mary	70	56	1,039	.....	1,165
Somerset	2,285	169	2,790	1,825	7,069
Talbot	628	56	1,585	742	3,011
Wicomico	79	22	1,036	112	1,249
Worcester	.....	22	860	21	903
Total	6,962	1,125	18,540	16,185	42,812

Table showing, by counties, the vessels, boats, apparatus, and shore property employed in the fisheries of Maryland in 1897.

Items.	Anne Arundel.		Baltimore.		Calvert.		Caroline.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	27	$9,665	183	$230,385	27	$10,955	.....	.....
Tonnage	216	.....	4,459	.....	342	.....	.....	.....
Outfit	.....	3,209	.....	59,470	.....	5,045	.....	.....
Vessels transporting	34	20,775	92	194,050	14	12,200	.....	.....
Tonnage	442	.....	4,334	.....	451	.....	.....	.....
Outfit	.....	3,062	.....	18,802	.....	1,970	.....	.....
Boats	921	67,000	73	3,031	565	35,350	159	$1,697
Apparatus—vessel fisheries:								
Oyster dredges or scrapes	88	815	629	12,671	106	1,598	.....	.....
Tongs	35	224	.....	.....	15	192	.....	.....
Lines	.....	.....	.....	5	.....	.....	.....	.....
Apparatus—shore fisheries:								
Seines	26	2,376	13	3,650	10	965	17	1,835
Gill nets	26	466	21	385	17	160	506	5,079
Pound nets	60	6,240	10	850	36	5,950	15	800
Trap nets and weirs	.....	.....	2	30	.....	.....	.....	.....
Fyke nets	25	290	806	2,110	.....	.....	52	233
Trammel nets	3	210	.....	.....	.....	.....	.....	.....
Minor nets	132	94	6	30	.....	.....	.....	.....
Lines	.....	136	.....	.....	.....	.....	.....	.....
Eel pots	198	98	82	24	15	5	.....	.....
Oyster dredges or scrapes	17	425	4	125	70	1,050	.....	.....
Tongs	1,467	9,353	.....	.....	1,148	8,857	.....	.....
Shore and accessory property	.....	20,532	.....	1,533,807	.....	1,535	.....	5,190
Cash capital	.....	15,400	.....	1,363,460	.....	.....	.....	.....
Total	.....	160,370	.....	3,422,885	.....	85,832	.....	14,834

Items.	Cecil.		Charles.		Dorchester.		Harford.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	.....	.....	3	$1,450	344	$147,335	.....	.....
Tonnage	.....	.....	22	.....	2,929	.....	.....	.....
Outfit	.....	.....	.....	525	.....	52,457	.....	.....
Vessels transporting	.....	.....	4	2,650	50	79,450	5	$6,850
Tonnage	.....	.....	95	.....	2,171	.....	49	.....
Outfit	.....	.....	.....	420	.....	7,604	.....	360
Boats	276	$12,873	313	13,670	1,642	94,082	237	20,155
Apparatus—vessel fisheries:								
Oyster dredges or scrapes	.....	.....	6	105	1,352	21,940	.....	.....
Crab dredges or scrapes	.....	.....	.....	.....	19	57	.....	.....
Tongs	.....	.....	.....	.....	12	87	.....	.....
Eel pots	.....	.....	.....	.....	1,550	776	.....	.....
Apparatus—shore fisheries:								
Seines	14	4,745	6	3,250	8	415	14	9,615
Gill nets	234	9,583	239	7,279	771	3,214	356	10,454
Pound nets	144	10,280	66	5,675	137	10,810	16	1,460
Trap nets and weirs	9	580	.....	.....	.....	.....	.....	.....
Fyke nets	4,322	9,245	.....	.....	72	368	1,285	3,144
Trammel nets	2	160	.....	.....	12	35	14	1,915
Minor nets	7	21	4	20	134	325	7	350
Lines	.....	.....	.....	3	.....	171	.....	29
Eel pots	905	486	88	45	753	374	606	343
Oyster dredges or scrapes	.....	.....	11	77	678	7,523	.....	.....
Crab dredges or scrapes	.....	.....	.....	.....	198	594	.....	.....
Tongs	.....	.....	305	1,453	2,277	13,466	.....	.....
Shore and accessory property	.....	9,200	.....	5,350	.....	62,528	.....	43,195
Cash capital	.....	500	.....	.....	.....	67,300	.....	6,000
Total	.....	57,673	.....	41,972	.....	570,911	.....	103,870

Table showing, by counties, the vessels, boats, apparatus, and shore property employed in the fisheries of Maryland in 1897—Continued.

Items.	Kent.		Prince George.		Queen Anne.		St. Mary.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	2	$1,375	.....	.....	.....	.....	14	$5,450
Tonnage	25	.....	.....	.....	.....	.....	118	.....
Outfit	.....	900	.....	.....	.....	.....	.....	2,048
Vessels transporting	17	11,150	.....	.....	11	$8,260	19	13,050
Tonnage	341	.....	.....	.....	187	.....	344	.....
Outfit	.....	2,008	.....	.....	.....	1,315	.....	2,239
Boats	711	40,627	55	$1,401	641	31,231	589	19,540
Apparatus—vessel fisheries:								
Oyster dredges or scrapes	.....	.....	.....	.....	.....	.....	28	407
Seines	2	415	.....	.....	.....	.....	.....	.....
Apparatus—shore fisheries:								
Seines	34	1,324	14	2,640	59	1,597	2	375
Gill nets	2,306	23,323	30	610	145	1,034	12	585
Pound nets	98	7,110	8	570	26	3,120	66	9,105
Trap nets and weirs	.....	.....	1	15	.....	.....	.....	.....
Fyke nets	175	2,705	.....	.....	90	778	.....	.....
Minor nets	.....	.....	8	40	.....	.....	30	8
Lines	.....	407	.....	.....	.....	245	.....	64
Eel pots	54	18	.....	.....	172	84	95	38
Oyster dredges or scrapes	.....	.....	.....	.....	.....	.....	74	704
Tongs	760	4,500	.....	.....	792	4,878	814	4,135
Shore and accessory property	.....	6,634	.....	915	.....	4,556	.....	1,120
Total	.....	102,496	.....	6,191	.....	57,093	.....	58,868

Items.	Somerset.		Talbot.		Wicomico.		Worcester.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	381	$179,545	92	$57,015	14	$7,100	.....	.....	1,087	$650,275
Tonnage	4,092	.....	835	.....	124	.....	.....	.....	13,162	.....
Outfit	.....	71,746	.....	21,175	.....	1,469	.....	.....	.....	218,044
Vessels transporting	52	46,750	19	18,250	8	5,700	7	$9,150	332	428,285
Tonnage	1,350	.....	383	.....	146	.....	215	.....	10,508	.....
Outfit	.....	6,951	.....	1,935	.....	837	.....	435	.....	47,938
Boats	1,720	116,690	1,050	65,123	669	26,761	506	13,224	10,077	562,455
Apparatus—vessel fisheries:										
Oyster dredges or scrapes	1,298	21,442	368	5,520	52	808	.....	.....	3,877	65,306
Crab dredges or scrapes	100	418	.....	.....	.....	.....	.....	.....	119	475
Tongs	9	45	.....	.....	1	12	.....	.....	72	560
Seines	.....	.....	.....	.....	.....	.....	.....	.....	2	415
Lines	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Eel pots	.....	.....	.....	.....	.....	.....	.....	.....	1,550	776
Apparatus—shore fisheries:										
Seines	.....	.....	2	200	3	225	106	5,655	*328	38,867
Gill nets	75	510	1,240	4,157	588	5,821	1,898	4,604	†8,464	77,264
Pound nets	34	4,885	101	7,335	21	3,150	1	3,000	839	80,340
Trap nets and weirs	.....	.....	5	150	.....	.....	.....	.....	17	775
Fyke nets	24	445	43	394	223	3,401	.....	.....	7,117	23,108
Trammel nets	.....	.....	.....	.....	.....	.....	.....	.....	‡31	2,320
Minor nets	302	541	119	128	15	50	69	308	833	1,915
Lines	.....	102	.....	780	.....	143	.....	153	.....	2,283
Eel pots	87	33	88	44	179	109	138	69	3,360	1,770
Spears	50	113	.....	.....	.....	.....	.....	.....	50	113
Oyster dredges or scrapes	897	12,725	68	680	18	202	.....	.....	1,837	23,511
Crab dredges or scrapes	2,489	9,225	.....	.....	.....	.....	.....	.....	2,687	9,819
Tongs	1,493	6,828	1,115	7,224	653	3,924	305	1,469	11,119	66,087
Shore and accessory property	.....	113,876	.....	48,884	.....	3,635	.....	17,712	.....	1,878,669
Cash capital	.....	162,550	.....	23,075	.....	2,000	.....	.....	.....	1,640,285
Total	.....	755,420	.....	262,069	.....	65,347	.....	55,779	.....	5,821,610

*Total length of seines, 73,866 yards. †Total length of gill nets, 938,888 yards.
‡Total length of trammel nets, 6,504 yards.

Table showing, by counties, the yield of the fisheries of Maryland in 1897.

Species.	Cecil.		Charles.		Dorchester.		Harford.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	1,908,440	$8,847	1,153,000	$5,336	1,122,484	$7,727	1,682,520	$8,568
Alewives, salted	1,785,360	15,966	248,000	1,580			3,279,740	31,898
Alewives, smoked							3,360	120
Black bass	5,280	520					675	56
Blue-fish			1,350	48	8,100	318	2,150	107
Carp	6,100	141	820	25			3,820	120
Cat-fish	76,645	2,763	33,130	880	55,325	1,820	54,427	1,979
Croakers			1,000	20	7,250	170		
Drum					400	4		
Eels	71,830	2,238	4,200	192	89,910	3,594	52,360	1,983
Flounders			300	6	1,625	63		
Menhaden					5,000	5		
Perch, white	179,787	8,020	53,858	2,595	29,175	1,683	53,290	3,000
Perch, yellow	131,760	4,046	11,150	279	9,875	290	17,600	478
Pike	19,692	1,687			3,233	257	4,898	395
Shad, fresh	680,281	18,824	735,732	14,825	449,590	15,559	432,361	11,668
Shad, salted			20,000	500				
Sheepshead					200	12		
Spots					600	48		
Squeteague			1,625	61	7,550	262		
Striped bass	85,540	7,276	74,064	3,669	28,312	2,112	133,178	9,844
Sturgeon			12,984	628	42,215	1,660		
Suckers	25,100	520			4,020	107	17,400	331
Sun-fish	850	30					150	2
Crabs, soft					199,767	8,976		
Crabs, hard			5,600	36	1,356,250	10,635		
Crawfish			833	75				
Oysters			524,230	29,147	13,212,059	627,575		
Turtles	1,400	49			1,300	65		
Terrapin					3,652	1,905		
Caviar			954	420				
Total	4,978,065	70,927	2,882,830	60,322	16,637,892	684,847	5,737,929	70,549

Species.	Somerset.		Talbot.		Wicomico.		Worcester.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	139,600	$665	455,720	$3,186	426,440	$2,482	592,200	$4,563
Blue-fish	25,190	651	63,320	2,515	100	6	14,840	696
Bonito							1,000	50
Butter-fish	400	3			640	25	86,000	2,320
Cat-fish	9,235	314	21,890	636	80,404	3,386	4,600	143
Cero							1,000	50
Croakers	163,700	1,099	880	27			16,000	516
Drum	32,100	277					10,500	105
Eels	35,276	1,133	18,100	593	9,350	431	11,500	492
Flounders	2,000	46	900	36	3,450	153	1,800	72
King-fish							1,000	35
Menhaden	69,400	90					73,500	138
Mullet							1,500	60
Perch, white	11,885	332	28,780	1,268	29,330	2,157	201,665	11,918
Perch, yellow			8,750	395	10,200	330	1,500	63
Pike			2,410	167	5,374	533	17,870	558
Pompano	110	11					200	24
Sea bass							8,200	410
Shad, fresh	99,310	3,071	729,395	21,068	457,052	17,580	72,500	2,576
Spanish mackerel	600	48	2,400	212			800	96
Spots							1,200	52
Squeteague	87,950	1,258	9,250	366	705	43	390,700	9,214
Striped bass	5,725	348	19,350	1,377	18,526	1,567	76,940	10,965
Sturgeon	735	27			80,985	2,323	4,500	220
Suckers			1,400	32	9,250	188		
Crabs, soft	3,395,337	141,349	150,042	5,558				
Crabs, hard	632,667	5,344	2,231,793	14,511				
Oysters	8,944,558	510,669	7,055,874	332,436	1,717,450	96,956	2,250,507	256,642
Clams	49,368	3,780					72,920	5,062
Turtles					2,765	175		
Terrapin	1,143	850			2,231	248		
Total	13,706,289	671,365	10,800,254	384,383	2,854,252	128,583	3,914,942	307,030

Table showing, by counties, the yield of the fisheries of Maryland in 1897—Continued.

Species.	Anne Arundel.		Baltimore.		Calvert.		Caroline.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	928,000	$4,404	134,267	$428	626,400	$3,580	247,640	$1,771
Alewives, salted	3,000	72						
Blue-fish	23,560	1,057	4,100	144	4,550	194		
Carp	28,660	1,446	36,990	1,110	3,550	117	1,550	40
Cat-fish	20,170	880	46,250	958	7,200	285	11,330	411
Croakers	12,750	443	2,400	48	19,700	296		
Eels	33,475	1,289	26,028	561	1,040	55	1,950	77
Flounders					7,150	293		
Menhaden	25,200	42						
Perch, white	24,630	1,600	33,219	1,686	8,425	331	22,470	943
Perch, yellow	15,350	501	104,600	2,213	2,630	84	11,310	562
Pike	2,795	160	40,798	3,846			1,940	144
Sea bass			8,000	280				
Shad, fresh	171,375	4,877	30,800	770	160,120	3,516	657,596	17,159
Squeteague	45,475	1,799	3,300	99	15,200	456		
Striped bass	24,950	1,870	66,320	4,406	42,100	2,819	10,132	776
Sturgeon					350	15		
Suckers	700	19	9,300	181	700	21	4,380	129
Sun-fish	3,000	120						
Crabs, soft	154,461	8,398						
Crabs, hard	220,200	1,685						
Shrimp			1,020	510				
Oysters	4,093,369	232,681	3,300,010	237,647	1,903,055	138,168		
Terrapin	20	23			220	200		
Caviar					40	14		
Total	5,831,040	263,366	3,847,402	254,887	2,803,030	150,444	970,298	22,012

Species.	Kent.		Prince George.		Queen Anne.		St. Mary.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	778,560	$5,514	529,700	$2,482	396,760	$2,855	605,468	$10,249
Alewives, salted	92,800	1,160						
Black bass			810	37				
Blue-fish	8,400	269			7,650	232	23,398	919
Carp	3,000	90	3,965	146	17,180	451	5,290	139
Cat-fish	63,800	2,355	39,130	1,472	46,810	1,187	7,675	175
Croakers	850	36			2,350	56	9,415	178
Eels	10,705	364	2,600	78	32,620	1,366	5,200	238
Flounders							10,132	428
Hickory shad							3,752	53
Menhaden							180,000	90
Perch, white	178,964	11,039	22,555	1,172	19,088	1,100	28,524	1,124
Perch, yellow	29,200	1,877	12,400	382	25,560	1,206	3,850	77
Pike	11,610	881	2,300	151	1,790	145		
Shad, fresh	544,708	13,733	186,182	3,858	118,476	4,473	254,085	5,308
Spanish mackerel							5,962	477
Spots							1,128	39
Squeteague	2,740	93			6,100	183	26,584	958
Striped bass	201,909	13,205	17,690	1,036	84,257	6,369	46,354	2,406
Sturgeon							3,800	135
Suckers	2,400	70	5,550	128	2,830	75		
Crabs, soft	76,080	5,166			122,192	7,515	18,000	675
Crabs, hard	282,533	3,232			528,440	3,906	75,833	600
Crawfish			2,075	187				
Oysters	2,325,834	140,625			2,725,821	122,953	2,731,771	159,703
Caviar							600	210
Total	4,614,093	199,209	824,957	11,129	4,137,924	154,072	4,046,821	184,181

The number and value of shad taken in each county of Maryland in 1897 is shown in the following table:

Counties.	No.	Value.	Counties.	No.	Value.
Anne Arundel	48,964	$4,877	Prince George	53,195	$3,858
Baltimore	8,800	770	Queen Anne	33,850	4,473
Calvert	45,749	3,516	St. Mary	72,596	5,308
Caroline	187,885	17,159	Somerset	28,374	3,071
Cecil	194,366	18,824	Talbot	208,399	21,068
Charles	215,923	15,325	Wicomico	180,586	17,580
Dorchester	128,454	15,559	Worcester	20,714	2,576
Harford	123,582	11,668			
Kent	155,631	13,733	Total	*1,057,018	159,365

*5,799,563 pounds.

PRODUCTS TAKEN BY VESSELS AND BOATS WITH EACH APPARATUS.

Owing to the large quantity of oysters taken in this State, dredges and tongs are the most productive forms of apparatus employed in both the vessel and shore fisheries. In the vessel fisheries, dredges are more generally used than tongs. The catch taken with them consisted of 2,416,446 bushels of oysters valued at $943,051; soft crabs, 358,851 in number, valued at $5,312; and hard crabs, 47,601 in number, valued at $142. Tongs were also used to some extent, the catch by them being 31,578 bushels of oysters valued at $13,357. In the shore or boat fisheries, tongs are the principal apparatus, the quantity of oysters obtained with them being 4,118,717 bushels valued at $1,667,651, and of clams 15,286 bushels valued at $8,842. Dredges or scrapes are also used extensively by small boats in the oyster and crab fisheries. The quantity of oysters secured by small boats with dredges was 688,193 bushels valued at $261,143; of soft crabs 9,940,308 in number valued at $138,512, and of hard crabs 602,100 in number valued at $1,756. The value of all products taken with dredges in the vessel and shore fisheries combined was $1,349,916, and with tongs $1,689,850; a total of $3,039,766.

Seines are the next most important apparatus, with respect to the value of the catch. They were used in the vessel fisheries to a limited extent, but were operated chiefly by small boats. The catch with seines by vessels was 42,004 pounds of fish valued at $2,642, and by small boats in the shore fisheries 10,445,422 pounds of fish valued at $142,249, soft crabs 606,816 in number, valued at $12,931, and 220 pounds of terrapin valued at $200; the total value of the catch with this apparatus being $158,022. The principal species of fish taken were alewives, cat-fish, white and yellow perch, shad, squeteague, and striped bass.

The pound-net fisheries, embracing pound nets, trap nets, and weirs, were also of considerable importance. The catch of fish in this group of apparatus exceeded both in quantity and value that of seines, but the entire yield was slightly less in value. The products of this fishery consisted of 11,407,942 pounds of fish valued at $157,518, and 600 pounds of caviar valued at $210; a total of 11,408,542 pounds, having a value of $157,728. The species secured in largest quantities were alewives, blue-fish, cat-fish, croakers, menhaden, white and yellow perch, shad, squeteague, and striped bass.

Gill nets were fished to a greater or less extent in every county having fisheries, and were the only apparatus, except pound nets, so widely distributed. The products derived were 4,653,198 pounds of fish valued at $137,649, and 994 pounds of caviar valued at $434; a total of 4,654,192 pounds valued at $138,083, the value being second to that of the pound-net catch. Gill nets surpass every other single apparatus in the capture of shad, the catch of that species being

3,226,983 pounds valued at $85,152. Alewives, blue-fish, white perch, striped bass, and sturgeon were also taken in large quantities.

The products taken with other kinds of apparatus are also noteworthy. The catch obtained by vessels with hand lines was 12,000 pounds of blue-fish and sea bass valued at $420; and by boats with hand lines and trot lines, 224,750 pounds of fish valued at $8,535; soft crabs, 248,127 in number, valued at $1,518; hard crabs, 15,349,248 in number, valued at $38,049; and 2,025 pounds of turtle valued at $131, the total value of the catch with lines being $48,653. The quantity of fish in fyke nets was 961,024 pounds valued at $33,645; of terrapin 3,837 pounds valued at $1,693, and of turtle 3,440 pounds valued at $158; the total catch of all species being 968,301 pounds valued at $35,496.

A variety of minor nets, consisting chiefly of dip nets, bow nets, terrapin nets, crawfish nets or dredges, turtle pots, and sunken fyke nets, was also operated, obtaining 103,519 pounds of fish valued at $3,508; hard and soft crabs 1,194,534 in number, valued at $19,366; shrimp 1,020 pounds valued at $510; crawfish 2,908 pounds valued at $262; terrapin 3,209 pounds valued at $1,333; the total value being $24,979. The quantity of eels caught by vessels with eel pots was 61,000 pounds valued at $2,440, and by boats with eel pots and spears 245,295 pounds valued at $8,600, a total of 306,295 pounds valued at $11,040. In trammel nets 57,590 pounds of fish, principally white perch and striped bass, were taken, having a value of $3,539. The apparatus of capture employed in the vessel fisheries of the State was not so varied nor the products obtained so valuable as in the shore or boat fisheries. The aggregate value of the products of the vessel fisheries was $967,364, and of the shore fisheries $2,649,942.

Following are tables showing by counties the quantity and value of all species taken by vessels and boats with each apparatus in 1897:

Table showing, by counties, the seine catch of Maryland in 1897.

Species.	Anne Arundel.		Baltimore.		Calvert.		Caroline.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives, fresh	41,000	$246	67,800	$193	62,500	$313	170,708	$991
Blue-fish	11,715	471	.....	.....	375	24	.....	.....
Carp	28,000	1,420	35,000	1,050	1,100	44	920	21
Cat-fish	13,600	562	23,050	468	6,000	244	4,680	152
Croakers	12,750	443	2,400	48	.....	.....	.....	.....
Eels	8,525	321	5,400	112	300	14	800	32
Flounders	.....	.....	.....	.....	500	24	.....	.....
Perch, white	12,630	717	15,205	784	3,775	151	14,500	532
Perch, yellow	14,800	479	34,700	747	2,000	65	4,490	201
Pike	725	61	9,300	860	.....	.....	410	31
Shad, fresh	11,200	280	11,600	290	21,200	530	190,939	5,542
Squeteague	44,025	1,741	1,800	54	.....	.....	.....	.....
Striped bass	17,400	1,270	43,450	2,875	6,000	360	1,770	140
Suckers	700	19	3,700	69	700	21	950	30
Sun-fish	1,800	72	.....	.....	.....	.....	.....	.....
Crabs, soft	4,000	250	.....	.....	.....	.....	.....	.....
Terrapin	.....	.....	.....	.....	220	200	.....	.....
Total	222,870	8,352	253,405	7,550	104,670	1,990	390,167	7,672

Table showing, by counties, the seine catch of Maryland in 1897—Continued.

Species.	Cecil.		Charles.		Dorchester.		Harford.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives, fresh	607,600	$3,985	450,000	$1,625	75,000	$438	1,548,600	$7,524
Alewives, salted	1,140,400	8,866	240,000	1,500			3,279,740	31,898
Alewives, smoked							3,360	120
Black bass	4,020	394					100	10
Blue-fish			350	12	6,300	252	2,150	107
Carp	2,600	60	820	25			3,080	98
Cat-fish	3,000	113	6,750	168	1,375	34	1,000	20
Eels	680	29	250	5			1,000	20
Perch, white	6,100	304	29,025	1,238	3,425	144	1,900	79
Perch, yellow	10,100	302			1,000	45	1,000	39
Pike	6,000	584			200	15	100	7
Shad, fresh	111,961	3,170	87,400	2,425	9,600	288	97,165	3,241
Shad, salted			20,000	500				
Spots					600	48		
Squeteague			750	26	4,400	175		
Striped bass	55,180	4,837	34,945	1,561	4,700	386	49,738	3,135
Suckers	4,300	85			700	14	800	16
Sun-fish	850	30					150	2
Total	1,952,791	22,759	870,290	9,085	107,300	1,839	4,989,883	46,316

Species.	Talbot.		Prince George.		Queene Anne.		St. Mary.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives, fresh	16,320	$136	421,500	$1,928	14,760	$183		
Black bass			810	37				
Blue-fish					250	10	2,770	$97
Carp			3,765	136	780	20		
Cat-fish	240	10	34,680	1,330	5,260	201	1,750	53
Croakers					2,350	56		
Eels			2,600	78	1,030	38	800	22
Perch, white	400	20	17,530	896	4,638	302	18,200	728
Perch, yellow	650	26	10,000	316	16,560	784		
Pike			2,000	121	1,440	116		
Shad, fresh	26,100	678	66,475	1,570	13,910	748		
Squeteague							5,825	230
Striped bass	200	14	12,810	743	54,890	4,066	23,925	1,061
Suckers			4,950	116	130	5		
Crabs, soft					122,192	7,515		
Total	43,910	884	577,120	7,271	238,190	14,044	53,270	2,191

Species.	Kent.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives, fresh	5,200	$75	14,000	$93	408,000	$8,716	3,902,988	$21,446
Alewives, salted							4,660,140	42,264
Alewives, smoked							3,360	120
Black bass							4,930	441
Blue-fish	6,200	186					30,110	1,159
Carp	3,000	90					79,065	2,964
Cat-fish	7,900	268	2,400	88	4,600	143	116,285	3,854
Croakers	450	18			1,800	90	19,750	655
Eels	1,300	52			300	10	22,985	733
Flounders					600	30	1,100	54
Menhaden					73,500	138	73,500	138
Mullet					1,500	60	1,500	60
Perch, white	11,950	759	2,600	148	111,540	6,123	253,418	12,925
Perch, yellow	1,350	54	300	12	1,500	63	98,450	3,133
Pike					15,870	488	36,045	2,283
Shad, fresh	3,300	144	7,500	375	11,138	432	669,488	19,713
Shad, salted							20,000	500
Spots							600	48
Squeteague	400	12			22,100	864	99,300	3,102
Striped bass	13,410	846	1,300	130	32,160	4,730	351,878	26,154
Suckers	800	24					17,730	399
Sun-fish							2,800	104
Crabs, soft	76,080	5,166					202,272	12,931
Terrapin							220	200
Total	131,340	7,694	28,100	846	684,608	16,887	10,647,914	155,380

Table showing, by counties, the seine catch of Maryland in 1897—Continued.

Species.	Kent.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	700	$23					700	$23
Cat-fish	500	30					500	30
Eels	100	4					100	4
Perch, white	2,064	182					2,064	182
Pike	100	8					100	8
Squeteague	840	21					840	21
Striped bass	37,500	2,370					37,500	2,370
Suckers	200	4					200	4
Total	42,004	2,642					42,004	2,642
Total shore and vessel	173,344	10,336	28,100	$846	684,608	$16,887	10,689,918	158,022

Table showing, by counties, the gill-net catch in the shore fisheries of Maryland in 1897.

Species.	Anne Arundel.		Baltimore.		Calvert.		Caroline.		Cecil.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	41,000	$328			400	$6	13,920	$202		
Blue-fish	11,100	555								
Perch, white	500	40			300	6	200	14		
Shad	12,000	300	6,000	$150	16,120	403	447,233	11,076	508,283	$13,631
Striped bass	2,300	180	9,800	616	800	39	6,042	472	17,220	1,231
Sturgeon					350	15				
Caviar					40	14				
Total	66,900	1,403	15,800	766	18,010	483	467,395	11,764	525,503	14,862

Species.	Charles.		Dorchester.		Harford.		Kent.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	118,000	$662	29,800	$209	24,000	$254	88,800	$1,286
Blue-fish			1,300	46				
Perch, white	1,250	75			14,140	918	108,800	6,993
Perch, yellow							11,000	550
Pike					1,480	122		
Shad	560,996	10,710	189,069	6,819	331,868	8,283	467,910	11,481
Squeteague			700	17				
Striped bass	6,850	414	300	36	54,740	4,432	181,430	8,545
Sturgeon	12,984	628	41,040	1,619				
Caviar	954	420						
Total	701,034	12,909	262,209	8,746	426,178	14,009	807,940	28,855

Species.	Prince George.		Queen Anne.		St. Mary.		Somerset.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives			47,600	$486				
Blue-fish					14,000	$560	17,090	$388
Perch, white	1,000	$40						
Shad	102,170	1,948	34,884	1,297			10,715	467
Spanish mackerel					5,187	415		
Squeteague					1,425	50	650	10
Striped bass	1,205	72						
Total	104,375	2,060	82,484	1,783	20,612	1,025	28,455	865

Species.	Talbot.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	40,040	$436	63,332	$556	184,200	$847	651,092	$5,272
Blue-fish	60,120	2,387					103,610	3,936
Cat-fish			1,400	70			1,400	70
Perch, white			3,000	177	90,125	5,790	219,315	14,053
Perch, yellow			250	6			11,250	556
Pike			400	40	2,000	65	3,830	227
Shad	242,757	6,177	290,303	12,166	6,675	244	3,226,983	85,152
Spanish mackerel	2,400	212					7,587	627
Squeteague	7,450	294			1,200	48	11,425	419
Striped bass	5,930	467	450	45	44,780	6,235	281,847	22,784
Sturgeon			78,485	2,251			132,859	4,513
Suckers			2,000	40			2,000	40
Caviar							994	484
Total	358,697	9,973	439,620	15,351	328,980	13,229	4,654,192	138,083

Table showing, by counties, the pound net, trap net, and weir catch in the shore fisheries of Maryland in 1897.

Species.	Anne Arundel.		Baltimore.		Calvert.		Caroline.		Cecil.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	844,000	$3,818	51,667	$197	563,500	$3,261	60,460	$555	1,286,400	$4,767
Alewives, salted	3,000	72	.....	.....	.....	.....	.....	.....	644,960	7,100
Blue-fish	715	31	100	4	4,175	170	.....	.....	.....	.....
Carp	410	16	1,700	51	2,450	73	500	15	2,500	51
Cat-fish	720	36	8,090	188	1,200	41	4,850	188	28,645	978
Croakers	.....	.....	.....	.....	19,700	296	.....	.....	.....	.....
Eels	5,750	238	3,613	107	400	13	400	16	7,050	257
Flounders	.....	.....	.....	.....	6,650	269	.....	.....	.....	.....
Menhaden	25,200	42	.....	.....	.....	.....	.....	.....	.....	.....
Perch, white	2,200	135	4,110	206	4,350	174	3,100	185	48,007	2,482
Perch, yellow	.....	.....	18,735	443	630	19	3,410	180	84,110	2,544
Pike	120	5	6,776	659	.....	.....	830	59	6,912	554
Shad	148,175	4,297	13,200	330	122,800	2,583	18,224	507	53,208	1,783
Squeteague	1,450	58	1,500	45	15,200	456	.....	.....	.....	.....
Striped bass	5,250	420	12,680	888	35,300	2,420	1,560	104	10,070	954
Suckers	.....	.....	1,300	26	.....	.....	2,300	65	6,800	139
Total	1,037,020	9,168	123,471	3,144	776,355	9,775	95,634	1,874	2,178,662	21,609

Species.	Charles.		Dorchester.		Harford.		Kent.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	585,000	$3,049	1,015,284	$6,987	109,920	$790	614,160	$3,385
Alewives, salted	8,000	80	.....	.....	.....	.....	92,800	1,160
Blue-fish	1,000	36	.....	.....	.....	.....	1,500	60
Cat-fish	26,380	712	32,850	916	12,017	376	16,400	641
Croakers	1,000	20	7,250	170	.....	.....	.....	.....
Drum	.....	.....	400	4	.....	.....	.....	.....
Eels	250	7	6,160	244	1,430	48	4,280	160
Flounders	300	6	1,625	63	.....	.....	.....	.....
Menhaden	.....	.....	5,000	5	.....	.....	.....	.....
Perch, white	23,583	1,282	23,500	1,353	9,180	466	41,300	2,192
Perch, yellow	11,150	279	7,875	235	11,600	289	7,100	287
Pike	.....	.....	1,733	138	313	25	2,150	168
Shad	87,336	1,690	250,421	8,438	3,328	144	61,883	1,783
Squeteague	875	35	1,450	50	.....	.....	1,500	60
Striped bass	32,269	1,694	22,262	1,606	890	85	17,259	1,267
Sturgeon	.....	.....	1,175	41	.....	.....	.....	.....
Suckers	.....	.....	2,470	68	1,000	23	550	17
Total	777,143	8,890	1,379,455	20,318	149,678	2,216	860,882	11,180

Species.	Prince George.		Queen Anne.		St. Mary.		Somerset.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	108,200	$554	324,800	$2,069	605,468	$10,249	134,200	$605
Blue-fish	.....	.....	7,400	222	6,628	262	7,200	235
Butter-fish	.....	.....	.....	.....	.....	.....	400	8
Carp	200	10	600	21	5,290	139	.....	.....
Cat-fish	4,450	142	3,000	103	5,925	122	3,300	90
Croakers	.....	.....	.....	.....	9,415	178	163,000	1,085
Drum	.....	.....	.....	.....	.....	.....	32,000	274
Eels	.....	.....	16,600	693	200	6	1,066	52
Flounders	.....	.....	.....	.....	10,132	428	1,500	30
Hickory shad	.....	.....	.....	.....	3,752	53	.....	.....
Menhaden	.....	.....	.....	.....	180,000	90	69,400	90
Perch, white	4,025	236	10,050	562	10,324	396	4,400	22
Perch, yellow	2,400	66	2,200	92	3,850	77	.....	.....
Pike	300	30	50	4	.....	.....	.....	.....
Pompano	.....	.....	.....	.....	.....	.....	110	11
Shad	17,537	340	68,375	2,372	254,085	5,808	88,700	1,112
Spanish mackerel	.....	.....	.....	.....	775	62	600	48
Spots	.....	.....	.....	.....	1,128	39	.....	.....
Squeteague	.....	.....	6,100	183	19,334	678	72,800	674
Striped bass	3,675	221	23,917	1,903	22,429	1,345	8,895	202
Sturgeon	.....	.....	.....	.....	3,800	135	735	27
Suckers	600	12	.....	.....	.....	.....	.....	.....
Caviar	.....	.....	.....	.....	600	210	.....	.....
Total	141,387	1,611	463,092	8,224	1,143,135	19,777	533,306	4,560

Table showing, by counties, the pound net, trap net, and weir catch in the shore fisheries of Maryland in 1897—Continued.

Species.	Talbot.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	393,440	$2,536	276,300	$1,353	.....	.....	6,972,799	$44,175
Alewives, salted	.....	.....	.....	.....	.....	.....	748,760	8,412
Blue-fish	3,200	128	.....	.....	2,000	$80	33,948	1,228
Bonito	.....	.....	.....	.....	1,000	50	1,000	50
Butter-fish	.....	.....	.....	.....	86,000	2,320	86,400	2,323
Carp	.....	.....	.....	.....	.....	.....	13,650	376
Cat-fish	18,250	508	4,150	166	.....	.....	170,227	5,207
Cero	.....	.....	.....	.....	1,000	50	1,000	50
Croakers	880	27	.....	.....	2,400	72	203,645	1,848
Drum	.....	.....	.....	.....	10,500	105	42,900	383
Eels	4,900	165	400	22	.....	.....	52,499	2,018
Flounders	900	36	550	24	1,200	42	22,857	898
Hickory shad	.....	.....	.....	.....	.....	.....	3,752	53
King-fish	.....	.....	.....	.....	1,000	35	1,000	35
Menhaden	.....	.....	.....	.....	.....	.....	279,600	227
Perch, white	26,780	1,155	2,400	205	.....	.....	217,309	11,051
Perch, yellow	7,400	334	1,200	52	.....	.....	161,660	4,897
Pike	2,130	148	324	32	.....	.....	21,638	1,822
Pompano	.....	.....	.....	.....	200	24	310	35
Shad	459,188	14,175	140,910	4,441	750	28	1,738,120	49,331
Spanish mackerel	.....	.....	.....	.....	800	96	2,175	206
Spots	.....	.....	.....	.....	1,200	52	2,328	91
Squeteague	1,800	72	100	3	272,000	5,440	394,109	7,754
Striped bass	11,920	802	2,950	246	.....	.....	206,326	14,157
Sturgeon	.....	.....	2,500	72	4,500	220	12,710	495
Suckers	1,200	26	1,000	20	.....	.....	17,220	396
Caviar	.....	.....	.....	.....	.....	.....	600	210
Total	931,988	20,102	432,784	6,636	384,550	8,614	11,408,542	157,728

Table showing, by counties, the fyke-net catch in the shore fisheries of Maryland in 1897.

Species.	Anne Arundel.		Baltimore.		Caroline.		Cecil.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	2,000	$12	14,800	$38	2,552	$23	14,440	$95
Black bass	.....	.....	.....	.....	.....	.....	1,260	126
Carp	.....	.....	290	9	130	4	1,000	30
Cat-fish	5,350	257	15,110	302	1,800	71	44,000	1,632
Eels	.....	.....	3,790	77	750	29	10,250	352
Perch, white	2,200	148	13,904	696	4,670	212	124,180	5,159
Perch, yellow	.....	.....	51,165	1,023	3,410	181	36,550	1,160
Pike	1,350	70	24,722	2,327	700	54	5,880	468
Shad	.....	.....	.....	.....	1,200	34	2,922	84
Striped bass	.....	.....	390	27	760	60	2,670	222
Suckers	.....	.....	4,300	86	1,130	34	14,000	296
Turtles	.....	.....	.....	.....	.....	.....	1,400	49
Total	10,900	487	128,471	4,585	17,102	702	258,552	9,673

Species.	Dorchester.		Harford.		Kent.		Queen Anne.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	2,400	$93	.....	.....	70,400	$768	9,600	$117
Black bass	.....	.....	275	$22	.....	.....	.....	.....
Carp	.....	.....	.....	.....	.....	.....	15,800	410
Cat-fish	11,200	491	34,560	1,307	20,500	676	38,550	883
Croakers	.....	.....	.....	.....	400	18	.....	.....
Eels	.....	.....	5,000	182	925	32	.....	.....
Perch, white	1,750	151	21,960	1,116	14,850	913	4,400	236
Perch, yellow	500	5	5,000	150	9,750	486	6,800	330
Pike	800	64	2,835	224	9,360	705	300	25
Shad	500	14	.....	.....	11,615	325	1,307	56
Striped bass	1,050	84	1,280	64	2,310	177	1,550	127
Suckers	850	25	6,400	108	850	25	2,700	70
Terrapins	2,898	1,545	.....	.....	.....	.....	.....	.....
Turtles	1,800	65	.....	.....	.....	.....	.....	.....
Total	23,248	2,537	77,810	3,173	140,960	4,125	81,007	2,254

Table showing, by counties, the fyke-net catch in the shore fisheries of Maryland in 1897—Continued.

Species.	Somerset.		Talbot.		Wicomico.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	5,400	$60	5,920	$78	72,808	$480	200,320	$1,764
Black bass							1,535	148
Blue-fish					100	6	100	6
Butter-fish					640	25	640	25
Carp							17,220	463
Cat-fish	5,835	220	3,400	118	35,104	1,411	215,409	7,368
Croakers							400	18
Eels			1,600	62	2,050	125	24,365	859
Flounders	200	10			2,900	129	3,100	139
Perch, white	7,485	310	1,600	93	19,130	1,407	216,129	10,441
Perch, yellow			700	35	7,950	245	121,825	3,615
Pike			280	19	4,650	461	50,877	4,417
Shad	8,420	334	1,350	38	18,339	598	45,653	1,483
Squeteague					605	40	605	40
Striped bass	1,830	146	1,300	94	13,326	1,096	26,466	2,097
Suckers			200	6	5,950	122	36,380	772
Terrapins					939	148	3,837	1,693
Turtles					740	44	3,440	158
Total	29,170	1,080	16,350	543	185,231	6,337	968,301	35,496

Table showing, by counties, the catch of minor nets in the shore fisheries of Maryland in 1897.

Species.	Anne Arundel.		Baltimore.		Cecil.		Charles.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shad					3,907	$156		
Crabs, soft	150,461	$8,148						
Shrimp			1,020	$510				
Crawfish							833	$75
Terrapin	20	23						
Total	150,481	8,171	1,020	510	3,907	156	833	75

Species.	Dorchester.		Prince George.		St. Mary.		Somerset.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value,
Shad							41,475	$1,158
Crabs, soft	36,000	$1,620			18,000	$675	126,051	4,881
Crabs, hard							333	2
Crawfish			2,075	$187				
Terrapin	754	360					1,143	850
Total	36,754	1,980	2,075	187	18,000	675	169,002	6,891

Species.	Talbot.		Wicomico.		Worcester		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Cat-fish			700	$31			700	$31
Perch, white			2,200	220			2,200	220
Perch, yellow			500	15			500	15
Shad					53,937	$1,872	99,319	3,186
Striped bass			500	50			500	50
Suckers			300	6			300	6
Crabs, soft	67,333	$4,040					397,845	19,364
Crabs, hard							333	2
Shrimp							1,020	510
Crawfish							2,908	262
Terrapin			1,292	100			3,209	1,333
Total	67,333	4,040	5,492	422	53,937	1,872	508,834	24,979

Table showing, by counties, the trammel-net catch in the shore fisheries of Maryland in 1897.

Species.	Anne Arundel.		Cecil.		Dorchester.		Hartford.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Black bass							300	$24	300	$24
Carp	250	$10					740	22	990	32
Cat-fish	500	25	1,000	$40	800	$12	1,600	64	3,900	141
Perch, white	7,000	560	1,500	75	500	35	2,150	86	11,150	756
Perch, yellow	550	22	1,000	40	500	5			2,050	67
Pike	600	24	900	81	500	40	220	17	2,220	162
Striped bass			400	32			26,180	2,093	26,580	2,125
Suckers							9,200	184	9,200	184
Sun-fish	1,200	48							1,200	48
Total	10,100	689	4,800	268	2,300	92	40,390	2,490	57,590	3,539

Table showing, by counties, the line catch of Maryland in 1897.

Species.	Anne Arundel.		Baltimore.		Charles.		Dorchester.		Harford.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Blue-fish			4,000	$140						
Sea bass			8,000	280						
Total			12,000	420						
Shore fisheries:										
Blue-fish							500	$20		
Cat-fish							9,100	367	5,250	$212
Perch, white									3,960	335
Sheepshead							200	12		
Squeteague							1,000	20		
Striped bass									350	35
Crabs, hard	220,200	$1,685			5,600	$36	1,356,250	10,635		
Total	220,200	1,685			5,600	36	1,367,050	11,054	9,560	582

Species.	Kent.		Queen Anne.		St. Mary.		Somerset.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Blue-fish							900	$28
Cat-fish	18,500	$740					100	4
Croakers							700	14
Drum							100	3
Flounders							300	6
Squeteague							14,500	574
Striped bass			3,900	$273				
Crabs, hard	282,533	3,232	528,440	3,906	75,833	$600	415,767	3,444
Total	301,033	3,972	532,340	4,179	75,833	600	432,367	4,073

Species.	Talbot.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish							4,000	$140
Sea bass							8,000	280
Total							12,000	420
Shore fisheries:								
Blue-fish					12,840	$616	14,240	664
Cat-fish			36,650	$1,620			69,600	2,948
Croakers					11,800	354	12,500	368
Drum							100	3
Eels			500	30			500	30
Flounders							300	6
Perch, white							3,960	335
Sheepshead							200	12
Sea bass					8,200	410	8,200	410
Squeteague					95,400	2,862	110,900	3,456
Striped bass							4,250	308
Crabs, soft	82,709	$1,518					82,709	1,518
Crabs, hard	2,231,793	14,511					5,116,416	38,049
Turtle			2,025	131			2,025	131
Total	2,314,502	16,029	39,175	1,781	128,240	4,242	5,425,900	48,238

Table showing the catch of eels by pots and spears in Maryland in 1897.

Counties.	Lbs.	Value.	Counties.	Lbs.	Value.
Shore fisheries:			Shore fisheries:		
Anne Arundel	19,200	$730	Somerset	34,210	$1,081
Baltimore	13,225	265	Talbot	11,600	376
Calvert	940	28	Wicomico	6,400	254
Cecil	53,850	1,600	Worcester	11,200	482
Charles	8,700	180			
Dorchester	22,750	910	Total	245,295	8,600
Harford	44,930	1,733			
Kent	4,100	116	Vessel fisheries:		
Queen Anne	14,990	635	Dorchester	61,000	2,440
St. Mary	4,200	210			

NOTE.—All taken with pots except 30,000 pounds, $900, speared in Somerset County.

Table showing the catch by dredges in Maryland in 1897.

Counties.	Oysters.		Crabs, soft.		Crabs, hard.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Anne Arundel	205,450	$12,149				
Baltimore	3,292,310	237,207				
Calvert	253,680	18,063				
Charles	24,500	1,225				
Dorchester	5,403,650	269,806	16,900	$760		
St. Mary	127,085	7,262				
Somerset	4,864,846	269,587	102,717	4,552	15,867	$142
Talbot	2,631,811	121,177				
Wicomico	111,790	6,575				
Total	16,915,122	943,051	119,617	5,312	15,867	142
Shore fisheries:						
Anne Arundel	124,600	8,053				
Baltimore	7,700	440				
Calvert	191,450	13,675				
Charles	47,250	2,363				
Dorchester	2,059,610	101,291	146,867	6,596		
St. Mary	342,090	19,870				
Somerset	1,827,406	105,775	3,166,569	131,916	200,700	1,756
Talbot	188,510	8,042				
Wicomico	28,735	1,634				
Total	4,817,351	261,143	3,313,436	138,512	200,700	1,756
Grand total	21,732,473	1,204,194	3,433,053	143,824	216,567	1,898

Table showing the catch by tongs in Maryland in 1897.

Counties.	Oysters.		Clams.	
	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:				
Anne Arundel	167,734	$10,457		
Calvert	15,400	1,215		
Dorchester	23,912	900		
Somerset	11,900	635		
Wicomico	2,100	150		
Total	221,046	13,357		
Shore fisheries:				
Anne Arundel	3,595,585	202,022		
Calvert	1,442,525	105,215		
Charles	452,480	25,569		
Dorchester	5,724,887	255,578		
Kent	2,325,834	140,625		
Queen Anne	2,725,821	122,953		
St. Mary	2,262,596	132,571		
Somerset	2,240,406	134,672	49,368	$3,780
Talbot	4,235,553	203,217		
Wicomico	1,574,825	88,597		
Worcester	*2,250,507	256,642	72,920	5,062
Total	28,831,019	1,667,651	122,288	8,842
Grand total	29,052,065	1,681,008	122,288	8,842

*Includes 41,500 pounds of seed oysters.

THE WHOLESALE FISHERY TRADE.

The wholesale fishery trade of Maryland, as here presented, embraces not only the handling of products of the local fisheries in a raw or unprepared condition, but also includes the oyster-canning industry, the opening of oysters and the shipment and sale of the edible part, the preparation of crab meat, the salting of alewives or other species, and the handling of fish, fresh or salted, or any other fishery products, at wholesale or on commission, regardless of the source from which they are derived. The persons and capital employed have also been included in the general fishery tables.

This trade is carried on to a greater or less extent in 25 localities on both sides of the Chesapeake and in 8 different counties. The number of firms engaged in the various branches of the trade was 235, the value of the shore property used was $1,759,391, the cash or working capital amounted to $1,615,285, and the number of persons employed, including proprietors, clerks, operatives, and laborers, was 15,788.

The products consisted of canned oysters valued at $1,540,690, opened oysters valued at $3,552,561, oysters sold in the shell valued at $159,471, oyster shells and lime made from oyster shells valued at $35,022, clams valued at $8,576, crabs, hard and soft, and crab meat worth $288,956, shrimp valued at $328, terrapin and turtles of various species valued at $43,444, fresh fish valued at $742,557, and salted fish, which, with the exception of alewives, are chiefly the product of the New England fisheries, valued at $292,682; the total value of the trade aggregating $6,664,297. The great relative importance of the oyster trade is apparent when it is considered that $5,287,744 of the above amount was received for oyster products.

The principal market is Baltimore, its trade being more than ten times as great as that of any other locality. This is due principally to the existence of a large oyster-canning industry and opened-oyster business. There is also an important commission trade in oysters. In addition to these branches large quantities of fresh fish and other fishery products from all sections of the State are handled, the aggregate value of the trade being $5,189,832.

Crisfield and Cambridge rank next to Baltimore in importance. Cambridge surpasses Crisfield in the extent of its oyster business, but Crisfield is the most extensive market and shipping-point for soft crabs in the United States. The trade of Crisfield, including all products handled, aggregated $427,285, and that of Cambridge $376,804.

The following table shows by localities the extent of the wholesale trade in fishery products of Maryland in 1897.

Table showing the extent of the wholesale trade in fishery products of Maryland in 1897.

Items.	Annapolis.		Baltimore.		Lapidum.		Havre de Grace and Perryville.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Establishments	8	$19,675	105	$1,532,700	3	$3,130	3	$4,150
Cash capital		15,400		1,363,460		2,800		3,700
Persons engaged	349		11,686		53		23	
Products handled:								
Oysters—								
Canned.....1-lb. cans			11,399,867	710,695				
Canned.....2-lb. cans			6,906,370	829,995				
Opened.....gallons	71,992	46,460	2,882,475	2,434,201				
In shell .....bushels			85,500	127,900				
Shells .....do	29,168	364	2,486,000	6,577				
Lime (made from shells), bushels			440,250	17,079				
Clams.....number			416,000	1,332				
Crabs—								
Hard .....do	175,000	526	1,025,000	4,125				
Soft.....do	233,884	4,927	1,671,933	35,775				
Crab meat.....pounds	29,400	3,519	28,416	3,789				
Shrimp.....do			2,625	328				
Terrapin—								
Diamond-back, number			3,988	14,487				
Western .....do			6,744	1,400				
Sliders.....do			61,550	1,210				
Snapping turtles ..do			38,610	1,610				
Fish—								
Fresh.....pounds			17,976,875	715,058			549,296	17,314
Salted .....do			5,685,420	284,271	533,920	6,915	163,200	1,496
Value of products		55,796		5,189,832		6,915		18,810

Items.	St. Michaels.		Claiborne.		Oxford and Bellevue.		Tilghman Island.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Establishments	3	$12,700	2	$2,250	12	$24,345	2	$2,850
Cash capital		7,500		1,400		12,575		1,600
Persons engaged	112		43		650		37	
Products handled:								
Oysters, opened, gallons	84,675	66,876	19,666	14,724	242,953	172,110	23,590	16,693
Crab meat.....pounds					63,756	6,301		
Value of products		66,876		14,724		178,411		16,693

Items.	Deal Island.		Oriole, Chance, and Mount Vernon.		Cambridge.		White Haven and Nanticoke.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Establishments	7	$3,835	5	$1,948	22	$61,515	2	$2,835
Cash capital		3,800		3,000		67,300		2,000
Persons engaged	100		19		1,030		112	
Products handled:								
Oysters, opened, gallons	41,500	34,975			482,193	354,252	27,412	19,179
Oysters in shell, bushels			9,000	3,600				
Shells .....do					769,837	9,652		
Crabs, hard ....number			159,000	1,480	1,370,045	10,485		
Crabs, soft .....do	652,800	15,505	570,000	11,873	75,000	1,565		
Crab meat.....pounds					9,000	900		
Terrapin, diamond-back, number			448	292				
Value of products		50,480		17,195		376,804		19,179

Table showing the extent of the wholesale trade in fishery products of Maryland in 1897—Continued.

Items.	Fairmount and vicinity.		Westover and Edwin.		Coulbourn Creek.	
	No.	Value.	No.	Value.	No.	Value.
Establishments	7	$11,525	5	$425	4	$11,345
Cash capital	.....	14,700	.....	3,500	.....	6,500
Persons engaged	218	.....	15	.....	156	.....
Products handled:						
Oysters opened.....gallons..	74,400	60,500	.....	.....	57,500	46,000
Oysters in shell .....bushels..	.....	.....	10,775	5,681	.....	.....
Crabs, hard .....number..	25,000	125	.....	.....	9,500	62
Crabs, soft .....do....	150,528	5,645	.....	.....	195,000	5,600
Value of products	.....	66,270	.....	5,681	.....	51,662

Items.	Tulls Corner and East Creek.		Crisfield.		Lawsonia.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Establishments	5	$6,275	31	$52,125	9	$5,763	235	$1,759,391
Cash capital	.....	6,200	.....	92,300	.....	7,550	.....	1,615,285
Persons engaged	138	.....	985	.....	162	.....	15,788	.....
Products handled:								
Oysters—								
Canned.....1-lb. cans..	.....	.....	.....	.....	.....	.....	11,399,867	710,695
Canned.....2-lb. cans..	.....	.....	.....	.....	.....	.....	6,906,370	829,995
Opened.....gallons..	53,843	42,752	249,519	201,961	53,666	41,878	4,365,384	3,552,561
In shell.....bushels..	.....	.....	18,480	19,790	3,500	2,500	127,255	159,471
Shells .....do....	.....	.....	100,000	1,350	.....	.....	3,385,005	17,943
Lime (made from shells), bushels	.....	.....	.....	.....	.....	.....	440,250	17,079
Clams.....number..	.....	.....	2,100,000	4,050	1,200,000	3,194	3,716,000	8,576
Crabs—								
Hard .....do....	.....	.....	192,200	1,297	.....	.....	2,955,745	18,000
Soft.....do....	.....	.....	5,432,868	162,599	540,600	11,360	9,522,613	254,849
Crab meat .....pounds..	.....	.....	12,900	1,598	.....	.....	143,472	16,107
Shrimp .....do....	.....	.....	.....	.....	.....	.....	2,625	328
Terrapin—								
Diamond-back, number	.....	.....	12,560	24,455	.....	.....	16,996	39,284
Western .....number..	.....	.....	.....	.....	.....	.....	6,744	1,400
Sliders.....do....	.....	.....	.....	.....	.....	.....	61,550	1,210
Snapping turtles ..do....	.....	.....	.....	.....	.....	.....	38,610	1,610
Fish—								
Fresh.....pounds..	.....	.....	282,246	10,185	.....	.....	18,808,417	742,557
Salted .....do....	.....	.....	.....	.....	.....	.....	6,382,540	292,682
Value of products....	.....	42,752	.....	427,285	.....	58,932	.....	6,664,297

FISHERIES OF VIRGINIA.

The fisheries of Virginia are prosecuted mainly in the waters of Chesapeake Bay and the estuaries and rivers tributary thereto, the exception being the oyster and other fisheries along the ocean coast of Accomac, Northampton, and Princess Anne counties.

The persons employed in the fisheries in 1897 numbered 28,277, of whom 5,102 were on vessels, either fishing or transporting, and 19,150 were engaged in the shore fisheries, while the remaining 4,025 persons were employed in menhaden and oyster factories and in the wholesale trade. This is a considerable increase over 1891, when 4,308 persons were employed on vessels, 16,027 in the shore fisheries, and 3,260 in the factories and the wholesale trade, a total of 23,595.

The investment in the fisheries included 1,055 vessels, valued with their outfit at $914,824; 10,302 boats, worth $493,276; 1,250 pound nets, worth $264,600; 145 seines, worth $54,012; 9,307 gill nets, worth $46,235; oyster dredges and tongs, worth $73,755, and various minor apparatus, worth $12,402. Besides the foregoing there was $607,682 worth of shore and accessory property employed and cash capital to the amount of $424,750, making a total investment of $2,891,536.

This was a slight decrease from the figures for 1891, when the value of the investment was $2,948,659. The principal decrease was in value of shore and accessory property and cash capital, which in 1891 was reported at $717,787 and $467,500, respectively. The vessels with their outfit in 1891 were valued at $939,136 and the boats at $463,722. As a partial offset for this decrease a large increase occurred in the value of the pound nets, their value being $165,990 in 1891 and $264,600 in 1897, the number in the meantime increasing from 891 to 1,250.

The value of products in 1897 was $3,179,498, being $468,347 less than in 1891 when the yield was worth $3,647,845 to the fishermen. This decrease is due to the reduced value of the oyster product, which in 1891 was worth $2,524,348, whereas in 1897 it was but $2,041,683. The yield of shad, the second item in value among the fishery products, shows a gratifying increase from $207,394 in 1891 to $304,448 in 1897. During the same years the menhaden product shows an increase from $197,523 to $255,241; the value of the clams increased from $36,030 to $66,097, and the crab yield arose from $62,062 to $68,245. Most of the other species show a decrease in the yield—squeteague from $124,645 to $89,967; alewives or river herring from $93,905 to $70,841; blue-fish from $67,545 to $34,802, and cat-fish from $28,487 to $12,292.

The decrease in value of the fisheries is not due to a reduction in quantity of products obtained, but to a smaller selling price. For instance, while the oyster yield decreased in value from $2,524,348 to $2,041,683, the quantity obtained in the former year was 6,162,086 bushels and in 1897 it was 7,023,848 bushels. The value of squeteague decreased from $124,645 in 1891 to $89,967 in 1897, although the

quantity increased from 3,929,899 pounds in the former year to 6,525,806 pounds in the latter. The yield of croakers increased in weight from 1,075,690 pounds in 1891 to 4,161,529 pounds in 1897, but the value decreased from $36,847 to $28,144.

The condensed statistics of the fisheries of this State are shown in the following three tables, relating respectively to the persons employed, the capital invested, and the products:

Table of persons employed.

How engaged.	No.
In vessel fisheries	4,282
On vessels transporting	820
In shore or boat fisheries	19,150
Shoresmen	4,025
Total	28,277

Table of apparatus and capital.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	791	$464,487	Apparatus—shore fisheries—Continued.		
Tonnage	9,796	.....	Fyke nets	361	$4,687
Outfit	.....	199,675	Minor nets	450	205
Vessels transporting	264	211,375	Lines	.....	1,632
Tonnage	5,422	.....	Eel pots	270	404
Outfit	.....	39,287	Slat traps	68	1,345
Boats	10,302	493,276	Spears	14	17
Apparatus—vessel fisheries:			Oyster dredges or scrapes	458	6,110
Seines (total length, 31,668 feet)	38	25,550	Oyster tongs	10,590	46,157
Oyster dredges	532	14,594	Clam tongs, rakes, hoes, and forks	1,012	1,960
Oyster tongs and forks	1,791	6,894	Crab dredges or scrapes	826	2,063
Clam tongs, rakes, etc	159	89	Shore and accessory property	.....	607,682
Apparatus—shore fisheries:			Cash capital	.....	424,750
Seines (total length, 121,377 feet)	107	28,162	Total	.....	2,891,536
Pound nets	1,250	264,600			
Gill nets (total length, 1,113,324 feet)	9,307	$46,235			

Table of products.

Species.	Lbs.	Value.	Species.	Lbs.	Value.
Alewives, fresh	13,217,510	$66,174	Pike	34,963	$2,680
Alewives, salted	472,000	4,667	Pompano	70,135	5,515
Black bass	14,075	654	Scup	4,000	120
Blue-fish	1,505,228	34,802	Sea bass	1,765	40
Bonito	25,350	798	Shad	11,529,474	304,448
Butter-fish	465,828	10,624	Sheepshead	28,968	1,905
Carp	5,119	167	Spanish mackerel	509,106	39,911
Cat-fish	457,417	12,292	Spots	1,081,292	26,539
Cero	1,200	78	Squeteague	6,525,806	89,967
Cod	800	40	Striped bass	576,262	35,079
Crevalle	123,300	2,523	Sturgeon	631,619	16,563
Croakers	4,161,529	28,144	Suckers	75,606	2,250
Drum	114,420	1,094	Sun-fish	2,350	66
Eels	84,560	2,790	Whiting	14,100	285
Flounders	265,280	7,930	Oysters	[1] 49,166,936	2,041,688
Hickory shad	196,916	8,409	Clams	[2] 841,568	66,097
Hog-fish	15,390	940	Crabs, soft	[3] 1,068,116	39,914
King-fish	120,075	4,970	Crabs, hard	[4] 5,331,398	28,331
Mackerel	300	18	Terrapins	11,822	2,104
Menhaden	178,656,362	255,241	Turtles	56,825	1,077
Moon-fish	28,494	727	Frogs	1,025	108
Mullet	54,521	1,196	Caviar	63,960	19,023
Perch, white	278,294	13,527	Total	277,993,949	3,179,498
Perch, yellow	113,885	2,998			

[1] 7,023,848 bushels. [2] 105,196 bushels. [3] 8,204,348 in number. [4] 15,994,194 in number.

The crustacean and molluscan products above shown in pounds are given by number and bushels in the following table:

Products.		No.	Value.
Crabs, hard		15,994,194	$28,331
Crabs, soft		3,204,348	39,914
Clams	bushels	105,196	66,097
Oysters	do	7,023,848	2,041,683

STATISTICS BY COUNTIES.

There are in Virginia 34 counties bordering on the tidal waters, in all of which the commercial fisheries are more or less extensive. The most important of these, from a fishery point of view, are Accomac, Lancaster, Northumberland, Middlesex, Elizabeth City, Norfolk, Mathews, Northampton, York, and Gloucester. The fisheries in some of the remaining 24 counties are of comparatively small extent. The following series of tables present detailed statistics for each county for 1897:

Table showing the number of persons employed in the fisheries of Virginia in 1897.

Counties.	In vessel fisheries.	On vessels transporting.	In shore or boat fisheries.	Shoresmen.	Total.
Accomac	1,023	107	2,470	490	4,090
Alexandria	8	10	180	.....	198
Caroline	.....	.....	28	.....	28
Charles City	.....	.....	201	.....	201
Chesterfield	.....	.....	26	.....	26
Dinwiddie	.....	.....	18	.....	18
Elizabeth City	179	35	614	489	1,317
Essex	.....	19	571	.....	590
Fairfax	.....	.....	176	9	185
Gloucester	354	58	837	.....	1,249
Hanover	.....	.....	34	.....	34
Henrico	.....	.....	177	.....	177
Isle of Wight	109	2	230	.....	341
James City	11	.....	122	.....	133
King and Queen	7	.....	44	.....	51
King George	17	.....	294	.....	311
King William	94	16	200	197	507
Lancaster	237	62	2,188	363	2,850
Mathews	42	126	1,650	.....	1,818
Middlesex	12	49	2,682	17	2,760
Nansemond	306	25	378	79	788
New Kent	.....	.....	260	.....	260
Norfolk	620	133	1,005	1,805	8,563
Northampton	140	62	592	113	907
Northumberland	573	25	1,080	266	1,944
Princess Anne	.....	.....	288	103	391
Prince George	.....	.....	164	.....	164
Prince William	.....	2	127	5	134
Richmond	88	32	681	.....	751
Stafford	.....	.....	134	13	147
Surry	.....	.....	72	.....	72
Warwick	124	17	168	.....	309
Westmoreland	160	11	596	.....	767
York	228	29	863	76	1,196
Total	4,282	820	19,160	4,025	28,277

Table showing, by counties, the vessels, boats, apparatus, and shore property employed in the fisheries of Virginia in 1897.

Items.	Accomac.		Alexandria.		Caroline.		Charles City.		Chesterfield.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	181	$89,957	1	$650						
Tonnage	1,936		17							
Outfit		31,316		165						
Vessels transporting	31	41,750	4	2,200						
Tonnage	847		44							
Outfit		5,332		260						
Boats	1,844	106,248	94	2,570	13	$160	103	$1,728	8	$150
Apparatus—vessel fisheries:										
Seines	5	3,000	1	150						
Oyster dredges	296	7,084								
Oyster tongs and forks	304	975								
Clam tongs, rakes, etc	139	71								
Apparatus—shore fisheries:										
Seines	37	662	1	100	1	300	1	200	5	250
Pound nets	77	16,275			15	1,500				
Gill nets	5	36	87	4,955	6	123	137	5,062	3	45
Fyke nets	10	430								
Minor nets	89	30					2	5	2	6
Lines		165						2		
Eel pots	32	18								
Spears	14	17								
Oyster dredges or scrapes	213	3,632								
Oyster tongs	1,690	8,146								
Clam tongs, rakes, hoes, and forks	779	1,680								
Crab dredges or scrapes	826	2,063								
Shore and accessory property		52,165		300		200		1,100		
Cash capital		61,750								
Total		432,802		11,350		2,283		8,097		451

Items.	Dinwiddie.		Elizabeth City.		Essex.		Fairfax.		Gloucester.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing			26	$38,035					88	$44,325
Tonnage			446						1,269	
Outfit				14,149						20,253
Vessels transporting			9	9,750	6	$3,800			22	16,250
Tonnage			283		154				400	
Outfit				1,925		868				2,783
Boats	9	$90	323	18,385	264	6,740	67	$3,968	448	27,345
Apparatus—vessel fisheries:										
Seines			5	3,000						
Oyster dredges			32	1,565						
Oyster tongs and forks			70	243					277	1,055
Clam tongs, rakes, etc			2	4						
Apparatus—shore fisheries:										
Seines					3	550	2	8,150		
Pound nets			75	22,850	26	2,825	40	2,445	110	30,250
Gill nets	7	105			639	682	19	900		
Fyke nets					18	225	59	733		
Minor nets	2	6								
Lines				240						36
Eel pots					12	30				
Oyster tongs			402	1,447	297	891			933	3,109
Shore and accessory property		75		97,790		725		4,200		2,100
Cash capital				57,000						
Total		276		266,383		17,336		20,396		147,506

Items.	Princess Anne.		Prince George.		Prince William.		Richmond.		Stafford.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels transporting					1	$300				
Tonnage					8					
Outfit						55				
Boats	159	$3,390	98	$1,090	47	1,735	319	$10,900	33	$1,945
Apparatus—shore fisheries:										
Seines	4	2,100	1	100	3	3,115			3	4,700
Pound nets	16	17,700			12	810	89	12,625	42	1,910
Gill nets	211	1,398	108	4,176	20	1,250	1,784	1,784	6	625
Fyke nets					24	420				
Minor nets			6	15						
Lines		212		3						
Eel pots							100	200		
Oyster tongs	100	150					401	1,387		
Shore and accessory property		8,475		800		1,280		3,475		4,225
Cash capital		1,000								
Total		31,425		6,184		8,965		30,371		13,405

Vessels, boats, apparatus, etc., employed in the fisheries in Virginia in 1897—Continued.

Items.	Hanover.		Henrico.		Isle of Wight.		James City.		King and Queen.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing					27	$5,250	2	$1,200	3	$350
Tonnage					249		79		23	
Outfit						3,541		535		180
Vessels transporting					1	150				
Tonnage					5					
Outfit						104				
Boats	17	$136	100	$1,192	120	2,511	63	1,219	22	154
Apparatus—vessel fisheries:										
Oyster tongs and forks					80	280	10	38	6	21
Apparatus—shore fisheries:										
Seines			1	250	2	110	3	290		
Gill nets	28	240	117	2,136	2,057	5,356	438	2,352	44	484
Fyke nets					18	270				
Lines						60				
Eel pots					30	30				
Slat traps			65	1,300						
Oyster tongs							34	148		
Shore and accessory property				600		5,100		631		250
Total		376		5,478		22,761		6,413		1,439

Items.	King George.		King William.		Lancaster.		Mathews.		Middlesex.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	4	$875	15	$8,775	18	$64,850	10	$3,100	2	$550
Tonnage	21		235		635		110		27	
Outfit		600		5,225		16,333		2,070		475
Vessels transporting			6	5,250	16	12,100	43	32,350	14	10,550
Tonnage			107		355		954		451	
Outfit				738		2,790		6,790		2,557
Boats	143	5,361	99	838	1,096	65,660	828	40,745	964	55,700
Apparatus—vessel fisheries:										
Seines					9	6,900				
Oyster dredges	8	105			6	300				
Oyster tongs and forks			78	311	18	137	24	174	8	28
Apparatus—shore fisheries:										
Seines	3	750	3	700	7	1,650				
Pound nets	112	9,560			136	26,900	106	24,425	8	1,200
Gill nets	219	2,210	351	3,055			10	100		
Fyke nets	9	135	181	1,810						
Minor nets					114	30				
Lines		10		45				150		
Oyster dredges or scrapes	12	72								
Oyster tongs	60	240	4	16	1,186	6,180	1,076	5,398	1,322	7,488
Clam tongs, rakes, etc							100	150		
Shore and accessory property		1,445		17,050		85,050		2,765		4,325
Cash capital				29,000		37,000				
Total		21,363		72,813		325,880		118,217		82,873

Items.	Nansemond.		New Kent.		Norfolk.		Northampton.		Northumberland.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	63	$23,875			126	$45,890	32	$22,175	71	$71,880
Tonnage	657				1,278		370		1,171	
Outfit		18,129				34,656		8,786		22,953
Vessels transporting	10	5,650			47	34,525	27	16,100	7	7,350
Tonnage	109				776		331		246	
Outfit		1,300				7,085		3,012		950
Boats	204	2,629	144	$754	456	31,155	537	13,937	831	37,025
Apparatus—vessel fisheries:										
Seines							4	3,200	14	9,300
Oyster dredges					2	100	4	100	130	4,050
Oyster tongs and forks	208	832			423	1,741	22	106		
Clam tongs, rakes, etc							18	14		
Apparatus—shore fisheries:										
Seines	2	575	4	300	4	2,000	4	550		
Pound nets	7	3,155			4	3,800	21	14,500	259	56,200
Gill nets	410	1,080	1,082	3,528	515	1,030				
Fyke nets	9	180					1	100		
Minor nets	20	60					55	12	160	41
Lines		15				42		262		70
Eel pots									60	90
Slat traps	3	45								
Oyster dredges or scrapes									166	1,937
Oyster tongs	177	708			544	2,192	305	1,730	686	2,222
Clam tongs, rakes, etc							133	130		
Shore and accessory property		5,650		1,030		228,000		21,665		49,925
Cash capital		4,000				159,000		13,500		62,000
Total		67,883		5,612		551,216		119,879		325,993

Vessels, boats, apparatus, etc., employed in the fisheries of Virginia in 1897—Continued.

Items.	Surry.		Warwick.		Westmoreland.		York.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing			25	$5,250	27	$9,875	70	$27,625
Tonnage			301		288		684	
Outfit				2,121		4,600		13,588
Vessels transporting			6	2,750	3	700	11	9,850
Tonnage			64		28		260	
Outfit				467		325		1,946
Boats	39	$1,205	71	3,200	308	15,371	431	28,040
Apparatus—vessel fisheries:								
Oyster dredges					54	1,290		
Oyster tongs and forks			88	300			175	653
Apparatus—shore fisheries:								
Seines	1	100	6	330	6	600		
Pound nets			1	200	76	8,870	18	6,600
Gill nets	874	2,971	100	200	23	123	7	230
Fyke nets							32	384
Lines		12		20		24		264
Eel pots	36	36						
Oyster dredges or scrapes					67	469		
Oyster tongs			95	370	3,24	1,806	954	3,029
Shore and accessory property		700		550		1,530		4,506
Cash capital								500
Total		5,024		15,788		46,083		97,215

Table showing, by counties, the products of the fisheries of Virginia in 1897.

Species.	Accomac.		Alexandria.		Caroline.		Charles City.		Chesterfield.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	173,450	$625	70,000	$350	171,000	$2,040	22,400	$168	22,600	$338
Black bass			200	10			3,400	144		
Blue-fish	123,614	3,791								
Bonito	6,150	184								
Butter-fish	9,000	220								
Carp			500	15						
Cat-fish	3,830	216	2,800	86	6,000	180				
Cero	1,100	70								
Cod	800	40								
Croakers	321,775	4,613					800	24		
Drum	35,140	449								
Eels	7,165	217								
Flounders	23,075	378								
Hickory shad					18,000	90	18,750	375		
King-fish	11,925	398								
Mackerel	100	12								
Menhaden	19,378,100	24,952								
Mullet	14,876	304								
Perch, white	15,760	552	2,933	176	2,500	75	1,500	65		
Perch, yellow			1,160	35			2,800	84		
Pompano	11,835	858								
Sea bass	1,165	22								
Shad	265,850	6,935	389,700	7,794	76,875	1,780	100,750	11,550	25,317	723
Sheepshead	4,618	376								
Spanish mackerel	102,080	7,021								
Spots	35,116	382								
Squetengue	603,695	15,370	650	26			700	21		
Striped bass	6,800	514	3,700	222	9,000	450	6,000	440		
Sturgeon	22,025	1,311	1,250	75			63,625	1,188		
Whiting	1,500	45								
Oysters	7,077,175	383,483								
Clams	472,576	35,196								
Crabs, soft	888,583	31,362								
Crabs, hard	25,000	125								
Terrapin	2,572	1,434					150	30	1,500	90
Turtles	700	33					790	16		
Frogs							290	23		
Caviar	400	40					5,320	1,596		
Total	29,647,250	521,528	472,893	8,789	283,375	4,615	527,275	15,724	49,417	1,151

Table showing the products of the fisheries of Virginia in 1897—Continued.

Species.	Dinwiddie.		Elizabeth City.		Essex.		Fairfax.		Gloucester.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Alewives, fresh	.....	.....	264,482	$2,857	142,922	$1,559	940,742	$4,953	119,000	$1,190
Black bass	.....	.....	.....	.....	.....	.....	875	44	.....	.....
Blue-fish	.....	.....	234,115	7,023	.....	.....	.....	.....	25,200	756
Bonito	.....	.....	6,000	240	.....	.....	.....	.....	.....	.....
Butter-fish	.....	.....	52,628	1,576	.....	.....	.....	.....	.....	.....
Carp	.....	.....	.....	.....	.....	.....	2,282	65	.....	.....
Cat-fish	.....	.....	.....	.....	43,800	1,314	41,810	1,255	.....	.....
Croakers	.....	.....	1,384,164	6,921	.....	.....	.....	.....	330,000	1,650
Drum	.....	.....	4,400	44	.....	.....	.....	.....	27,500	275
Eels	.....	.....	.....	.....	7,000	280	3,385	102	.....	.....
Flounders	.....	.....	51,485	1,554	540	22	.....	.....	.....	.....
Hickory shad	.....	.....	2,740	55	.....	.....	.....	.....	.....	.....
King-fish	.....	.....	1,600	64	.....	.....	.....	.....	.....	.....
Menhaden	.....	.....	12,005,500	28,369	52,000	35	.....	.....	220,000	550
Perch, white	.....	.....	3,400	170	7,800	480	37,314	2,162	.....	.....
Perch, yellow	.....	.....	.....	.....	1,100	33	21,800	545	.....	.....
Pike	.....	.....	.....	.....	.....	.....	3,388	214	.....	.....
Pompano	.....	.....	16,055	1,151	.....	.....	.....	.....	.....	.....
Shad	19,600	$560	340,816	10,227	165,328	4,462	350,803	6,877	550,000	16,500
Sheepshead	.....	.....	2,000	160	.....	.....	.....	.....	.....	.....
Spanish mackerel	.....	.....	39,525	2,193	.....	.....	.....	.....	11,000	660
Spots	.....	.....	149,149	2,983	.....	.....	.....	.....	.....	.....
Squeteague	.....	.....	1,446,874	21,703	.....	.....	.....	.....	165,000	2,475
Striped bass	.....	.....	3,000	120	13,500	1,230	36,497	2,168	.....	.....
Sturgeon	.....	.....	24,757	496	600	12	100	4	24,750	495
Suckers	.....	.....	.....	.....	775	16	13,350	282	.....	.....
Sun-fish	.....	.....	.....	.....	.....	.....	1,050	32	.....	.....
Whiting	.....	.....	5,000	100	.....	.....	.....	.....	.....	.....
Oysters	.....	.....	3,293,500	118,494	580,650	40,775	.....	.....	3,234,875	92,801
Clams	.....	.....	32,400	2,450	.....	.....	.....	.....	57,040	4,414
Crabs, hard	.....	.....	727,032	2,423	.....	.....	.....	.....	88,000	660
Terrapins	500	30	.....	.....	.....	.....	.....	.....	1,100	400
Turtles	.....	.....	5,750	115	.....	.....	.....	.....	9,000	180
Caviar	.....	.....	3,570	1,071	140	40	.....	.....	3,500	1,050
Total	20,100	590	20,099,942	212,559	1,016,155	50,258	1,453,396	18,703	4,865,965	124,056

Species.	Princess Anne.		Prince George.		Prince William.		Richmond.		Stafford.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	16,000	$160	.....	.....	568,000	$2,970	257,500	$3,050	728,280	$4,465
Alewives, salted	.....	.....	.....	.....	.....	.....	.....	.....	406,000	4,060
Black bass	.....	.....	3,000	$60	.....	.....	.....	.....	.....	.....
Blue-fish	234,269	3,686	.....	.....	.....	.....	.....	.....	.....	.....
Bonito	6,500	195	.....	.....	.....	.....	.....	.....	.....	.....
Butter-fish	240,150	5,313	.....	.....	.....	.....	.....	.....	.....	.....
Carp	.....	.....	.....	.....	725	22	.....	.....	812	49
Cat-fish	.....	.....	5,000	100	15,200	465	49,000	1,290	19,787	601
Crevalle	117,000	2,370	.....	.....	.....	.....	.....	.....	.....	.....
Croakers	1,012,435	5,284	.....	.....	.....	.....	.....	.....	.....	.....
Drum	14,680	150	.....	.....	.....	.....	.....	.....	.....	.....
Eels	.....	.....	.....	.....	2,200	66	20,000	800	2,175	93
Flounders	1,000	16	.....	.....	.....	.....	.....	.....	.....	.....
Hog-fish	10,340	675	.....	.....	.....	.....	.....	.....	.....	.....
King-fish	77,500	3,100	.....	.....	.....	.....	.....	.....	.....	.....
Menhaden	100,000	100	.....	.....	.....	.....	235,000	193	.....	.....
Moon-fish	11,646	319	.....	.....	.....	.....	.....	.....	.....	.....
Mullet	23,245	318	.....	.....	.....	.....	600	12	.....	.....
Perch, white	2,000	60	800	16	22,675	1,219	12,000	600	19,850	1,184
Perch, yellow	.....	.....	600	12	10,900	288	2,000	60	60,325	1,509
Pike	.....	.....	.....	.....	2,200	132	.....	.....	28,875	2,310
Pompano	27,000	2,160	.....	.....	.....	.....	.....	.....	.....	.....
Scup	4,000	120	.....	.....	.....	.....	.....	.....	.....	.....
Shad	92,937	3,717	298,060	9,014	208,546	3,927	320,175	8,940	72,674	1,423
Sheepshead	21,500	1,290	.....	.....	.....	.....	.....	.....	.....	.....
Spanish mackerel	239,300	19,054	.....	.....	.....	.....	.....	.....	.....	.....
Spots	541,500	13,538	.....	.....	.....	.....	.....	.....	.....	.....
Squeteague	2,402,487	24,094	.....	.....	.....	.....	7,000	210	.....	.....
Striped bass	37,950	1,227	.....	.....	36,265	1,798	39,000	3,355	45,019	2,023
Sturgeon	68,400	2,776	65,850	1,238	.....	.....	.....	.....	.....	.....
Suckers	.....	.....	.....	.....	6,400	128	.....	.....	.....	.....
Sun-fish	.....	.....	500	10	600	18	.....	.....	.....	.....
Whiting	7,600	140	.....	.....	.....	.....	.....	.....	.....	.....
Oysters	8,750	938	.....	.....	.....	.....	1,054,200	66,055	.....	.....
Crabs, hard	705,000	4,500	.....	.....	.....	.....	.....	.....	.....	.....
Terrapins	.....	.....	6,000	120	.....	.....	.....	.....	.....	.....
Turtles	.....	.....	1,200	24	.....	.....	.....	.....	.....	.....
Caviar	8,620	2,572	5,810	1,743	.....	.....	.....	.....	.....	.....
Total	6,031,809	97,872	386,820	12,337	873,711	11,033	1,996,475	84,565	1,383,797	17,717

Table showing the products of the fisheries of Virginia in 1897—Continued.

Species.	King George.		King William.		Lancaster.		Mathews.		Middlesex.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	1,322,400	$8,188	28,625	$450	225,500	$1,390	413,400	$2,067	32,000	$320
Alewives, salted	6,000	60	.....	.....	.....	.....	.....	.....	.....	.....
Blue-fish	.....	.....	.....	.....	14,100	583	13,500	675	.....	.....
Butter-fish	.....	.....	.....	.....	60,000	900	.....	.....	.....	.....
Cat-fish	97,715	2,517	96,050	1,921	.....	.....	.....	.....	.....	.....
Croakers	6,400	202	.....	.....	60,000	300	20,000	200	.....	.....
Eels	1,250	43	1,810	54	.....	.....	.....	.....	.....	.....
Flounders	650	20	9,050	452	50,000	500	13,000	260	.....	.....
Hickory shad	.....	.....	.....	.....	.....	.....	38,180	763	.....	.....
Menhaden	.....	.....	.....	.....	61,581,200	88,113	390,000	585	16,000	40
Mullet	.....	.....	.....	.....	.....	.....	4,000	80	.....	.....
Perch, white	52,909	2,697	17,150	862	.....	.....	400	20	.....	.....
Perch, yellow	4,350	141	1,400	42	.....	.....	.....	.....	.....	.....
Pike	300	18	.....	.....	.....	.....	.....	.....	.....	.....
Pompano	.....	.....	.....	.....	600	72	.....	.....	.....	.....
Shad	401,366	8,551	145,211	2,879	858,110	26,532	1,297,000	32,425	21,700	620
Spanish mackerel	.....	.....	.....	.....	10,400	1,031	.....	.....	.....	.....
Spots	.....	.....	.....	.....	2,000	60	2,000	80	.....	.....
Squeteague	825	33	11,160	223	130,200	3,156	70,380	704	.....	.....
Striped bass	107,104	5,852	21,900	2,188	3,000	180	.....	.....	.....	.....
Sturgeon	19,759	1,085	6,225	125	31,000	620	55,600	1,240	.....	.....
Suckers	.....	.....	17,881	358	.....	.....	.....	.....	.....	.....
Oysters	167,650	8,383	477,750	11,150	4,419,800	209,410	3,864,000	137,250	6,157,340	297,198
Clams	.....	.....	.....	.....	.....	.....	47,600	3,400	.....	.....
Crabs, soft	.....	.....	.....	.....	118,800	6,192	.....	.....	.....	.....
Crabs, hard	23,833	286	78,500	393	12,000	88	435,000	2,900	.....	.....
Turtles	.....	.....	.....	.....	.....	.....	25,000	500	.....	.....
Caviar	1,240	460	1,660	498	4,340	1,302	3,640	1,040	.....	.....
Total	2,213,751	38,536	914,372	21,595	67,581,050	340,429	6,692,700	184,189	6,227,040	298,178

Species.	Nansemond.		New Kent.		Norfolk.		Northampton.		Northumberland.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	5,100	$51	146,645	$1,051	45,000	$475	773,450	$1,583	5,128,914	$17,774
Alewives, salted	.....	.....	.....	.....	.....	.....	.....	.....	38,000	332
Black bass	.....	.....	6,600	396	.....	.....	.....	.....	.....	.....
Blue-fish	5,000	151	.....	.....	1,300	65	830,090	17,328	6,485	211
Bonito	.....	.....	.....	.....	.....	.....	6,700	179	.....	.....
Butter-fish	65,000	1,300	.....	.....	24,000	960	12,100	268	2,750	83
Cat-fish	200	6	1,000	20	.....	.....	.....	.....	875	27
Cero	.....	.....	.....	.....	.....	.....	100	3	.....	.....
Crevalle	.....	.....	.....	.....	.....	.....	6,300	153	.....	.....
Croakers	180,500	1,020	.....	.....	283,000	1,790	140,725	2,072	10,700	180
Drum	.....	.....	.....	.....	1,000	10	31,700	166	.....	.....
Eels	.....	.....	.....	.....	.....	.....	.....	.....	6,900	207
Flounders	2,500	75	.....	.....	2,000	20	4,050	137	73,610	3,238
Hickory shad	.....	.....	14,500	185	.....	.....	.....	.....	83,746	1,611
Hog-fish	.....	.....	.....	.....	8,750	225	300	20	1,000	20
King-fish	.....	.....	.....	.....	25,000	1,000	4,050	408	.....	.....
Mackerel	.....	.....	.....	.....	.....	.....	200	6	.....	.....
Menhaden	500,000	1,250	.....	.....	.....	.....	14,724,232	20,149	69,444,330	90,880
Moon-fish	.....	.....	.....	.....	.....	.....	16,848	408	.....	.....
Mullet	.....	.....	.....	.....	11,800	482	.....	.....	.....	.....
Perch, white	2,050	83	2,000	100	1,200	26	.....	.....	1,225	38
Perch, yellow	.....	.....	4,700	151	.....	.....	.....	.....	.....	.....
Pompano	.....	.....	.....	.....	4,000	280	7,620	843	3,025	151
Sea bass	.....	.....	.....	.....	.....	.....	.....	.....	600	18
Shad	111,900	3,886	383,526	8,840	129,500	4,796	14,400	371	3,700,429	92,408
Sheepshead	.....	.....	.....	.....	.....	.....	850	79	.....	.....
Spanish mackerel	.....	.....	.....	.....	1,700	85	95,125	9,513	8,576	322
Spots	3,752	188	.....	.....	248,500	7,330	63,300	930	5,150	159
Squeteague	209,050	2,297	.....	.....	179,000	2,790	934,583	10,146	26,150	703
Striped bass	3,150	252	6,000	420	18,000	540	3,600	348	65,917	5,779
Sturgeon	1,000	20	20,000	400	2,400	120	2,880	89	117,273	3,172
Oysters	2,970,030	68,973	.....	.....	5,033,245	186,882	1,415,666	88,984	2,046,205	112,691
Clams	.....	.....	.....	.....	8,000	300	94,960	8,790	.....	.....
Crabs, soft	.....	.....	.....	.....	.....	.....	4,333	390	56,400	1,970
Crabs, hard	8,000	200	.....	.....	400,000	2,500	1,750,000	8,100	132,000	990
Turtles	.....	.....	510	10	.....	.....	.....	.....	13,875	199
Frogs	.....	.....	435	35	.....	.....	.....	.....	300	50
Caviar	.....	.....	3,750	1,125	200	50	.....	.....	7,000	2,000
Total	4,017,232	79,752	599,666	12,733	6,422,595	210,726	20,938,162	171,463	80,976,435	335,218

Table showing the products of the fisheries of Virginia in 1897—Continued.

Species.	Hanover.		Henrico.		Isle of Wight.		James City.		King and Queen.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	10,900	$216	232,200	$1,720			42,000	$309		
Cat-fish			24,000	1,047	8,000	$400	1,500	45		
Croakers					30,500	420				
Eels			22,500	625	6,000	180				
Hickory shad			15,000	150	6,000	180				
Perch, white			17,500	1,040	17,800	697	11,200	436		
Perch, yellow			500	25						
Shad	20,387	466	152,875	4,625	241,026	9,070	82,742	2,364	38,133	$686
Squeteague					75,000	1,340				
Striped bass			7,000	490	27,500	1,865	9,100	637		
Sturgeon			5,000	100	23,100	462	29,725	577		
Suckers			36,000	1,440	1,000	20				
Oysters					1,094,800	23,775	219,100	5,275	12,250	275
Caviar			1,040	312	3,640	1,092	5,600	1,600		
Total	31,287	682	513,615	11,569	1,534,366	39,501	400,967	11,243	50,383	961

Species.	Surry.		Warwick.		Westmoreland.		York.	
	Lbs.	Val.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh					1,282,000	$5,675	33,000	$180
Alewives, salted					22,000	215		
Blue-fish			2,000	$40	3,455	130	12,100	363
Butter-fish					200	4		
Carp					800	16		
Cat-fish	1,500	$45			39,350	762		
Croakers	5,000	150	19,500	160	2,330	69	403,700	3,089
Eels	4,000	120			175	3		
Flounders			4,500	100	2,820	78	27,000	1,080
Menhaden							10,000	25
Perch, white	5,100	123			16,028	638	200	8
Perch, yellow					2,250	68		
Pike					200	6		
Shad	114,480	4,243	17,500	700	190,608	3,902	81,150	2,655
Spanish mackerel							400	32
Spots	300	9	11,000	315	425	11	19,100	654
Squeteague	6,000	180	21,000	220	8,552	334	227,500	3,942
Striped bass	7,642	351	1,000	50	56,118	2,405	2,500	175
Sturgeon	43,150	864					3,150	94
Suckers					200	6		
Sun-fish					200	6		
Oysters			1,087,100	17,615	990,500	56,900	3,962,350	114,376
Clams							128,992	11,547
Crabs, hard					48,533	306	898,500	4,860
Caviar	4,340	1,302					450	130
Total	191,512	7,387	1,163,600	19,200	2,666,744	71,584	5,810,092	143,110

The number and value of shad taken in the waters of Virginia in 1897 are exhibited by counties in the following table:

Counties.	No.	Value.	Counties.	No.	Value.
Accomac	75,957	$6,935	Mathews	370,571	$32,425
Alexandria	111,343	7,794	Middlesex	6,200	620
Caroline	21,964	1,780	Nansemond	31,972	3,886
Charles City	114,500	11,550	New Kent	95,293	8,840
Chesterfield	7,233	723	Norfolk	37,000	4,796
Dinwiddie	5,600	560	Northampton	4,114	371
Elizabeth City	97,376	10,227	Northumberland	1,057,265	92,408
Essex	47,236	4,462	Princess Anne	26,553	3,717
Fairfax	100,229	6,877	Prince George	85,160	9,014
Gloucester	157,143	16,500	Prince William	59,570	3,927
Hanover	5,825	466	Richmond	91,479	8,940
Henrico	43,679	4,625	Stafford	20,764	1,423
Isle of Wight	68,865	9,070	Surry	32,709	4,243
James City	23,641	2,364	Warwick	5,000	700
King and Queen	10,895	686	Westmoreland	54,469	3,902
King George	114,676	8,551	York	23,185	2,655
King William	41,488	2,879			
Lancaster	245,174	26,532	Total	[1]8,294,118	304,448

[1] 11,529,474 pounds.

NOTES ON THE PRINCIPAL FISHERIES.

The principal fisheries are the oyster, the pound-net, the menhaden purse-seine, and the shad gill-net fisheries. The oyster yield in 1897 was valued at $2,041,683; the product of the pound nets, $513,589; the menhaden purse-seine fishery, $242,300, and the shad gill-net fisheries in the rivers, $81,171. Of minor consequence was the haul seine fishery, with a value of $68,260, the crab fisheries, yielding products to the value of $68,245, and the clam fisheries, with products worth $66,097. The value of the yield of the minor fisheries in the same year was $98,153, making the total yield of the fishery products in Virginia during 1897 worth $3,179,498.

The oyster industry is the principal fishery in Virginia and shows a gratifying increase so far as concerns the quantity over any previous year for which records are available. In 1880 the product was 6,837,240 bushels, for which the fishermen received $2,218,376; in 1888 it was 3,664,433 bushels, worth $1,336,012; in 1891, 6,074,025 bushels, worth $2,524,348, and in 1897 7,023,848 bushels, valued at $2,041,683. During the last year this industry gave employment to 18,189 fishermen, or 75 per cent of the total number in the State, using 1,022 vessels, valued, with their outfits, at $662,242; 7,682 boats, worth $416,018, and dredges, tongs, etc., worth $73,755. This shows some increase over 1891, when the fishermen and transporters numbered 16,343; 919 vessels, worth $786,626; 6,974 boats, worth $412,030, and dredges, tongs, etc., worth $57,872.

The general condition of the oyster industry of Virginia has changed considerably during the past ten years. The public reefs are growing less productive year after year and the extent of the planting business is constantly increasing. The State laws afford fairly good protection to private oyster-culture, and the prospects are exceedingly favorable for a large development in that line in the near future.

The pound-net fishery of Virginia is the most extensive and concentrated in America. The increase in this fishery during the past twenty years has been phenomenal. Within an area 70 miles long and 10 miles wide, covering the western side of Chesapeake Bay and the mouths of the tributaries thereof, there are set each spring over 850 pound nets, worth about $200,000. In addition, there are about 100 on the eastern shore of Virginia and about 300 in the various rivers at a greater distance than 10 miles from the Chesapeake. In 1897 the number of pound nets in the State aggregated 1,250, worth $264,600, against 891 in 1891, valued at $165,990. In 1880 the number of pound nets was but 152, worth $89,240, and in 1887 it was reported at 608, worth $164,355. The catch by the pound nets in 1891 amounted to 23,796,835 pounds, which sold for $471,560, whereas in 1897 it was 37,467,620 pounds, worth $513,589. The principal increase occurred in the yield of shad, from 3,645,467 pounds in 1891 to 8,035,114 pounds

in 1897; squeteague, from 1,759,464 to 5,184,428 pounds; croakers, from 247,980 pounds in 1891 to 2,742,049 pounds in 1897. Blue-fish fell off from 1,292,398 pounds to 662,993 pounds; Spanish mackerel, from 725,910 to 503,106 pounds, and sturgeon, from 575,320 to 335,590 pounds, including caviar. The value per pound of nearly all of these species shows a decrease from 1891 to 1897. Had the pound-net catch sold in the latter year for as much per pound as in the former the aggregate value would have been about $738,098, instead of $513,589.

The gill-net fisheries of Virginia are principally for the capture of shad, but many other species are also secured. There were 9,307 nets used in 1897, worth $46,235, and the product amounted to 4,053,779 pounds, for which the fishermen received $110,206. Of this product 2,972,548 pounds represented shad, the value being $81,171. Ranking next in value were sturgeon, including caviar, with a yield of 356,829 pounds, worth $19,269; alewives, or river herring, 575,800 pounds, worth $3,542, and striped bass, 43,567 pounds, worth $2,862. In 1891 the value of the gill nets was approximately the same, but the yield was somewhat greater, amounting to 4,857,214 pounds, worth $124,617.

The haul-seine fishery of Virginia, which is quite different from the menhaden purse-seine fishery, is of little value compared with former times. In the early part of the present century this was practically the only form of apparatus used for taking fish. Forty years ago nearly every large plantation bordering the rivers had a seine shore, and some of them were quite valuable. But the greater cheapness and efficiency of gill nets, pound nets, etc., has resulted in a great decrease in the number of seines employed. In 1891 there were 178 haul seines used, worth $32,470, and yielding 4,176,362 pounds of fish, valued at $98,074. In 1897 the number of seines was 107, valued at $28,462, and the catch of fish aggregated 5,282,251 pounds, worth $68,260. Among the principal species were spots, 482,965 pounds, worth $13,279; shad, 459,057 pounds, worth $10,258; squeteague, 439,218 pounds, worth $9,964; alewives, or river herring, 1,937,855 pounds, worth $13,357, and striped bass, 136,087 pounds, worth $7,483.

The crab fisheries yielded a product in 1897 valued at $68,245, of which $28,331 represented hard crabs and $39,914 soft crabs, the total weight of the former being 5,331,398 pounds and of the latter 1,068,116 pounds. The soft-crab fishery is prosecuted in Accomac, Lancaster, Northumberland, and Northampton counties, but principally in the first-named. The hard crabs are obtained in the waters of a dozen or more counties, but principally in Northampton, York, and Princess Anne. The soft crabs are caught by scrapes and dip nets, while the hard crabs are obtained by means of lines almost exclusively.

The following series of tables show in detail the extent of the fisheries by each form of apparatus in 1897.

Table showing, by counties, the yield of the seine fisheries of Virginia in 1897.

Species.	Accomac.		Alexandria.		Caroline.		Charles City.		Chesterfield.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Blue-fish	3,000	$75								
Cat-fish			1,200	$36						
Menhaden	19,081,000	24,612								
Perch, white			1,850	111						
Squeteague			650	26						
Striped bass			3,200	192						
Total	19,084,000	24,687	6,900	365						
Shore fisheries:										
Alewives, fresh					6,000	$60			22,600	$338
Black bass			200	10						
Blue-fish	325	10								
Carp			500	15						
Cat-fish			1,600	50	6,000	180				
Croakers	25,325	761					800	$24		
Drum	440	11								
Flounders	10,175	148								
Hickory shad					18,000	90	18,750	375		
King-fish	715	26								
Menhaden	3,000	15								
Mullet	14,166	277								
Perch, white	460	11	1,083	65	2,500	75	500	15		
Perch, yellow			1,160	85						
Sea bass	500	12								
Shad					6,000	160			16,917	483
Spots	8,225	157								
Squeteague	214,855	5,753					700	21		
Striped bass					9,000	450	2,000	160		
Sturgeon			1,250	75						
Total	278,186	7,181	5,793	250	47,500	1,015	22,750	595	39,517	821
Grand total	19,362,186	31,868	12,693	615	47,500	1,015	22,750	595	39,517	821

Species.	New Kent.		Norfolk.		Northampton.		Northumberland.		Princess Anne.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Vessel fisheries:										
Blue-fish					15,750	$450				
Croakers					5,000	125				
Menhaden					14,569,632	19,868	67,379,410	$88,240		
Squeteague					1,000	25				
Crabs, hard					20,000	100				
Total					14,611,382	20,568	67,379,410	88,240		
Shore fisheries:										
Alewives, fresh	113,045	$799								
Blue-fish									8,360	$240
Butter-fish									5,000	250
Cat-fish	1,000	20								
Croakers			248,000	$1,440					106,000	610
Drum									680	10
Flounders			1,000	10					1,000	16
Hickory shad	14,500	185								
Hog-fish			3,750	225					4,340	195
King-fish					500	50			1,700	68
Menhaden									100,000	100
Mullet			11,800	482					8,920	105
Perch, white			1,000	20					1,500	45
Perch, yellow	500	25								
Shad	49,000	1,400								
Spots			223,500	6,580	12,000	360			228,000	5,790
Squeteague			88,000	1,775	7,208	223			67,000	1,310
Total	178,045	2,429	577,050	10,532	19,708	633			532,500	8,739
Grand total	178,045	2,429	577,050	10,532	14,631,090	21,201	67,379,410	88,240	532,500	8,739

Table showing the yield of the seine fisheries of Virginia in 1897—Continued.

Species.	Elizabeth City.		Essex.		Fairfax.		Henrico.		Isle of Wight.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Menhaden	10,164,000	$23,760								
Shore fisheries:										
Alewives, fresh			5,000	$50	643,410	$3,217				
Carp					482	10				
Cat-fish			17,500	525	2,885	87	1,500	$30		
Croakers									500	$10
Hickory shad							15,000	150	6,000	180
Perch, white			5,300	355	4,539	272	1,000	50	500	20
Perch, yellow					500	13	500	25		
Shad			45,000	1,350	175,686	3,543	6,300	180		
Striped bass			6,500	605	9,447	559	7,000	490	3,000	210
Sturgeon					100	4				
Suckers					1,500	45			1,000	20
Total			79,300	2,885	838,549	7,750	31,300	925	11,000	440
Grand total	10,164,000	23,760	79,300	2,885	838,549	7,750	31,300	925	11,000	440

Species.	James City.		King George.		King William.		Lancaster.		Nansemond.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Menhaden							60,074,000	$85,820		
Shore fisheries:										
Alewives, fresh	42,000	$309	3,800	$29	16,000	$260				
Blue-fish									1,250	$38
Butter-fish									16,250	325
Cat-fish	1,500	45	5,050	152	14,750	295				
Croakers			200	6					29,500	170
Eels			1,250	43						
Flounders									625	19
Menhaden							926,000	1,324	50,000	125
Perch, white	1,200	36	4,974	283	7,600	480			150	3
Perch, yellow			2,600	65	1,000	30				
Shad	1,400	40	849	18	1,800,	38			4,000	125
Spots									2,815	141
Squeteague					300	6	5,000	150	50,756	510
Striped bass	3,000	210	10,360	621	2,700	270			650	52
Sturgeon	1,810	90								
Suckers					7,250	145				
Total	50,910	730	29,083	1,217	51,400	1,524	931,000	1,474	155,990	1,508
Grand total	50,910	730	29,083	1,217	51,400	1,524	61,005,000	87,294	155,990	1,508

Species.	Prince George.		Prince William.		Stafford.		Surry.		Warwick.		Westmoreland.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Alewives, fresh			232,000	$1,290	450,000	$3,025					24,000	$180
Alewives, salted					380,000	3,800						
Black bass	3,000	$60										
Blue-fish									2,000	$40	2,550	96
Butter-fish											200	4
Cat-fish	5,000	100	5,100	161	3,650	112	1,500	$45			6,500	158
Croakers									7,000	35	130	3
Eels											175	3
Flounders									2,000	40	350	9
Perch, white			7,460	447	8,350	386	3,000	60			5,000	169
Perch, yellow			2,950	74	300	8					1,500	45
Pike											200	6
Shad	210	6	90,270	1,700	61,625	1,215						
Spots									8,000	240	425	11
Squeteague											5,405	216
Striped bass			28,765	1,407	43,165	1,909	1,500	105			9,000	435
Suckers											200	6
Sun-fish											200	6
Total	8,210	166	366,535	5,079	947,090	10,455	6,000	210	19,000	355	55,835	1,347

Table showing the yield of the seine fisheries of Virginia in 1897—Continued.

SUMMARY.

Species.	Lbs.	Value.	Species.	Lbs.	Value.
Vessel fisheries:			Shore fisheries—Cont'd.		
Blue-fish	18,750	$525	Flounders	15,150	$242
Cat-fish	1,200	36	Hickory shad	72,250	980
Croakers	5,000	125	Hog-fish	8,090	420
Menhaden	171,268,042	242,300	King-fish	2,915	144
Perch, white	1,850	111	Menhaden	1,079,000	1,564
Squeteague	1,650	51	Mullet	34,886	864
Striped bass	3,200	192	Perch, white	56,106	2,792
Crabs, hard	20,000	100	Perch, yellow	11,010	320
			Pike	200	6
Total	171,319,692	243,440	Sea bass	500	12
			Shad	459,057	10,258
Shore fisheries:			Spots	482,965	13,279
Alewives fresh	1,557,855	9,557	Squeteague	439,218	9,964
Alewives, salted	380,000	3,800	Striped bass	136,087	7,483
Black bass	3,200	70	Sturgeon	3,160	169
Blue-fish	14,485	424	Suckers	9,950	216
Butter-fish	21,450	579	Sun-fish	200	6
Carp	982	25			
Cat-fish	78,535	1,960	Total	5,282,251	68,260
Croakers	417,455	3,059			
Drum	1,120	21	Grand total	176,601,943	311,700
Eels	1,425	46			

Table showing, by counties and species, the catch by gill nets used in the shore fisheries of Virginia in 1897.

Counties.	Alewives.		Black bass.		Blue-fish.		Cat-fish.		Croakers.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alexandria	70,000	$350								
Charles City	22,400	168	3,400	$144						
Essex	11,000	125								
Hanover	10,900	216								
Henrico	112,200	820								
King George	43,200	216								
King William	2,500	40					2,000	$40		
Mathews					500	$25				
New Kent	33,600	252	6,600	396						
Prince William	168,000	840								
Stafford	100,000	500								
Westmoreland	2,000	15								
York					9,600	288			500	$10
Total	575,800	3,542	10,000	540	10,100	313	2,000	40	500	10

Counties.	Hickory shad.		King-fish.		Mullet.		Perch, white.		Perch, yellow.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Accomac			400	$10	510	$25				
Charles City							1,000	$50	2,800	$84
Isle of Wight							15,000	600		
James City							10,000	400		
King William							500	20	400	12
Mathews	400	$8			4,000	80	400	20		
New Kent							2,000	100	4,200	126
Prince George							800	16	600	12
Surry							2,000	60		
York							200	8		
Total	400	8	400	10	4,510	105	31,900	1,274	8,000	234

Table showing, by counties and species, the catch by gill nets used in the shore fisheries of Virginia in 1897—Continued.

Counties.	Spots.		Squeteague.		Striped bass.		Sturgeon.			
							Flesh.		Caviar.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Accomac	100	$6.	2,125	$85						
Alexandria					500	$30				
Charles City					4,000	280	63,625	$1,188	5,320	$1,596
Essex							600	12	140	40
Fairfax					375	23				
Henrico							5,000	100	1,040	312
Isle of Wight			30,000	600	20,000	1,400	23,100	462	3,640	1,092
James City					6,100	427	27,915	487	5,600	1,600
King George					225	14	19,759	1,085	1,240	460
King William					100	8	6,225	125	1,660	498
Mathews	2,000	80	600	6						
New Kent					6,000	420	20,000	400	3,750	1,125
Princess Anne							43,000	1,720	6,065	1,820
Prince George							65,850	1,238	5,810	1,743
Prince William					225	14				
Stafford					100	8				
Surry					5,942	238	43,150	864	4,340	1,302
York	100	5	300	6						
Total	2,200	91	33,025	697	43,567	2,862	318,224	7,681	38,605	11,588

Counties.	Shad.		Suckers.		Sun-fish.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Accomac							3,135	$126
Alexandria	389,700	$7,794					460,200	8,174
Caroline	13,125	300					13,125	300
Charles City	400,750	11,550					503,295	15,060
Chesterfield	8,400	240					8,400	240
Dinwiddie	19,600	560					19,600	560
Essex	62,548	1,609					74,288	1,786
Fairfax	117,318	2,246					117,693	2,269
Hanover	20,387	466					31,287	682
Henrico	124,700	3,820					242,940	5,052
Isle of Wight	241,026	9,070					332,766	13,224
James City	81,342	2,324					130,957	5,238
King George	168,630	3,590					233,054	5,365
King and Queen	38,133	686					38,133	686
King William	137,981	2,660	1,500	$30			152,866	3,433
Mathews							7,900	219
Nansemond	53,500	1,948					53,500	1,948
New Kent	284,526	7,440					360,676	10,259
Norfolk	84,000	3,081					84,000	3,081
Princess Anne	52,500	2,100					101,565	5,640
Prince George	297,850	9,008			500	$10	371,410	12,027
Prince William	89,716	1,689					257,941	2,543
Richmond	147,500	4,093					147,500	4,093
Stafford	8,712	164					108,812	672
Surry	114,480	4,243					169,912	6,707
Warwick	7,000	280					7,000	280
Westmoreland	9,124	210					11,124	225
York							10,700	317
Total	2,972,548	81,171	1,500	30	500	10	4,053,779	110,206

Table showing by counties the catch by pound nets in the shore fisheries of Virginia in 1897.

Species.	Accomac.		Caroline.		Elizabeth City.		Essex.		Fairfax.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	173,450	$625	165,000	$1,980	264,482	$2,857	123,322	$1,348	297,832	$1,736
Black bass									400	20
Blue-fish	120,089	3,696			180,115	5,403				
Bonito	6,150	184								
Butter-fish	9,000	220			52,628	1,576				
Carp									600	18
Cat-fish	3,830	216					23,600	708	31,600	948
Cero	1,100	70								
Croakers	155,950	1,547			899,164	4,496				
Drum	21,250	166			2,400	24				
Eels							4,000	160		
Flounders	8,550	161			51,485	1,554				
Hickory shad					2,740	55				
King-fish	800	30			1,600	64				
Mackerel	100	12								
Menhaden	294,100	325			1,841,500	4,609	52,000	35		
Mullet	200	2								
Perch, white	9,600	384			3,400	170	2,050	103	25,025	1,502
Perch, yellow							200	6	11,650	291
Pike									450	36
Pompano	11,835	858			12,056	951				
Shad	265,550	6,923	57,750	1,320	840,816	10,227	55,080	1,413	57,799	1,088
Sheepshead	1,135	91								
Spanish mackerel	102,080	7,021			39,525	2,193				
Spots	26,091	173			29,149	583				
Squeteague	118,765	1,895			1,090,874	16,363				
Striped bass	5,200	416					5,200	499	25,175	1,511
Sturgeon	22,028	1,311			24,757	496				
Suckers							300	6	3,500	70
Whiting					5,000	100				
Turtles					5,750	115				
Caviar	100	40			3,570	1,071				
Total	1,356,450	26,366	222,750	3,300	4,851,010	52,907	265,752	4,278	453,531	7,220

Species.	Nansemond.		Northampton.		Northumberland.		Norfolk.		Princess Anne.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	800	$8	773,250	$1,581	5,128,914	$17,774	45,000	$475	16,000	$160
Alewives, salted					38,000	332				
Blue-fish	3,750	118	71,740	2,025	4,885	147	1,300	65	225,409	3,431
Bonito			6,700	179					6,500	195
Butter-fish	48,750	975	12,100	268	2,750	83	24,000	960	235,150	5,063
Cat-fish	100	3			875	27				
Cero			100	3						
Crevalle			6,300	153					117,000	2,370
Croakers	93,000	530	78,200	802	7,400	148	35,000	350	888,935	4,499
Drum			31,500	161			1,000	10	14,000	140
Eels					100	3				
Flounders	1,875	56	3,900	132	72,310	3,196	1,000	10		
Hickory shad					83,746	1,611				
Hog-fish			200	10					6,000	480
King-fish			3,550	358			25,000	1,000	75,800	3,032
Mackerel			200	6						
Menhaden	450,000	1,125	154,600	281	2,064,920	2,640				
Moon-fish			16,848	408					11,646	319
Mullet									14,325	213
Perch, white	1,300	50			1,225	38	200	6	500	15
Pompano			7,620	843	3,025	151	4,000	280	27,000	2,160
Scup									4,000	120
Shad	23,800	823	14,200	361	3,700,429	92,408	45,500	1,715	40,437	1,617
Sheepshead			700	68					21,500	1,290
Spanish mackerel			95,125	9,513	3,576	322	1,700	85	239,300	19,054
Spots	937	47	51,300	570	1,950	79	25,000	750	301,500	7,148
Squeteague	151,500	1,515	919,000	9,750	20,850	491	91,000	1,015	2,325,487	22,684
Striped bass	2,500	200	3,300	330	65,917	5,779	18,000	540	37,950	1,227
Sturgeon	1,000	20	2,880	89	117,273	3,172	2,400	120	25,400	1,056
Whiting									7,600	140
Turtles					13,875	199				
Caviar					7,000	2,000	200	50	2,555	752
Total	779,312	5,465	2,253,313	27,891	11,339,020	130,600	320,300	7,431	4,643,994	77,165

Table showing the catch by pound nets in the shore fisheries of Virginia in 1897—Continued.

Species.	Gloucester.		King George.		Lancaster.		Mathews.		Middlesex.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Alewives, fresh	119,000	$1,190	1,275,400	$7,943	225,500	$1,390	413,400	$2,067	32,000	$320
Alewives, salted	.....	.....	6,000	60	.....	.....	.....	.....	.....	.....
Blue-fish	25,200	756	.....	.....	14,100	582	13,000	650	.....	.....
Butter-fish	.....	.....	.....	.....	60,000	900	.....	.....	.....	.....
Cat-fish	.....	.....	91,215	2,314	.....	.....	.....	.....	.....	.....
Croakers	330,000	1,650	6,200	196	60,000	300	20,000	200	.....	.....
Drum	27,500	275	.....	.....	.....	.....	.....	.....	.....	.....
Flounders	.....	.....	650	20	50,000	500	13,000	260	.....	.....
Hickory shad	.....	.....	.....	.....	.....	.....	37,780	755	.....	.....
Menhaden	220,000	550	.....	.....	581,200	969	390,000	585	16,000	40
Perch, white	.....	.....	47,060	2,361	.....	.....	.....	.....	.....	.....
Perch, yellow	.....	.....	500	13	.....	.....	.....	.....	.....	.....
Pike	.....	.....	100	8	.....	.....	.....	.....	.....	.....
Pompano	.....	.....	.....	.....	600	72	.....	.....	.....	.....
Shad	550,000	16,500	231,887	4,943	858,110	26,532	1,297,000	32,425	21,700	620
Spanish mackerel	11,000	660	.....	.....	10,400	1,031	.....	.....	.....	.....
Spots	.....	.....	.....	.....	2,000	60	.....	.....	.....	.....
Squeteague	165,000	2,475	825	33	125,200	3,006	69,780	698	.....	.....
Striped bass	.....	.....	95,794	5,174	3,000	180	.....	.....	.....	.....
Sturgeon	24,750	495	.....	.....	31,000	620	55,600	1,240	.....	.....
Turtles	9,000	180	.....	.....	.....	.....	25,000	500	.....	.....
Caviar	3,500	1,050	.....	.....	4,340	1,302	3,640	1,040	.....	.....
Total	1,484,950	25,781	1,755,631	23,065	2,025,450	37,445	2,338,200	40,420	69,700	980

Species.	Prince William.		Richmond.		Stafford.		Warwick.		Westmoreland.		York.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Alewives, fresh	168,000	$840	257,500	$3,050	178,280	$940	.....	.....	1,256,000	$5,480	33,000	$180
Alewives, salted	.....	.....	.....	.....	26,000	260	.....	.....	22,000	215	.....	.....
Blue-fish	.....	.....	.....	.....	.....	.....	.....	.....	905	34	2,500	75
Carp	.....	.....	.....	.....	812	49	.....	.....	800	16	.....	.....
Cat-fish	850	26	49,000	1,290	16,137	489	.....	.....	32,850	604	.....	.....
Croakers	.....	.....	.....	.....	.....	.....	.....	.....	2,200	66	166,000	1,615
Eels	.....	.....	15,000	600	2,175	93	.....	.....	.....	.....	.....	.....
Flounders	.....	.....	.....	.....	.....	.....	500	$10	2,470	69	6,000	240
Menhaden	.....	.....	235,000	193	.....	.....	.....	.....	.....	.....	10,000	25
Mullet	.....	.....	600	12	.....	.....	.....	.....	.....	.....	.....	.....
Perch, white	8,550	438	12,000	600	11,500	798	.....	.....	11,028	469	.....	.....
Perch, yellow	3,000	90	2,000	60	60,025	1,501	.....	.....	750	23	.....	.....
Pike	.....	.....	.....	.....	28,875	2,310	.....	.....	.....	.....	.....	.....
Shad	28,560	538	172,675	4,847	2,337	44	10,500	420	181,484	3,692	79,500	2,600
Spanish mackerel	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400	32
Spots	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,600	252
Squeteague	.....	.....	7,000	210	.....	.....	1,000	20	3,147	118	95,000	1,760
Striped bass	6,275	327	39,000	3,355	1,754	106	.....	.....	47,118	1,970	.....	.....
Sturgeon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,150	94
Caviar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	450	180
Total	215,235	2,259	789,775	14,217	327,895	6,590	12,000	450	1,560,752	12,756	402,600	7,003

SUMMARY.

Species.	Lbs.	Value.	Species.	Lbs.	Value.
Alewives, fresh	10,945,630	$51,944	Mullet	15,125	$227
Alewives, salted	92,000	867	Perch, white	133,438	6,934
Black bass	400	20	Perch, yellow	78,125	1,984
Blue-fish	662,993	16,978	Pike	29,425	2,354
Bonito	19,350	558	Pompano	66,135	5,315
Butter-fish	444,378	10,045	Scup	4,000	120
Carp	2,212	83	Shad	8,035,114	211,056
Cat-fish	250,057	6,625	Sheepshead	23,335	1,449
Cero	1,200	73	Spanish mackerel	503,106	39,911
Crevalle	123,300	2,523	Spots	444,527	9,662
Croakers	2,742,049	16,399	Squeteague	5,184,428	62,033
Drum	97,650	776	Striped bass	356,183	21,614
Eels	21,275	856	Sturgeon	310,235	8,713
Flounders	211,740	6,208	Suckers	3,800	76
Hickory shad	124,266	2,421	Whiting	12,600	240
Hog-fish	6,200	490	Turtles	53,625	994
King-fish	106,250	4,484	Caviar	25,355	7,435
Mackerel	300	18			
Menhaden	6,309,320	11,377	Total	37,467,620	513,589
Moon-fish	28,494	727			

Table showing, by counties, the yield of the fyke-net fisheries of Virginia in 1897.

Species.	Accomac.		Essex.		Fairfax.		Isle of Wight.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives			3,600	$36				
Black bass					475	$24		
Carp					1 200	37		
Cat-fish			2,700	81	7,325	220	1,000	$50
Croakers	9,000	$130					6,000	90
Drum	200	2						
Eels	600	39			3,385	102		
Flounders	4,100	59	540	22				
Perch, white	5,700	157	450	22	7,750	388	2,300	77
Perch, yellow			900	27	9,650	241		
Pike					2,938	178		
Shad	300	12	2,700	90				
Squeteague	1,200	27					3,000	50
Striped bass	1,600	98	1,800	126	1,500	75	4,500	255
Suckers			475	10	8,350	167		
Sun-fish					1,050	32		
Total	22,700	524	13,165	414	43,623	1,464	16,800	522

Species.	King George.		King William.		Nansemond.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives			10,125	$150		
Cat-fish	1,450	$51	54,300	1,086		
Croakers					8,000	$320
Eels			1,810	54		
Flounders			9,050	452		
Perch, white	875	53	9,050	362		
Perch, yellow	1,250	63				
Pike	200	10				
Shad			5,430	181	5,200	150
Squeteague			10,860	217	2,800	112
Striped bass	725	43	18,100	1,810		
Suckers			9,131	183		
Total	4,500	220	127,856	4,495	16,000	582

Species.	Northampton.		Prince William.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs	Value.
Alewives	200	$2					13,925	$188
Black bass							475	24
Blue-fish	100	3					100	8
Carp			725	$22			1,925	59
Cat-fish			9,250	278			76,025	1,766
Croakers	600	6			26,000	$390	49,600	986
Drum	200	5					400	7
Eels			2,200	66			7,995	261
Flounders	150	5			21,000	840	34,840	1,378
Hog-fish	100	10					100	10
Perch, white			6,675	334			32,800	1,393
Perch, yellow			4,950	124			16,750	455
Pike			2,200	132			5,338	320
Shad	200	10			1,650	55	15,480	498
Sheepshead	150	11					150	11
Spots					1,800	72	1,800	72
Squeteague	4,000	80			29,000	580	50,860	1,066
Striped bass	300	18	1,000	50	2,500	175	32,025	2,650
Suckers			6,400	128			24,356	488
Sun-fish			600	18			1,650	50
Total	6,000	150	34,000	1,152	81,950	2,112	366,594	11,635

Table showing, by counties, the catch by lines in the shore fisheries of Virginia in 1897.

Species.	Accomac.		Elizabeth City.		Gloucester.		Isle of Wight.		King George.		King William.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Blue-fish	200	$10	54,000	$1,620								
Bonito			6,000	240								
Cat-fish							7,000	$350			25,000	$500
Cod	800	40										
Croakers	131,500	2,175	485,000	2,425			24,000	320				
Drum	13,250	270	2,000	20								
Flounders	250	10										
King-fish	10,510	332										
Pompano			4,000	200								
Sea bass	665	10										
Sheepshead	3,483	285	2,000	160								
Spots	700	46	120,000	2,400								
Squeteague	266,750	7,610	356,000	5,340			42,000	690				
Striped bass			3,000	120							1,000	100
Whiting	1,500	45										
Crabs, hard	25,000	125	727,032	2,423	88,000	$660			23,833	$286	78,500	893
Total	454,608	10,958	1,759,032	14,948	88,000	660	73,000	1,360	23,833	286	104,500	993

Species.	Lancaster.		Mathews.		Nansemond.		Norfolk.		Northampton.		Northumberland.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Blue-fish									742,500	$14,850	1,600	$64
Croakers									56,925	1,139	3,300	32
Flounders											1,300	42
Hog-fish											1,000	20
Sea bass											600	18
Spots											8,200	80
Squeteague					4,000	$160			3,375	68	5,300	212
Crabs, hard	12,000	$88	435,000	$2,900	8,000	200	400,000	$2,500	1,730,000	8,000	132,000	990
Total	12,000	88	435,000	2,900	12,000	360	400,000	2,500	2,532,800	24,057	148,300	1,458

Species.	Princess Anne.		Surry.		Warwick.		Westmoreland.		York.		Total.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Blue-fish	500	$15									798,800	$16,559
Bonito											6,000	240
Cat-fish											32,000	850
Cod											800	40
Croakers	17,500	175	5,000	$150	12,500	$125			211,200	$1,074	946,925	7,615
Drum											15,250	290
Flounders					2,000	50					3,550	102
Hog-fish											1,000	20
King-fish											10,510	332
Perch, white			100	3							100	3
Pompano											4,000	200
Sea bass											1,265	28
Sheepshead											5,483	445
Spots	12,000	600	300	9	8,000	75			10,600	225	149,800	3,435
Squeteague	10,000	100	6,000	180	20,000	200			103,200	1,596	816,625	16,156
Striped bass			200	8	1,000	50					5,200	278
Whiting											1,500	45
Crabs, hard	705,000	4,500					48,533	$306	898,500	4,860	5,311,398	28,231
Total	745,000	5,390	11,600	350	38,500	500	48,533	306	1,223,500	7,755	8,110,206	74,869

Table showing, by counties, the catch by dredges, tongs, and scrapes in Virginia for 1897.

Counties.	Oyster dredges.				Oyster tongs.				Total.	
	Oysters, market.		Oysters, seed.		Oysters, market.		Oysters, seed.			
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Vessel fisheries:										
Accomac	1,368,437	$75,386			764,610	$13,163			2,133,047	$88,549
Elizabeth City	588,000	30,240	315,000	$4,500	22,400	770	110,600	$1,814	1,036,000	37,324
Gloucester					662,900	27,990	1,236,550	18,015	1,899,450	46,005
Isle of Wight					280,700	9,530	343,000	4,900	623,700	14,430
James City							70,000	1,000	70,000	1,000
King George					27,650	1,383			27,650	1,383
King William					82,250	4,400	381,500	5,450	463,750	9,850
King and Queen					3,500	150	8,750	125	12,250	275
Lancaster	40,600	1,990			55,300	2,690			95,900	4,680
Mathews					77,000	2,750	35,000	500	112,000	3,250
Middlesex					11,340	648			11,340	648
Nansemond					1,047,830	29,963	1,131,200	16,160	2,179,030	46,123
Norfolk	84,000	3,600			2,769,445	109,662	135,800	2,380	2,989,245	115,642
Northampton	32,200	1,690			277,200	9,316			309,400	11,006
Northumberland	623,455	36,743							623,455	36,743
Warwick					422,100	12,065	35,000	500	457,100	12,565
Westmoreland	221,550	12,980							221,500	12,980
Richmond	11,900	680			12,600	825	66,500	950	91,000	2,455
York					507,850	18,138	353,500	5,163	861,350	23,301
Total	2,970,142	163,309	315,000	4,500	7,024,675	243,443	3,907,400	56,957	14,217,217	468,209
Shore fisheries:										
Accomac	550,900	25,765			4,203,528	261,209	189,700	7,960	4,944,128	294,934
Elizabeth City					1,382,500	68,670	875,000	12,500	2,257,500	81,170
Essex					580,650	40,775			580,650	40,775
Gloucester					763,175	38,621	572,250	8,175	1,335,425	46,796
Isle of Wight					471,100	9,345			471,100	9,345
James City					65,100	3,075	84,000	1,200	149,100	4,275
King George	42,000	2,100			98,000	4,900			140,000	7,000
King William					14,000	1,300			14,000	1,300
Lancaster					4,323,900	204,730			4,323,900	204,730
Mathews					3,752,000	134,000			3,752,000	134,000
Middlesex					6,146,000	296,550			6,146,000	296,550
Nansemond					791,000	22,850			791,000	22,850
Norfolk					2,044,000	71,240			2,044,000	71,240
Northampton					1,106,266	77,978			1,106,266	77,978
Northumberland	556,850	29,723			865,900	46,225			1,422,750	75,948
Princess Anne					8,750	938			8,750	938
Richmond					963,200	63,600			963,200	63,600
Warwick					630,000	5,050			630,000	5,050
Westmoreland	295,750	16,900			473,200	27,020			768,950	43,920
York					1,911,000	74,075	1,190,000	17,000	3,101,000	91,075
Total	1,445,500	74,488			30,593,269	1,452,151	2,910,950	46,835	34,949,719	1,573,474
Grand total	4,415,642	237,797	315,000	4,500	37,617,944	1,695,594	6,818,350	103,792	49,166,936	2,041,683

Counties.	Clam tongs and hoes.		Crab scrapes.	
	Clams.		Crabs, soft.	
	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:				
Accomac	112,048	$7,758		
Elizabeth City	400	50		
Norfolk	8,000	300		
Northampton	18,560	1,440		
Total	139,008	9,548		
Shore fisheries:				
Accomac	360,528	27,438	798,021	$28,646
Elizabeth City	32,000	2,400		
Gloucester	57,040	4,414		
Mathews	47,600	3,400		
Northampton	76,400	7,350		
York	128,992	11,547		
Total	702,560	56,549	798,021	28,646
Grand total	841,568	66,097	798,021	28,646

Table showing, by counties and species, the yield by slat traps, pots, and spears, and other minor apparatus in the shore fisheries of Virginia in 1897.

Apparatus and counties.	Alewives.		Cat-fish.		Eels.		Perch, white.		Shad.		Suckers.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Slat traps:												
Henrico	120,000	$900	22,500	$1,012	22,500	$625	16,500	$990	21,875	$625	36,000	$1,440
Nansemond	300	3	100	3	.....	.....	600	30	1,400	40	.....	.....
Total	120,300	903	22,600	1,015	22,500	625	17,100	1,020	23,275	665	36,000	1,440
Pots and spears:												
Accomac	.....	.....	.....	.....	6,565	178	.....	.....	.....	.....	.....	.....
Essex	.....	.....	.....	.....	3,000	120	.....	.....	.....	.....	.....	.....
Isle of Wight	.....	.....	.....	.....	6,000	180	.....	.....	.....	.....	.....	.....
Northumberland	.....	.....	.....	.....	6,800	204	.....	.....	.....	.....	.....	.....
Richmond	.....	.....	.....	.....	5,000	200	.....	.....	.....	.....	.....	.....
Surry	.....	.....	.....	.....	4,000	120	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	31,365	1,002	.....	.....	.....	.....	.....	.....
Other minor apparatus:												
Nansemond	4,000	40	.....	.....	.....	.....	.....	.....	24,000	800	.....	.....
Grand total	124,300	943	22,600	1,015	53,865	1,627	17,100	1,020	47,275	1,465	36,000	1,440

Apparatus and counties.	Crabs, soft.		Terrapins.		Turtles.		Frogs.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Other minor apparatus:								
Accomac	90,562	$2,716	2,572	$1,424	700	$33	.....	.....
Charles City	.....	.....	150	30	790	16	290	$23
Chesterfield	.....	.....	1,500	90	.....	.....	.....	.....
Dinwiddie	.....	.....	500	30	.....	.....	.....	.....
Gloucester	.....	.....	1,100	400	.....	.....	.....	.....
Lancaster	118,800	6,192	.....	.....	.....	.....	.....	.....
New Kent	.....	.....	.....	.....	510	10	435	35
Northampton	4,333	390	.....	.....	.....	.....	.....	.....
Northumberland	56,400	1,970	.....	.....	.....	.....	300	50
Prince George	.....	.....	6,000	120	1,200	24	.....	.....
Total	270,095	11,268	11,822	2,104	3,200	83	1,025	108

SUMMARY.

Apparatus and counties.	Lbs.	Value.	Apparatus and counties.	Lbs.	Value.
Slat traps:			Other minor apparatus:		
Henrico	239,375	$5,592	Accomac	93,834	$4,183
Nansemond	2,400	76	Charles City	1,230	69
			Chesterfield	1,500	90
Total	241,775	5,668	Dinwiddie	500	30
			Gloucester	1,100	400
Pots and spears:			Lancaster	118,800	6,192
Accomac	6,565	178	Nansemond	28,000	840
Essex	3,000	120	New Kent	945	45
Isle of Wight	6,000	180	Northampton	4,333	390
Northumberland	6,800	204	Northumberland	56,700	2,020
Richmond	5,000	200	Prince George	7,200	144
Surry	4,000	120	Total	314,142	14,403
Total	31,365	1,002	Grand total	587,282	21,073

THE MENHADEN INDUSTRY.

The menhaden industry of Virginia is in a prosperous condition, although there are not so many factories in operation now as formerly, there being 21 running in 1891, whereas in 1897 there were but 16. The value of the investment in the former year was $665,790, against $548,400 in the latter, while the number of men employed decreased from 1,229 to 1,170. The greatest decrease was in the number of seines

used, there being 60 in 1891 and only 37 in 1897. This is due principally to the gradual substitution of steamers for sail vessels, there being 63 sail vessels fishing and transporting in 1891 against 28 in 1897. Menhaden were fairly abundant, the catch numbering 263,203,000, but the fish were exceedingly dry, yielding only 177,043 gallons of oil; whereas the 191,365,500 fish caught in 1891 yielded 396,575 gallons. The quantity of scrap produced was 21,434 tons, worth $331,227, in 1897, against 17,054 tons, worth $230,647, in 1891. The following table shows in detail the extent of this industry in 1897:

Table showing the extent of the menhaden industry of Virginia in 1897.

Items.	No.	Value.	Items.	No.	Value.
Factories	16	$181,700	Steam vessels fishing	14	$148,000
Cash capital		115,500	Tonnage	1,061	
Wages paid factory employees		52,594	Outfit		34,227
Persons in factories	552		Sail vessels fishing	15	17,200
Persons on vessels	618		Tonnage	429	
Menhaden utilized	263,203,000	243,497	Outfit		10,322
Tons of dry scrap	13,488	255,543	Sail vessels transporting	13	13,400
Tons of crude and acidulated scrap	7,946	75,684	Tonnage	372	
Gallons of oil made	177,043	30,805	Outfit		2,651
			Seines (total length, 30,622 feet)	37	25,400

THE WHOLESALE FISHERY TRADE.

In connection with the fisheries of Virginia there is a considerable wholesale trade in fishery products. In 1897 there were 56 establishments or firms in 21 different localities of the State in this branch of industry. The investment in shore property and cash capital utilized in the business was $640,560, and the number of persons engaged was 3,079. The total value of the products handled was $1,663,956.

Table showing, by localities, the extent of the wholesale trade in fishery products of Virginia in 1897.

Items.	Lewisetta, Whealton, Sandy Bottom, and Earnest.		West Point.		Hampton.		Suffolk.		Portsmouth.	
	No.	Val.	No.	Val.	No.	Val.	No.	Val.	No.	Val.
Establishments	4	$25,950	4	$16,000	5	$35,460	2	$5,000	2	$28,000
Cash capital		21,500		29,000		37,000		4,000		12,000
Persons engaged	300		197		416		79		234	
Products handled.										
Oysters:										
Opened, gallons	56,000	47,600	170,500	161,725	96,635	82,139	31,000	34,800	126,550	101,240
In shell, bushels			400	200	17,000	8,100	425	215		
Canned, 1-lb. cans, number	480,000	30,000								
Canned, 2-lb. cans, do	60,000	6,500								
Oyster shells, bushels			2,000	25			44,000	1,100	190,000	3,800
Clams, do					3,975	3,506				
Crabs:										
Canned, 1-lb. cans, number					94,512	14,177				
Canned, 2-lb. cans, do					94,560	22,064				
Crab meat, gallons	1,280	896							10,000	7,200
Crab refuse, tons	11	121			105	1,155				
Fish, fresh, pounds					66,000	1,970				
Value of products		85,117		161,950		133,111		36,115		112,240

Table showing, by localities, the extent of the wholesale trade in fishery products of Virginia in 1897—Continued.

Items.	Norfolk.		Cape Charles and Brighton.		Willis Wharf.		Chesconessex, Leemont, Hopkins, Mappsville, and Dreka.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Establishments	16	$195,000	3	$8,000	2	$3,000	5	$5,500
Cash capital		147,000		12,000		3,000		18,700
Persons engaged	1,552		50		52		65	
Products handled.								
Oysters:								
Opened ..... gallons..	961,000	768,800			20,000	12,995	15,475	11,666
In shell ..... bushels..	51,600	20,640	2,500	2,625			15,000	12,600
Canned, 1-lb. cans..number..	115,200	6,720						
Canned, 2-lb. cans ..... do....	21,600	2,304						
Oyster shells ..... bushels..	1,017,000	13,720						
Clams ..... do....	5,700	2,850	5,000	6,275	2,000	1,600	3,500	3,250
Clams:								
Canned, 1-lb. cans..number..			72,000	6,000				
Canned, 2-lb. cans ..... do....			6,000	900				
Clam juice, 2-lb. cans.... do....			4,800	300				
Crabs:								
Hard ..... do....	225,000	900	2,952,000	7,995			33,200	249
Soft ..... do....			13,000	390			932,510	27,198
Crab meat ..... gallons..	36,500	26,550	5,400	3,200				
Terrapin ..... pounds..	3,000	60			525	250	1,260	1,040
Turtles ..... do....	5,000	500						
Fish, fresh ..... do....	2,720,700	96,765	735,170	7,528			66,000	2,380
Caviar ..... do....	8,400	2,400					300	120
Value of products		942,209		35,213		14,845		58,503

Items.	Watchapreague and Wisharts Point.		Franklin City.		Chincoteague.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Establishments	2	$1,050	5	$2,700	6	$5,900	56	$331,560
Cash capital		4,500		10,500		9,800		309,000
Persons engaged	40		41		63		3,079	
Products handled.								
Oysters:								
Opened ..... gallons..	16,500	11,200	13,575	9,355	6,700	4,566	1,513,935	1,246,086
In shell ..... bushels..	625	550	20,210	16,918	19,825	16,652	127,585	78,500
Canned, 1-lb. cans..number..							595,200	36,720
Canned, 2-lb. cans ..... do....							81,600	8,804
Oyster shells ..... bushels..							1,253,000	18,645
Clams ..... do....	750	750	13,925	11,790	15,211	12,372	50,061	42,393
Clams:								
Canned, 1-lb. cans..number..							72,000	6,000
Canned, 2-lb. cans. ..... do....							6,000	900
Clam juice, 2-lb. cans.... do....							4,800	300
Crabs:								
Hard ..... do....							3,210,200	9,144
Soft ..... do....							945,510	27,588
Canned, 1-lb. cans ..... do....							94,512	14,177
Canned, 2-lb. cans ..... do....							94,560	22,004
Crab meat ..... gallons..							68,180	37,840
Crab refuse ..... tons..							116	1,276
Terrapin ..... pounds..							4,785	1,350
Turtles ..... do....							5,000	500
Fish, fresh ..... do....					25,000	500	3,612,870	109,143
Caviar ..... do....							8,700	2,520
Value of products		12,500		38,063		34,090		1,663,956

STATISTICS

OF THE

FISHERIES OF THE NEW ENGLAND STATES.

PREPARED IN THE DIVISION OF STATISTICS AND METHODS OF THE FISHERIES, UNITED STATES FISH COMMISSION.

C. H. TOWNSEND, Assistant in Charge.

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INTRODUCTORY NOTE.

The report on the fisheries of the New England States presented herewith relates to the condition of the commercial fisheries in the year 1898, and is based on inquiries made in the field in 1899 by statistical agents of the U. S. Fish Commission.

The results of the investigation have already been published in condensed form as Statistical Bulletin No. 15, and in the report of the Commissioner for 1900.

The report has been prepared under the direction of Mr. C. H. Townsend, assistant in charge of the division of fisheries.

The agents of the division engaged in the investigations in the field were Messrs. C. H. Stevenson in Connecticut, W. A. Wilcox and T. M. Cogswell in Massachusetts and New Hampshire, Ansley Hall in Massachusetts, E. S. King in Rhode Island, and J. N. Cobb in Maine.

The assistant in charge visited some of the more important fisheries of the region, and Mr. J. B. Wilson was temporarily engaged in Massachusetts.

GEO. M. BOWERS,
Commissioner.

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STATISTICS OF THE FISHERIES OF THE NEW ENGLAND STATES.

GENERAL NOTES AND STATISTICS.

The New England States having coast fisheries are Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut. The number of persons engaged in the fisheries of these States in 1898 was 35,631. Of this number 22,367 were fishermen and 13,264 were shoresmen employed in the various shore industries directly connected with the fisheries. Maine and Massachusetts maintain extensive fisheries, but the industry is considerably smaller in the other three States. Maine employed in its fisheries 16,954 persons, Massachusetts 14,363, New Hampshire only 154, Rhode Island 1,687, and Connecticut 2,473. Since the last general canvass of these States in 1889 there has been a decrease of 905 in the number of persons employed. In Maine there was an increase of 2,825 persons, while a decrease occurred in all of the other States, the largest number being 2,875 in Massachusetts, and the largest percentage, 57.80 per cent, in New Hampshire.

The amount of capital invested in the fisheries was $19,637,036. The investment in Maine was $4,013,053; in New Hampshire, $52,648; in Massachusetts, $13,372,902; in Rhode Island, $957,142; and in Connecticut, $1,241,291. As compared with 1889 the capital invested has decreased $457,758. There has been an increase in Maine of $1,123,160 and in Massachusetts of $127,673. In New Hampshire there was a decrease of $60,012, in Rhode Island of $63,036, and in Connecticut of $1,585,543. The decrease in Connecticut is due chiefly to the fact that the value of the oyster-grounds, included in 1889, was omitted in 1898, the actual decrease in the investment being about $282,818.

The number of fishing and transporting vessels employed in the fisheries was 1,427, having a net tonnage of 43,821 tons, and a value of $2,920,825. The value of their outfits was $1,303,514. There has been a slight decrease since 1889 in the number of vessels and a large decrease in the tonnage. The vessels have increased in number in Maine, Massachusetts, and Rhode Island, but have decreased in the other States. The decrease in the total tonnage is due chiefly to many of the larger fishing vessels being sold for use in the coasting trade, and their places in the fisheries being supplied by smaller ones; and also to the transfer of a number of menhaden vessels from the New England region to the State of New York. The number of boats employed in the shore fisheries was 10,557, valued at $621,670; the apparatus of capture used on vessels and boats was valued at $1,218,898; the value of shore and

accessory property in the fisheries and fishery industries was $7,115,030, and the cash capital amounted to $6,457,099.

The products of the fisheries aggregated 393,457,906 pounds, valued at $9,682,290. Maine produced 123,404,561 pounds, valued at $2,654,919; New Hampshire, 3,020,715 pounds, valued at $48,987; Massachusetts, 202,257,817 pounds, valued at $4,463,727; Rhode Island, 32,854,396 pounds, valued at $955,058; and Connecticut, 31,920,417 pounds, valued at $1,559,599. Some of the more important species secured in the fisheries of these States were cod, cusk, haddock, hake, and pollock, valued at $2,798,109, halibut at $569,515, mackerel at $481,933, herring at $596,684, alewives at $76,959, smelt at $140,912, blue-fish at $86,461, scup at $93,353, squeteague at $108,945, sword-fish at $90,130, shad at $44,018, eels at $64,756, lobsters at $1,276,967, clams and quahogs at $578,455, and oysters at $1,910,684. The products of the whale fisheries, consisting chiefly of whale, sperm, and sea-elephant oils, and whalebone, were valued at $285,688.

There has been a decrease in the products of the fisheries since 1889 of 259,712,134 pounds, or 39.76 per cent, in quantity, and of $868,351, or 8.23 per cent, in value. A decrease in quantity has occurred in all of the States in this section, varying from 4.75 per cent in Maine to 74.20 per cent in Rhode Island. The value in New Hampshire has also decreased $39,524, or 44.65 per cent, and in Massachusetts $1,394,547, or 23.80 per cent, but in Maine it has increased $543,713, or 25.75 per cent, and to a small extent in Rhode Island and Connecticut.

The decrease in products in the various States, except in New Hampshire, where it relates to nearly all of the principal species, is due chiefly to a smaller quantity of algæ and to a decline in the catch of menhaden. The products of Maine in 1889 included 12,900,000 pounds of algæ, valued at $6,315, whereas none appears in the statistics of that State in 1898. The products of Massachusetts included 117,993,900 pounds of algæ in 1889, valued at $66,034, and only 700,000 pounds, valued at $22,375, in 1898. If the algæ were eliminated from the statistics of these States in both years the result in Maine would be an increase in the more important products of 6,744,697 pounds in quantity and of $550,028 in value, and in Massachusetts an increase of 20,334,048 pounds in quantity and a decrease of $1,350,888 in value. The increase in the value of the products in Maine may be attributed principally to the high prices received for lobsters, but in Massachusetts the catch of lobsters was not large enough to materially offset the decrease in the value of products occasioned by the comparatively low prices received for fish. In Rhode Island the products have decreased in quantity, owing to a reduction of 109,440,000 pounds in the catch of menhaden. There has, however, been considerable increase in that State in the quantity of food species. The decrease in the products of Connecticut may be accounted for by the absence of

algæ, of which 18,000,000 pounds were included in 1889, and also by a falling off in the catch of cod, menhaden, and various other species.

The following publications of the United States Fish Commission may be consulted in studying the statistics of the fisheries of the New England States:

The Fishery Industries of the United States. Section II. Geographical Review of the Fisheries for 1880. Parts I to V.

The Fishery Industries of the United States. Section V. History and Methods of the Fisheries.

Report on the Fisheries of the New England States, by J. W. Collins and Hugh M. Smith. Bull. U. S. Fish Com. 1890, pp. 73–176.

Report on the Condition of the Sea Fisheries of the South Coast of New England in 1871 and 1872, by Spencer F. Baird. Rept. U. S. Fish Com. 1871–72, pp. I–XLI.

The Sea Fisheries of Eastern North America, by Spencer F. Baird. Rept. U. S. Fish Com. 1886, pp. 3–224.

Statistical Review of the Coast Fisheries of the United States, by J. W. Collins. Rept. U. S. Fish Com. 1888, pp. 271–378.

The Herring Industry of the Passamaquoddy Region, Maine, by Ansley Hall. Rept. U. S. Fish Com. 1896, pp. 443–489.

Notes on the Oyster Fishery of Connecticut, by J. W. Collins. Bull. U. S. Fish Com. 1889, pp. 461–497.

The Lobster Fishery of Maine, by John N. Cobb. Bull. U. S. Fish Com. 1899, pp. 241–265.

The three tables which follow show in detail the number of persons employed, the amount of capital invested, and the quantity and value of the products of the fisheries of the New England States in 1898, and the table on page 321 presents a comparison of the extent of the fisheries in the years 1889 and 1898:

Table showing the number of persons engaged in the fisheries of the New England States in 1898.

States.	Fishermen.	Shoresmen.	Total.
Maine	8,717	8,237	16,954
New Hampshire	143	11	154
Massachusetts	10,341	4,022	14,363
Rhode Island	1,340	347	1,687
Connecticut	1,826	647	2,473
Total	22,367	13,264	35,631

Table showing the investment in the fisheries of the New England States in 1898.

Items.	Maine.		New Hampshire.		Massachusetts.	
	No.	Value.	No.	Value.	No.	Value.
Vessels	497	$538,400	5	$3,900	637	$1,776,025
Tonnage	8,175		79		30,558	
Outfit		182,427		3,458		939,772
Boats	5,741	284,897	123	5,395	2,625	178,082
Seines	251	29,660	1	500	272	88,382
Bag nets	202	8,645				
Dip nets	182	637			213	272
Drag nets					27	1,610
Fyke nets	26	710			88	1,124
Gill nets	3,722	37,413	60	844	4,632	50,312
Pound nets	67	14,680	17	6,960	126	141,835
Snap nets	20	20				
Trap nets	33	14,125			4	900
Weirs	557	111,618				
Lines, hand and trawl		51,965		2,118		221,365
Pots, eel	333	188			1,290	2,376
Pots, lobster	155,978	155,777	1,675	1,666	26,264	31,481
Harpoons		1,155				1,200
Spears	145	127				
Dredges, tongs, rakes, hoes, and forks		2,032		32		15,199
Other apparatus						469
Shore and accessory property		1,193,478		12,775		5,125,248
Cash capital		1,385,099		15,000		4,797,250
Total		4,013,053		52,648		13,372,902

Items.	Rhode Island.		Connecticut.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Vessels	93	$167,850	195	$434,650	1,427	$2,920,825
Tonnage	1,454		3,555		43,821	
Outfit		46,597		131,260		1,303,514
Boats	854	72,381	1,214	80,915	10,557	621,670
Seines	49	7,243	67	6,355	640	132,140
Bag nets					202	8,645
Dip nets					395	909
Drag nets					27	1,610
Fyke nets	329	2,462	410	3,522	853	7,818
Gill nets	184	7,085	89	5,025	8,637	100,679
Pound nets	202	110,395	66	19,930	478	293,800
Snap nets	4	20			24	40
Trap nets					37	15,025
Weirs					557	111,618
Lines, hand and trawl		2,010		1,357		278,815
Pots, eel	3,139	1,987	1,313	1,197	6,075	5,748
Pots, lobster	10,312	12,716	10,830	17,405	205,049	219,045
Harpoons		109		177		2,641
Spears	29	46	56	37	230	210
Dredges, tongs, rakes, hoes, and forks		6,549		15,131		88,943
Other apparatus		43		700		1,212
Shore and accessory property		439,149		344,380		7,116,030
Cash capital		80,500		179,260		6,457,099
Total		957,142		1,241,291		19,637,036

Table showing the quantity and value of products taken in the fisheries of the New England States in 1898.

Species.	Maine.		New Hampshire.		Massachusetts.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore					36,090	$912
Alewives, fresh	925,325	$8,016	25,000	$250	1,877,061	22,268
Alewives, salted	986,600	8,437	200,000	2,500	586,700	6,790
Alewives, smoked	606,800	8,849			71,440	2,230
Blue-fish					832,849	38,089
Bonito					89,136	2,410
Butter-fish	14,800	740			30,620	818
Cat-fish	4,000	40			5,200	110
Cod, fresh	10,091,088	167,231	689,150	10,756	40,632,151	688,721
Cod, salted	5,232,622	147,024	2,000	70	30,682,827	718,318
Cunners	148,300	1,025			85,350	5,250
Cusk, fresh	1,138,201	12,545	97,500	995	5,825,173	61,308
Cusk, salted	86,667	1,210			128,863	2,206
Eels, fresh	160,611	12,622			425,846	17,635
Eels, salted	3,200	320				
Flounders and flat-fish	786,697	17,539			1,168,876	14,793
Haddock, fresh	7,274,909	119,982	1,379,750	14,552	35,451,284	418,526
Haddock, salted	956,657	12,369	4,000	100	130,230	1,292
Hake, fresh	18,329,899	110,558	115,400	1,379	21,099,428	161,495
Hake, salted	2,405,578	23,886	1,500	38	232,388	2,139
Halibut, fresh	304,890	22,075			8,663,443	487,714
Halibut, salted					1,859,854	59,726
Herring, fresh	37,017,814	174,813	65,000	650	16,562,338	256,335
Herring, salted	1,400,650	26,159			5,801,159	76,212
Herring, smoked	8,738,500	63,005				
Hickory shad					1,000	15
King-fish					245	22
Mackerel, fresh	1,441,157	85,344	58,750	3,207	3,791,233	197,339
Mackerel, salted	163,000	12,761			2,912,131	164,525
Menhaden, fresh	6,780,000	17,105			1,497,367	10,544
Menhaden, salted	539,900	3,601				
Perch			1,650	165	57,523	3,662
Pollock, fresh	1,126,746	8,463	180,200	1,559	6,566,388	38,256
Pollock, salted	1,002,704	10,901	1,200	24	517,649	4,789
Pompano					150	15
Salmon	53,322	10,009			60	30
Scup					1,043,625	14,253
Sea bass					99,300	4,946
Shad, fresh	701,879	14,006			29,333	1,426
Shad, salted	160,000	5,746				
Smelt	1,608,045	139,345			7,079	515
Spanish mackerel					210	30
Squeteague					1,371,910	39,518
Striped bass	25,067	4,206	850	85	12,948	939
Sturgeon	12,075	367			8,490	402
Suckers	200	1				
Sword-fish, fresh	878,290	44,395			569,916	34,465
Sword-fish, salted					27,270	815
Tautog					289,505	7,567
Tomcod	310,083	6,158				
Whiting					37,200	492
Refuse fish	55,000	354				
Squid, fresh					1,064,425	14,570
Squid, salted					5,000	50
Lobsters	11,183,294	992,856	108,515	9,372	1,693,741	147,702
Shrimp					25,200	1,183
Quahogs or hard clams					510,536	50,724
Clams (soft), fresh	8,758,800	274,885	6,000	360	1,470,951	102,594
Clams (soft), salted	711,200	48,568				
Mussels					7,400	180
Oysters					708,575	156,235
Scallops	166,509	14,522			875,512	94,971
Winkles					9,500	475
Irish moss			70,000	2,450	700,000	22,375
Caviar	845	454				
Sounds and tongues	281,917	12,840			67,562	2,808
Haddock spawn					700	18
Halibut fins					21,900	384
Livers	672,800	5,497				
Oil, fish	157,920	4,591	14,250	475	358,927	13,963
Oil, sea-elephant					472,500	20,790
Oil, whale					3,119,450	199,023
Whalebone					27,100	65,875
Total	123,404,561	2,654,919	3,020,715	48,987	202,257,817	4,463,727

Products taken in the fisheries of the New England States in 1898—Continued.

Species.	Rhode Island.		Connecticut.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore					36,090	$912
Alewives, fresh	628,132	$6,621	868,400	$7,346	4,323,918	44,501
Alewives, salted	74,100	940			1,847,400	18,667
Alewives, smoked	136,390	2,712			814,630	13,791
Blue-fish	330,290	15,521	963,285	32,851	2,126,424	86,461
Bonito	124,450	2,615			213,586	5,025
Bullheads	300	24	3,032	114	3,332	138
Butter-fish	207,000	5,615	60,280	2,370	312,700	9,543
Carp			910	46	910	46
Cat-fish					9,200	150
Cod, fresh	1,111,811	23,556	451,225	10,978	52,975,425	901,242
Cod, salted	315,101	13,154			36,232,550	878,566
Cunners	3,300	100			236,950	6,375
Cusk, fresh					7,060,874	74,848
Cusk, salted					215,530	3,416
Eels, fresh	443,374	20,030	206,970	14,149	1,236,801	64,436
Eels, salted					3,200	320
Flounders and flat-fish	1,710,057	27,576	443,864	13,383	4,109,494	73,291
Haddock, fresh	366,525	8,373	112,800	856	44,585,268	562,289
Haddock, salted					1,090,887	13,761
Hake, fresh					34,544,727	278,432
Hake, salted					2,639,466	26,063
Halibut, fresh					8,968,333	509,789
Halibut, salted					1,859,854	59,726
Herring, fresh	2,000	10			53,647,152	431,308
Herring, salted					7,201,809	102,371
Herring, smoked					3,738,500	63,005
Hickory shad	13,000	328			14,000	348
King-fish	1,970	128			2,215	150
Mackerel, fresh	359,900	15,004	40,913	1,753	5,691,953	302,647
Mackerel, salted			28,000	2,000	3,103,131	179,286
Menhaden, fresh	3,140,000	7,591	11,182,910	26,334	22,600,277	61,574
Menhaden, salted					539,900	3,601
Minnows	3,728	356			3,728	356
Perch	48,475	1,920	15,572	760	123,220	5,507
Pickerel	200	20	5,420	271	5,620	291
Pollock, fresh	50,000	500			7,923,334	48,778
Pollock, salted					1,521,553	15,714
Pompano					150	15
Salmon					53,382	10,039
Scup	6,890,225	75,596	101,040	3,504	7,534,890	93,353
Sea bass	440,950	11,935	247,789	12,182	788,039	29,063
Shad, fresh	25,112	1,625	499,325	21,215	1,255,649	38,272
Shad, salted					160,000	5,746
Smelt	4,100	215	5,600	837	1,624,824	140,912
Spanish mackerel	700	104	66	12	976	146
Squeteague	3,125,635	63,976	193,643	5,451	4,691,188	108,945
Striped bass	101,950	10,511	13,845	1,662	154,660	17,403
Sturgeon			700	33	21,265	802
Suckers			53,373	2,068	53,573	2,069
Sword-fish, fresh	55,875	2,935	85,980	7,520	1,590,061	89,315
Sword-fish, salted					27,270	815
Tautog	248,129	7,214	70,540	3,118	608,174	17,899
Tomcod	8,000	240	88,750	1,677	356,833	8,075
Whiting			3,850	185	41,050	677
Miscellaneous fish	245,750	5,522			245,750	5,522
Refuse fish	1,012,000	1,222			1,067,000	1,576
Squid, fresh	124,000	1,875	6,900	150	1,195,325	16,095
Squid, salted					5,000	50
Crabs, fiddler	128	78			128	78
Crabs, hard	7,875	575			7,875	575
Crabs, soft	5,020	1,675			5,020	1,675
Lobsters	578,066	43,290	1,098,192	83,748	14,661,808	1,276,967
Shrimp	2,250	750			27,450	1,933
Quahogs or hard clams	249,696	31,816	234,000	29,900	994,232	112,440
Clams (soft), fresh	150,150	20,569	199,800	19,039	10,585,701	417,447
Clams (soft), salted					711,200	48,568
Mussels	15,550	694			22,950	824
Oysters	3,201,646	505,378	14,633,283	1,249,071	18,543,504	1,910,684
Scallops	115,386	10,471	50,160	5,016	1,207,567	124,980
Winkles					9,500	475
Irish moss					770,000	24,825
Caviar					845	454
Sounds and tongues	2,100	630			351,579	16,273
Haddock spawn					700	18
Halibut fins					21,900	384
Livers					672,800	5,497
Oyster shells	7,674,000	3,968			7,674,000	3,968
Oil fish					531,097	19,029
Oil, sea-elephant					472,500	20,790
Oil, whale					3,119,450	199,028
Whalebone					27,100	65,875
Total	32,854,396	955,058	31,920,417	1,559,599	393,457,906	9,682,290

Comparative table showing the extent of the fisheries of the New England States in 1889 and 1898.

PERSONS ENGAGED.

States.	1889.	1898.	Increase or decrease in 1898 as compared with 1889.	Percentage of increase or decrease in 1898 as compared with 1889.
Maine	14,129	16,954	+2,825	+19.99
New Hampshire	365	154	— 211	—57.80
Massachusetts	17,238	14,363	—2,875	—16.68
Rhode Island	1,757	1,687	— 70	— 3.98
Connecticut	3,047	2,473	— 574	—18.84
Total	36,536	35,631	— 905	— 2.48

CAPITAL INVESTED.

States.	1889.	1898.	Increase or decrease in 1898 as compared with 1889.	Percentage of increase or decrease in 1898 as compared with 1889.
Maine	$2,889,893	$4,013,053	+$1,123,160	+38.87
New Hampshire	112,660	52,648	— 60,012	—53.27
Massachusetts	13,245,229	13,372,902	+ 127,673	+ .96
Rhode Island	1,020,178	957,142	— 63,036	— 6.18
Connecticut	2,826,834	1,241,291	— 1,585,543	—56.09
Total	20,094,794	19,637,036	— 457,758	— 2.28

PRODUCTS.

States.	Lbs.			Percentage of increase or decrease in 1898 as compared with 1889.
	1889.	1898.	Increase or decrease in 1898 as compared with 1889.	
Maine	129,559,364	123,404,561	— 6,155,303	— 4.75
New Hampshire	4,354,568	3,020,715	— 1,333,853	—30.63
Massachusetts	299,217,669	202,257,817	— 96,959,852	—32.40
Rhode Island	127,365,475	32,854,396	— 94,511,079	—74.20
Connecticut	92,672,464	31,920,417	— 60,752,047	—65.56
Total	653,170,040	393,457,906	—259,712,134	—39.76

States.	Value.			Percentage of increase or decrease in 1898 as compared with 1889.
	1889.	1898.	Increase or decrease in 1898 as compared with 1889.	
Maine	$2,111,206	$2,654,919	+ $543,713	+25.75
New Hampshire	88,511	48,987	— 39,524	—44.65
Massachusetts	5,858,274	4,463,727	—1,394,547	—23.80
Rhode Island	935,144	956,058	+ 19,914	+ 2.13
Connecticut	1,557,506	1,559,599	+ 2,093	+ .13
Total	10,550,641	9,682,290	— 868,351	— 8.23

FISHERIES OF MAINE.

Among the New England States Maine occupies second place in the extent of its fisheries, being surpassed only by Massachusetts. The lobster fishery is more important than in all the other New England States combined, and the alewife, herring, salmon, shad, smelt, swordfish, and clam fisheries are more extensive than in any other State in this region. There are also important cod and mackerel fisheries.

The persons engaged in fisheries in 1898 numbered 16,954, of whom 1,947 were employed on vessels, 6,770 in the shore fisheries, and 8,237 were shoresmen. The number of vessels fishing and transporting was 497, valued, with their outfits, at $720,827. The number of boats was 5,741, worth $284,897. The apparatus in the vessel fisheries was valued at $65,777, and in the shore fisheries at $362,975. The total investment, including shore property and cash capital, was $4,013,053.

The fishery products amounted to 123,404,561 pounds, valued at $2,654,919. The lobster fishery yielded 11,183,294 pounds, worth $992,855; of clams, fresh and salted, there were 9,470,000 pounds, worth $323,453; cod, fresh and salted, 15,323,710 pounds, worth $314,255. The cusk, haddock, hake, and pollock, taken in the cod fisheries, aggregated 27,321,361 pounds, worth $299,914. The herring fishery yielded 42,156,964 pounds of fresh, salted, and smoked products, worth $263,477. The products of the alewife fishery, fresh, salted, and smoked, were 2,519,725 pounds, worth $25,302.

The following tables show the number of persons employed, the capital invested, and the quantity and value of products for 1898:

Persons employed.

How engaged.	No.
On vessels fishing	1,784
On vessels transporting	213
In shore or boat fisheries	6,770
Shoresmen	8,237
Total	16,954

Table of apparatus and capital.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	411	$380,750	Apparatus—shore fisheries—continued.		
Tonnage	6,791		Weirs	557	$111,618
Outfit		161,621	Gill nets	2,265	25,894
Vessels transporting	86	157,650	Fyke nets	26	710
Tonnage	1,384		Dip nets	182	637
Outfit		30,806	Bag nets	202	8,645
Boats	5,741	284,897	Snap nets	20	20
Apparatus—vessel fisheries:			Seines	208	15,165
Gill nets	1,457	11,519	Lines, hand and trawl		27,712
Seines	43	14,495	Pots, eel	303	180
Lines, hand and trawl		24,253	Pots, lobster	141,740	141,539
Pots, eel	30	8	Spears	145	127
Pots, lobster	14,238	14,238	Hoes and rakes	2,107	1,180
Hoes	27	14	Dredges	133	743
Dredges	15	95	Shore and accessory property		1,193,478
Harpoons		1,165	Cash capital		1,385,099
Apparatus—shore fisheries:					
Pound nets	67	14,680	Total		4,013,053
Trap nets	33	14,125			

Table of products.

Species.	Vessel fisheries.		Shore fisheries.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh			925,325	$8,016	925,325	$8,016
Alewives, salted			986,600	8,437	986,600	8,437
Alewives, smoked			606,800	8,849	606,800	8,849
Butter-fish			14,800	740	14,800	740
Cat-fish			4,000	40	4,000	40
Cod, fresh	4,760,222	$78,084	5,330,866	89,147	10,091,088	167,231
Cod, salted	3,988,308	116,096	1,294,314	30,928	5,282,622	147,024
Cunners			148,300	1,025	148,300	1,025
Cusk, fresh	836,604	9,069	301,597	3,476	1,138,201	12,545
Cusk, salted	48,469	695	38,198	515	86,667	1,210
Eels, fresh	7,700	347	152,911	12,275	160,611	12,622
Eels, salted			3,200	320	3,200	320
Flounders	48,929	890	737,768	16,649	786,697	17,539
Haddock, fresh	4,035,065	71,557	3,239,844	48,425	7,274,909	119,982
Haddock, salted	514,850	7,563	441,807	4,806	956,657	12,369
Hake, fresh	8,036,028	62,708	5,293,871	47,850	13,329,899	110,558
Hake, salted	1,271,908	11,916	1,133,675	11,970	2,405,578	23,886
Halibut	165,256	11,676	139,634	10,399	304,890	22,075
Herring, fresh	5,075,650	47,122	31,942,164	127,191	37,017,814	174,313
Herring, salted	553,650	13,602	847,000	12,557	1,400,650	26,159
Herring, smoked			3,738,500	63,005	3,738,500	63,005
Mackerel, fresh	410,860	40,127	1,030,297	45,217	1,441,157	85,344
Mackerel, salted	134,000	10,586	29,000	2,175	163,000	12,761
Menhaden, fresh	6,670,000	16,720	110,000	385	6,780,000	17,105
Menhaden, salted	48,400	726	491,500	2,875	539,900	3,601
Pollock, fresh	514,354	3,913	612,392	4,550	1,126,746	8,463
Pollock, salted	411,256	3,917	591,448	6,984	1,002,704	10,901
Salmon			53,322	10,009	53,322	10,009
Shad, fresh	100,000	1,800	601,879	12,206	701,879	14,006
Shad, salted	83,200	2,496	76,800	3,250	160,000	5,746
Smelt	36,163	2,170	1,571,882	187,175	1,608,045	189,345
Striped bass			25,067	4,206	25,067	4,206
Sturgeon			12,075	367	12,075	367
Suckers			200	1	200	1
Sword-fish	878,290	44,395			878,290	44,395
Tomcod	13,538	542	296,545	5,616	310,083	6,158
Refuse fish			55,000	354	55,000	354
Lobsters	907,831	91,924	10,275,463	900,931	11,183,294	992,855
Clams, fresh	53,000	1,370	8,705,800	273,515	*8,758,800	274,885
Clams, salted	83,000	1,660	628,200	46,908	†711,200	48,568
Scallops	16,288	1,896	150,271	18,126	‡166,509	14,522
Caviar			845	454	845	454
Livers	446,320	3,637	226,480	1,860	672,800	5,497
Sounds	159,158	7,175	114,884	5,469	274,042	12,644
Tongues	4,045	102	3,880	94	7,875	196
Oil	122,400	3,420	35,520	1,171	157,920	4,591
Total	40,384,687	669,401	83,019,874	1,985,518	123,404,561	2,654,919

*Represents 875,880 bushels. †Represents 42,672 bushels. ‡Represents 27,752 bushels.

THE FISHERIES BY COUNTIES.

Commercial fishing is carried on from all of the coast counties and from two counties situated on the Penobscot River.

The number of persons employed in Washington County in 1898 was 7,322; of these, 5,863 were shoresmen engaged principally in the sardine and other branches of the herring industry. In Hancock County there were 3,173 persons, of whom 681 were employed on vessels. The vessel fisheries of this county are more important than those of any other county. The fisheries of Lincoln County employed 2,209 persons, those of Cumberland and Knox 1,662 and 1,421 respectively. The fisheries of the remaining four counties were less extensive, employing only 1,167 persons.

The counties having the largest amount of capital invested were Washington, Lincoln, Cumberland, and Hancock.

The investment in the fisheries of Washington County, owing to an extensive sardine industry, was nearly twice that of any other county, amounting to $1,413,825. The investment in Lincoln County was $750,622, in Cumberland $733,041, and in Hancock $552,491. The largest number of vessels, 178, valued at $142,100, is in Hancock County. Knox County has 98, valued at $90,000; Cumberland 73, valued at $110,400; Lincoln 59, valued at $102,650, and Washington 57, worth $70,250. A comparatively small number is employed in each of the other counties. A number of the transporting vessels above included are steamers used in the lobster-carrying trade.

In the vessel fisheries gill nets are used extensively in three counties, and hand and trawl lines in four counties. Lobster pots are employed in all but two counties, the largest number being in Hancock and Knox, the former having 7,146 and the latter 4,140.

In the shore fisheries the largest number of boats are in Hancock County, being 1,419. Two other counties, Washington and Cumberland, each have nearly 1,000. The forms of apparatus most extensively used are weirs and gill nets in Washington County, weirs in Hancock, gill nets in Knox, weirs and gill nets in Sagadahoc, and gill nets in Cumberland and York counties. Lobster pots are the most numerous form of apparatus in all counties except Penobscot.

Lincoln County leads in the quantity of products secured, with 32,323,528 pounds, valued at $521,186, but is exceeded in value by Hancock County with 20,775,195 pounds, valued at $617,619. Washington County leads in the herring and pollock fisheries; Hancock County in the cod, flounder, salmon, scallop, and lobster fisheries; Knox County in the cusk and hake fisheries; Lincoln County in the alewife, mackerel, menhaden, shad, and smelt fisheries, and Cumberland County in the haddock, sword-fish, and clam fisheries.

In 1889 scallops were taken only in Hancock County, while they are now secured in Washington, Hancock, Waldo, Knox, Lincoln, and Cumberland counties. There may also be other grounds in various parts of the State which have not yet been discovered.

The three following tables show the extent of the fisheries in each county of Maine in 1898:

Table showing the number of persons employed in the fisheries of Maine in 1898.

Counties.	On vessels fishing.	On vessels transporting.	In shore or boat fisheries.	Shoresmen.	Total.
Washington	111	63	1,285	5,868	7,322
Hancock	649	32	1,669	823	3,173
Penobscot	3	.....	13	.....	16
Waldo	24	.....	134	.....	158
Knox	238	64	858	261	1,421
Lincoln	300	15	954	940	2,209
Sagadahoc	16	2	521	4	543
Cumberland	325	37	964	336	1,662
York	68	.....	372	10	450
Total	1,784	213	6,770	8,237	16,954

Table showing, by counties, the vessels, boats, apparatus, and capital employed in the fisheries of Maine in 1898.

Items.	Washington.		Hancock.		Penobscot.		Waldo.		Knox.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	32	$22,200	166	$118,250	2	$500	8	$4,000	71	$47,800
Tonnage	393		2,476		10		99		915	
Outfit		4,872		50,411		45		820		18,238
Vessels transporting	25	48,050	12	23,850					27	42,200
Tonnage	387		181						466	
Outfit		7,485		5,810						9,165
Boats	987	80,816	1,419	68,377	13	143	112	2,823	882	44,097
Apparatus — vessel fisheries:										
Gill nets	27	176	361	3,118			10	100	439	2,990
Seines			5	1,400					3	710
Lines, hand and trawl		998		3,975		29		163		3,934
Pots, eel			30	8						
Pots, lobster	1,710	1,710	7,146	7,146	82	82			4,140	4,140
Hoes			17	9			6	3	4	2
Dredges			13	81			2	14		
Harpoons				5						60
Apparatus—shore fisheries:										
Pound nets							38	1,900	7	380
Trap nets	3	75	5	650					3	2,450
Weirs	149	37,189	155	20,475	3	150	30	2,426	33	11,822
Gill nets	272	4,901	90	738	10	270			126	1,277
Fyke nets							4	60		
Dip nets	123	528	15	45					6	12
Bag nets	65	1,580	58	2,205	8	450	30	1,300		
Seines			74	3,595					19	1,400
Lines, hand and trawl		847		1,499				76		4,621
Pots, eel	70	18	70	35						
Pots, lobster	22,390	22,373	23,880	23,880			575	575	39,040	39,030
Spears			22	15					4	8
Hoes and rakes	280	246	774	399			45	23	217	109
Dredges	11	37	88	330			5	31	4	20
Shore and accessory property		467,824		126,561		100		477		90,694
Cash capital		711,900		89,424						94,600
Total		1,413,825		552,491		1,769		15,391		419,759

Items.	Lincoln.		Sagadahoc.		Cumberland.		York.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	53	$91,250	6	$2,600	58	$78,400	15	$15,150
Tonnage	1,040		58		1,571		229	
Outfit		30,439		1,068		38,318		7,410
Vessels transporting	6	11,400	1	150	15	32,000		
Tonnage	110		8		242			
Outfit		2,548		80		5,768		
Boats	758	23,881	332	6,704	946	47,596	292	10,460
Apparatus—vessel fisheries:								
Gill nets	178	1,328			387	3,367	55	440
Seines	22	8,825			13	3,560		
Lines, hand and trawl		3,805		456		8,613		2,280
Pots, eel								
Pots, lobster	510	510			400	400	250	250
Harpoons						987		103
Apparatus—shore fisheries:								
Pound nets			7	4,200	15	8,200		
Trap nets	1	1,000			15	6,950	6	3,000
Weirs	55	24,084	105	12,582	26	1,390	1	1,500
Gill nets	83	745	417	4,795	717	6,684	550	6,484
Fyke nets	2	80	10	450	10	120		
Dip nets	18	22	15	15			5	15
Bag nets	2	80	38	2,985	1	45		
Snap nets					20	20		
Seines	56	3,790	2	170	52	5,750	5	460
Lines, hand and trawl		6,856		686		9,515		3,612
Pots, eel			133	117			30	10
Pots, lobster	29,190	29,190	2,188	1,964	17,932	17,932	6,595	6,596
Spears	60	43	6	3	53	58		
Hoes and rakes	251	127	55	28	365	187	120	61
Dredges	12	60			18	65		
Shore and accessory property		299,559		7,629		190,016		10,618
Cash capital		211,000		1,000		267,100		10,075
Total		750,622		47,632		783,041		78,528

Table showing, by counties, the products of the fisheries of Maine in 1898.

Species.	Washington.		Hancock.		Penobscot.		Waldo.		Knox.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	135,200	$866	244,800	$1,698	8,500	$57	29,100	$342	62,775	$473
Alewives, salted	25,000	250							173,100	3,008
Alewives, smoked	38,000	760	129,100	1,291			32,000	448	137,500	2,150
Cat-fish									4,000	40
Cod, fresh	376,420	9,682	673,229	11,772	14,000	280	39,900	898	1,284,258	17,043
Cod, salted	619,215	14,303	3,559,807	99,132					44,700	728
Cusk, fresh			22,250	273					481,077	5,189
Cusk, salted	23,380	385	28,469	355					16,000	181
Eels	11,200	940	11,616	660					5,800	544
Flounders	12,300	123	611,563	12,880			10,534	220	42,919	938
Haddock, fresh	221,014	3,832	521,355	8,001	8,000	80	29,300	516	800,638	4,032
Haddock, salted	235,790	2,157	638,117	9,248					10,250	73
Hake, fresh	37,275	366	667,183	7,057	12,500	125	77,750	835	4,984,285	34,608
Hake, salted	446,180	4,168	1,520,906	14,245					89,100	767
Halibut	62,800	4,433	128,805	9,817			800	68	40,786	3,159
Herring, fresh	14,050,550	47,629	5,852,170	29,861			4,800	12	4,662,580	17,482
Herring, salted	416,000	8,520	60,000	1,350			26,250	473	472,600	5,262
Herring, smoked	3,738,500	63,005								
Mackerel, fresh	2,250	20	217,640	2,123			1,000	20	192,437	7,955
Mackerel, salted			15,800	1,225						
Menhaden, fresh									130,000	455
Pollock, fresh	93,360	1,057	90,055	875	5,300	53	11,000	92	202,402	869
Pollock, salted	485,345	5,809	474,714	4,794					6,700	50
Salmon	10,860	1,648	19,740	3,911	1,778	397	19,350	3,740	1,412	267
Shad	81,565	2,712	7,450	407					2,000	80
Smelt	208,996	23,202	353,409	42,318	6,400	832	46,900	6,034	46,674	3,601
Sword-fish			35,710	2,500					58,547	2,815
Tomcod	116,400	1,207	15,500	174	7,000	280	9,200	172	1,939	19
Refuse fish			16,900	169			6,100	25		
Lobsters	1,628,704	140,189	2,643,222	251,491	1,264	118	17,766	1,713	2,451,944	216,363
Clams, fresh	1,315,200	26,840	1,549,080	44,726			60,820	2,441	2,054,940	70,732
Clams, salted	108,000	2,160	264,600	38,880					17,000	340
Scallops	4,000	400	124,595	10,317			3,695	319	8,075	850
Livers	34,600	275	116,720	918			1,500	11	258,540	1,941
Sounds	10,490	485	34,775	1,661			930	45	91,704	3,936
Tongues	1,360	42	6,315	150					200	4
Oil			120,600	3,350						
Total	24,548,954	367,468	20,775,195	617,619	64,742	2,222	428,695	18,424	18,836,882	405,954

Species.	Lincoln.		Sagadahoc.		Cumberland.		York.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	388,950	$4,183	7,500	$112	45,000	$225	4,000	$60
Alewives, salted	788,500	5,179						
Alewives, smoked	270,200	4,200						
Butter-fish					14,800	740		
Cod, fresh	2,011,969	30,479	417,929	7,925	3,871,654	63,264	1,402,729	25,888
Cod, salted	835,100	27,162			12,100	242	162,200	5,457
Cunners					148,300	1,025		
Cusk, fresh	263,308	2,970	14,443	194	311,876	3,266	45,247	653
Cusk, salted	12,518	187					6,300	99
Eels	37,900	3,078	39,275	2,967	52,420	4,193	5,600	560
Flounders	89,641	2,982			19,740	396		
Haddock, fresh	739,667	10,793	177,088	3,152	3,725,938	71,690	1,051,909	17,886
Haddock, salted	43,500	856			9,000	135	20,000	400
Hake, fresh	2,982,478	24,098	123,800	1,238	3,887,340	36,613	557,288	5,618
Hake, salted	226,192	1,909			10,200	82	113,000	2,715
Halibut	17,699	1,358			54,000	3,240		
Herring, fresh	11,532,270	72,833	119,000	850	601,800	4,004	194,644	1,642
Herring, salted	376,000	9,776			28,800	541	21,000	237
Mackerel, fresh	444,932	35,685	31,200	1,380	356,497	23,626	195,201	14,535
Mackerel, salted	123,000	9,225			24,200	2,311		
Menhaden, fresh	6,650,000	16,650						
Menhaden, salted			92,500	481	447,400	3,120		
Pollock, fresh	247,977	1,764	3,600	24	349,302	2,535	123,750	1,204
Pollock, salted	20,000	120			5,745	46	10,200	82
Salmon							182	46
Shad	339,900	6,798	303,764	6,722	125,200	2,988	2,000	50
Smelt	448,053	30,426	106,545	8,502	367,968	23,049	23,100	1,386
Striped bass	9,000	1,350	16,067	2,856				
Sturgeon			12,075	367				
Suckers			200	1				
Sword-fish					648,283	32,412	135,800	6,668
Tomcod	24,600	236	20,400	170	110,844	3,732	4,200	168
Refuse fish					82,000	160		
Lobsters	2,155,517	185,774	384,900	30,392	1,423,691	120,616	476,386	46,199
Clams, fresh	1,094,290	27,358	91,400	2,337	2,217,870	81,341	375,200	19,110
Clams, salted	32,000	670			289,600	6,518		
Scallops	5,529	466			20,615	2,170		
Caviar			845	454				
Livers	53,400	421	4,640	41	174,720	1,608	28,680	287
Sounds	48,638	2,350	1,783	83	74,043	3,476	11,679	608
Oil	10,800	360	12,600	420	10,080	336	3,840	125
Total	32,323,528	521,186	1,981,554	70,668	19,470,876	499,695	4,974,135	151,683

THE FISHERIES BY APPARATUS.

The products of the vessel fisheries aggregated 40,384,687 pounds, valued at $669,401, and of the shore fisheries 83,019,874 pounds, valued at $1,985,518. The more important forms of apparatus employed and the quantity and value of their catch were lobster and eel pots, 11,241,935 pounds, $997,146; hand and trawl lines, 44,627,264 pounds, $718,095; hoes, rakes, and dredges, 9,636,509 pounds, $337,975; seines, 13,612,954 pounds, $167,798; gill nets, 5,528,884 pounds, $101,294; pound nets and trap nets, 1,619,513 pounds, $18,354; weirs, 33,956,221 pounds, $214,551, and harpoons in the vessel fishery for sword-fish, 878,290 pounds, $44,395. The remainder of the products was taken with fyke nets, dip nets, bag nets, snap nets, and spears, and amounted to 2,302,991 pounds, valued at $55,311.

The following tables show by counties and species the number of pounds and value of fishery products taken with each form of apparatus in the vessel and shore fisheries of Maine in 1898:

Table showing, by counties, the yield of the seine fisheries of Maine in 1898.

Species.	Knox.		Sagadahoc.		York.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Mackerel, fresh	40,200	$2,950				
Shore fisheries:						
Alewives	6,000	120				
Flounders	42,919	938				
Herring	180,000	450			46,200	$330
Mackerel, fresh	5,564	340				
Shad	2,000	80	19,200	$384		
Smelt	19,917	1,190	1,500	90	23,100	1,386
Tomcod			300	3	4,200	168
Total	256,400	3,118	21,000	477	73,500	1,884
Total vessel and shore	296,600	6,068	21,000	477	73,500	1,884

Species.	Hancock.		Lincoln.		Cumberland.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Flounders	12,000	$300			300	$4	12,300	$304
Herring, fresh	520,000	750	3,675,200	$28,046	82,000	507	4,277,200	29,303
Herring, salted			291,500	7,579			291,500	7,579
Mackerel, fresh			145,211	20,736	73,000	4,850	258,411	28,536
Mackerel, salted			94,000	7,050	24,200	2,311	118,200	9,361
Menhaden			6,650,000	16,650			6,650,000	16,650
Shad, fresh			80,000	1,600	20,000	200	100,000	1,800
Shad, salted					83,200	2,496	83,200	2,496
Smelt					36,163	2,170	36,163	2,170
Tomcod					13,538	542	13,538	542
Total	532,000	1,050	10,935,911	81,661	332,401	13,080	11,840,512	98,741
Shore fisheries:								
Alewives					45,000	225	51,000	345
Flounders	523,700	11,334	89,641	2,982	18,620	326	669,880	15,580
Herring	9,600	36			8,300	41	244,100	857
Mackerel, fresh			47,845	8,272			53,409	8,612
Mackerel, salted			29,000	2,175			29,000	2,175
Pollock	8,000	80	12,000	60			20,000	140
Shad							21,200	464
Smelt	38,775	3,984	219,389	18,850	288,022	17,281	590,703	37,731
Tomcod					85,650	2,952	90,150	3,123
Refuse fish	3,000	30					3,000	30
Total	583,075	15,414	397,875	27,339	440,592	20,825	1,772,442	69,057
Total vessel and shore	1,115,075	16,464	11,333,786	109,000	772,993	33,905	13,612,954	167,798

Table showing, by counties, the yield of the gill-net fisheries of Maine in 1898.

Species.	Washington.		Hancock.		Penobscot.		Waldo.		Sagadahoc.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Herring, fresh	145,000	$910	398,800	$8,871						
Herring, salted							26,250	$473		
Total	145,000	910	398,800	8,871			26,250	473		
Shore fisheries:										
Alewives			6,000	110						
Herring, fresh	2,059,750	11,263								
Herring, salted	206,000	4,635	60,000	1,350						
Menhaden, salted									92,500	$481
Salmon	2,412	862			1,118	$232				
Shad, fresh	19,000	286							238,964	5,343
Shad, salted	60,000	2,375	7,000	385					9,800	490
Smelt	12,000	1,440								
Striped bass									15,617	2,811
Sturgeon									10,875	363
Caviar									845	454
Total	2,359,162	20,861	73,000	1,845	1,118	232			368,601	9,942
Total vessel and shore	2,504,162	21,271	471,800	10,716	1,118	232	26,250	473	368,601	9,942

Species.	Knox.		Lincoln.		Cumberland.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Herring, fresh			254,650	$8,038					798,450	$17,819
Herring, salted	122,600	$2,812	84,500	2,197	28,800	$541			262,150	6,023
Mackerel	38,723	2,474	28,321	3,427	59,892	4,333	3,313	$265	130,249	10,499
Menhaden, fresh	20,000	70							20,000	70
Menhaden, salted					48,400	726			48,400	726
Total	181,323	5,356	367,471	13,662	137,092	5,600	3,313	265	1,259,249	35,137
Shore fisheries:										
Alewives	4,500	34	9,000	90					19,500	234
Cod, fresh							45,250	1,600	45,250	1,600
Cod, salted							30,000	1,050	30,000	1,050
Herring, fresh	10,800	41	6,300	62	93,000	575	91,000	680	2,260,850	12,621
Herring, salted	342,000	2,250					21,000	237	629,000	8,472
Mackerel	8,250	375			148,474	10,711	82,680	10,793	239,404	21,879
Menhaden, fresh	110,000	385							110,000	385
Menhaden, salted					399,000	2,394			491,500	2,875
Salmon									3,530	594
Shad, fresh			57,500	1,150					315,464	6,779
Shad, salted									76,800	3,250
Smelt									12,000	1,440
Striped bass			9,000	1,350					24,617	4,161
Sturgeon									10,875	363
Caviar									845	454
Total	475,550	3,085	81,800	2,652	640,474	13,680	269,930	14,360	4,269,635	66,157
Total vessel and shore	656,873	8,441	449,271	16,314	777,566	19,280	273,243	14,625	5,528,884	101,294

Table showing, by counties, the yield of the fyke-net fisheries of Maine in 1898.

Species.	Waldo.		Lincoln.		Sagadahoc.		Cumberland.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Flounders	6,400	$128					5,400	$54	11,800	$182
Pollock	3,300	13							3,300	13
Smelt			2,000	$120	2,237	$187			4,237	307
Sturgeon					1,200	4			1,200	4
Tomcod	1,200	12	500	2	1,600	3			3,300	17
Refuse fish	4,200	10							4,200	10
Total	15,100	163	2,500	122	5,037	194	5,400	54	28,037	533

Table showing, by counties, the yield of the pound-net and trap-net fisheries of Maine in 1898.

Species.	Washington.		Hancock.		Waldo.		Knox.		Lincoln.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Eels	3,400	$272								
Herring			80,000	$300			400,080	$1,500	240,000	$1,200
Mackerel			8,000	100			4,800	28	40,000	200
Pollock									10,000	100
Salmon			765	115	9,492	$1,852	1,400	265		
Smelt	6,196	682								
Total	9,596	954	88,765	515	9,492	1,852	406,280	1,793	290,000	1,500

Species.	Sagadahoc.		Cumberland.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Butter-fish			14,800	$740			14,800	$740
Eels							3,400	272
Herring	119,000	$850	386,500	2,652	30,800	$232	1,256,380	6,734
Mackerel	30,000	1,200	59,043	2,528	84,667	2,540	226,510	6,596
Pollock			31,000	155	3,200	40	44,200	295
Salmon					170	43	11,827	2,275
Shad	35,800	505	20,400	255			56,200	760
Smelt							6,196	682
Total	184,800	2,555	511,743	6,330	118,837	2,855	1,619,513	18,354

Table showing, by counties, the yield of the weir fisheries of Maine in 1898.

Species.	Hancock.		Penobscot.		Waldo.		Lincoln.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives, fresh	233,300	$1,555	8,500	$57	29,100	$342	79,700	$797
Alewives, smoked	123,100	1,231			32,000	448	270,200	4,200
Herring, fresh	4,843,770	19,904			4,800	12	7,356,120	35,487
Mackerel	200,940	1,849			1,000	20	169,920	962
Salmon	18,975	3,796	660	165	9,858	1,888		
Shad	450	22					202,400	4,048
Smelt	14,708	1,858					3,900	312
Tomcod	7,600	76						
Refuse fish	2,800	28						
Total	5,445,643	30,319	9,160	222	76,758	2,710	8,082,240	45,806

Species.	Washington.		Cumberland.		Knox.		York.		Total.	
	Lbs.	Value.	Lbs.	Val.	Lbs.	Value.	Lbs.	Val.	Lbs.	Value.
Shore fisheries:										
Alewives, fresh	25,400	$254			10,000	$150			386,000	$3,155
Alewives, salted					112,500	2,250			112,500	2,250
Alewives, smoked	7,000	140			77,500	1,550			509,800	7,569
Cod							50,000	$625	50,000	625
Eels			620	$49					620	49
Flounders			420	12					420	12
Herring, fresh	11,685,800	34,396	32,000	229	4,071,700	15,491	26,644	400	28,020,834	105,919
Herring, salted	210,000	3,885			8,000	200			218,000	4,085
Herring, smoked	3,738,500	63,005							3,738,500	63,005
Mackerel	2,250	20	4,600	184	82,000	942	19,066	572	479,776	4,549
Pollock							20,000	100	20,000	100
Salmon	8,448	1,286			12	2	12	3	37,965	7,140
Shad	2,565	51	1,600	32			2,000	50	209,015	4,203
Smelt	72,500	7,174	24,233	2,018					115,341	11,362
Tomcod	3,800	34	11,250	230					22,650	340
Refuse fish			32,000	160					34,800	188
Total	15,756,263	110,245	106,723	2,914	4,361,712	20,585	117,722	1,750	33,956,221	214,551

Table showing, by counties, the catch with dip nets, bag nets, and snap nets in Maine in 1898.

Species.	Washington.		Hancock.		Penobscot.		Waldo.		Knox.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Alewives, fresh	109,800	$612	5,000	$33	.....	.....	.....	.....	42,275	$169
Alewives, salted	25,000	250	.....	.....	.....	.....	.....	.....	60,600	758
Alewives, smoked	31,000	620	6,000	60	.....	.....	.....	.....	60,000	600
Flounders	.....	.....	2,641	54	.....	.....	1,510	$30	.....	.....
Herring	160,000	1,060	.....	.....	.....	.....	.....	.....	.....	.....
Smelt	118,300	13,906	76,726	9,830	6,400	$832	40,600	5,278	.....	.....
Tomcod	112,600	1,173	7,900	98	7,000	280	8,000	160	.....	.....
Refuse fish	.....	.....	11,100	111	.....	.....	1,900	15	.....	.....
Total	556,700	17,621	109,367	10,186	13,400	1,112	52,010	5,483	162,875	1,527

Species.	Lincoln.		Sagadahoc.		Cumberland.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Alewives, fresh	300,250	$3,296	7,500	$112	.....	.....	4,000	$60	468,825	$4,282
Alewives, salted	788,500	5,179	.....	.....	.....	.....	.....	.....	874,100	6,187
Alewives, smoked	.....	.....	.....	.....	.....	.....	.....	.....	97,000	1,280
Cunners	.....	.....	.....	.....	148,300	$1,025	.....	.....	148,300	1,025
Flounders	.....	.....	.....	.....	.....	.....	.....	.....	4,151	84
Herring	.....	.....	.....	.....	.....	.....	.....	.....	160,000	1,060
Smelt	3,500	210	19,946	1,596	800	80	.....	.....	266,272	31,732
Striped bass	.....	.....	450	45	.....	.....	.....	.....	450	45
Suckers	.....	.....	200	1	.....	.....	.....	.....	200	1
Tomcod	1,000	3	9,900	62	406	8	.....	.....	146,806	1,784
Refuse fish	.....	.....	.....	.....	.....	.....	.....	.....	13,000	126
Total	1,093,250	8,688	37,996	1,816	149,506	1,113	4,000	60	2,179,104	47,606

Table showing, by counties, the yield of the hand and trawl line fisheries of Maine in 1898.

Species.	Sagadahoc.		Penobscot.		Cumberland.		Waldo.		York.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Cod, fresh	221,929	$4,005	14,000	$280	2,123,187	$36,142	34,400	$798	369,575	$7,331
Cusk, fresh	10,643	144	.....	.....	228,956	2,190	.....	.....	35,547	515
Flounders	.....	.....	.....	.....	.....	.....	2,624	62	.....	.....
Haddock, fresh	99,088	1,837	8,000	80	2,405,701	46,858	26,500	488	338,850	6,697
Hake, fresh	98,400	984	12,500	125	2,102,079	18,761	65,750	715	343,188	3,433
Halibut	.....	.....	.....	.....	54,000	3,240	600	48	.....	.....
Mackerel, fresh	1,200	180	.....	.....	.....	.....	.....	.....	.....	.....
Pollock, fresh	3,000	21	5,300	53	167,292	1,301	7,000	72	36,850	286
Livers	3,440	29	.....	.....	133,460	1,195	1,500	11	13,140	131
Sounds	1,383	63	.....	.....	41,029	1,846	930	45	6,760	317
Oil	3,600	120	.....	.....	.....	.....	.....	.....	.....	.....
Total	442,683	7,383	39,800	538	7,255,704	111,533	139,304	2,239	1,143,410	18,710
Shore fisheries:										
Cod, fresh	196,000	3,920	.....	.....	1,748,467	27,122	5,500	100	937,904	16,832
Cod, salted	.....	.....	.....	.....	12,100	242	.....	.....	182,200	4,407
Cusk, fresh	3,800	50	.....	.....	82,920	1,076	.....	.....	9,700	138
Cusk, salted	.....	.....	.....	.....	.....	.....	.....	.....	6,300	99
Eels	.....	.....	.....	.....	9,600	768	.....	.....	5,600	560
Haddock, fresh	78,000	1,315	.....	.....	1,320,237	24,832	2,800	28	713,059	11,189
Haddock salted	.....	.....	.....	.....	9,000	135	.....	.....	20,000	400
Hake, fresh	25,400	254	.....	.....	1,785,261	17,852	12,000	120	214,100	2,185
Hake, salted	.....	.....	.....	.....	10,200	82	.....	.....	113,000	2,715
Halibut	.....	.....	.....	.....	.....	.....	200	20	.....	.....
Mackerel	.....	.....	.....	.....	11,488	1,020	.....	.....	5,475	365
Pollock, fresh	600	8	.....	.....	151,010	1,079	700	7	64,200	778
Pollock, salted	.....	.....	.....	.....	5,745	46	.....	.....	10,200	82
Smelt	82,862	6,629	.....	.....	18,750	1,500	6,800	756	.....	.....
Tomcod	8,600	102	.....	.....	.....	.....	.....	.....	.....	.....
Livers	1,200	12	.....	.....	41,260	413	.....	.....	15,540	156
Sounds	400	20	.....	.....	33,014	1,630	.....	.....	4,919	291
Oil	9,000	300	.....	.....	10,080	336	.....	.....	3,840	125
Total	405,862	12,605	.....	.....	5,249,132	78,133	27,500	1,031	2,256,037	39,822
Total vessel and shore	848,545	19,988	39,800	538	12,504,836	189,666	166,804	3,270	3,399,447	58,532

Table showing the yield of the hand and trawl line fisheries of Maine in 1898—Continued.

Species.	Washington.		Hancock.		Knox.		Lincoln.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Cod, fresh	75,480	$1,891	339,249	$6,351	677,433	$8,611	904,969	$12,675	4,760,222	$78,084
Cod, salted	143,615	3,292	3,028,693	86,990	24,000	314	742,000	25,500	3,938,308	116,096
Cusk, fresh			21,450	261	339,929	3,778	200,079	2,181	836,604	9,069
Cusk, salted	20,000	340	28,469	355					48,469	695
Flounders	3,200	32	30,805	492					36,629	586
Haddock, fresh	59,314	995	207,520	3,835	333,035	1,747	557,057	9,020	4,035,065	71,557
Haddock, salted	72,365	682	442,485	6,881					514,850	7,563
Hake, fresh	37,275	366	335,240	3,604	3,339,886	22,942	1,701,710	11,778	8,036,028	62,708
Hake, salted	147,215	1,677	1,124,688	10,239					1,271,903	11,916
Halibut	24,710	1,746	77,225	5,945	6,636	531	2,085	166	165,256	11,676
Mackerel, fresh			8,700	174	10,500	630	1,800	108	22,200	1,092
Mackerel, salted			15,800	1,225					15,800	1,225
Pollock, fresh	43,760	633	39,841	363	92,738	409	119,073	775	514,354	3,913
Pollock, salted	112,645	1,314	298,611	2,603					411,256	3,917
Livers	10,000	82	78,320	607	176,560	1,338	29,900	244	446,320	3,637
Sounds	2,450	98	20,155	1,075	59,719	2,585	26,732	1,146	159,158	7,175
Tongues	100	3	3,945	99					4,045	102
Oil			118,800	3,300					122,400	3,420
Total	752,129	13,151	6,219,996	134,399	5,060,436	42,885	4,285,405	63,593	25,338,867	394,431
Shore fisheries:										
Cat-fish					4,000	40			4,000	40
Cod, fresh	299,940	7,791	333,980	5,421	606,825	8,432	1,107,000	17,804	5,235,616	86,922
Cod, salted	475,600	11,011	530,614	12,142	20,700	414	93,100	1,662	1,264,314	29,878
Cusk, fresh			800	12	141,148	1,411	63,229	789	301,597	3,476
Cusk, salted	3,380	48			16,000	181	12,518	187	38,198	515
Eels									15,200	1,328
Flounders	9,100	91	32,517	530					41,617	621
Haddock, fresh	161,700	2,837	313,835	4,166	467,603	2,285	182,610	1,773	3,239,844	48,425
Haddock, salted	163,425	1,475	195,682	2,367	10,250	73	43,500	356	441,807	4,806
Hake, fresh			331,943	3,453	1,644,399	11,666	1,280,768	12,320	5,293,871	47,850
Hake, salted	298,965	2,491	396,218	4,006	89,100	767	228,192	1,909	1,133,675	11,970
Halibut	38,090	2,687	51,580	3,872	34,160	2,628	15,614	1,192	139,634	10,399
Mackerel					2,400	216	11,835	1,980	31,198	3,581
Pollock, fresh	49,600	424	42,214	432	109,664	460	106,904	819	524,892	4,002
Pollock, salted	372,700	4,495	176,103	2,191	6,700	50	20,000	120	591,448	6,984
Smelt			223,200	26,691	26,757	2,411	219,264	15,934	577,133	53,921
Tomcod					1,939	19	23,100	231	88,639	352
Livers	24,600	193	38,400	306	81,980	603	23,500	177	226,480	1,860
Sounds	8,040	387	14,620	586	31,985	1,351	21,906	1,204	114,884	6,469
Tongues	1,260	39	2,370	51	200	4			3,830	94
Oil			1,800	50			10,800	360	35,520	1,171
Total	1,906,400	33,969	2,685,826	66,276	3,295,800	33,011	3,461,840	58,817	19,288,397	328,664
Total vessel and shore	2,658,529	47,120	8,905,822	200,675	8,356,236	75,896	7,747,245	122,410	44,627,264	718,095

Table showing the catch with spears in Maine in 1898.

Counties.	Eels.		Flounders.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:						
Hancock	1,600	$128	9,900	$170	11,500	$298
Knox	4,000	400			4,000	400
Lincoln	37,900	3,078			37,900	3,078
Sagadahoc	250	20			250	20
Cumberland	42,200	3,376			42,200	3,376
Total	85,950	7,002	9,900	170	95,850	7,172

Table showing, by counties, the catch with hoes, rakes, and dredges in Maine in 1898.

Species.	Washington.		Lincoln.		Sagadahoc.		Cumberland.		York.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Clams, fresh	1,315,200	$26,840	1,094,290	$27,358	91,400	$2,337	2,217,870	$81,341	375,200	$19,110
Clams, salted	108,000	2,160	32,000	670	.....	.....	289,600	6,518	.....	.....
Scallops	4,000	400	5,529	466	.....	.....	20,615	2,170	.....	.....
Total	1,427,200	29,400	1,131,819	28,494	91,400	2,337	2,528,085	90,029	375,200	19,110

Species.	Hancock.		Waldo.		Knox.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Clams, fresh	47,000	$1,175	3,000	$120	3,000	$75	53,000	$1,370
Clams, salted	83,000	1,660	.....	.....	.....	.....	83,000	1,660
Scallops	15,250	1,318	988	78	.....	.....	16,238	1,396
Total	145,250	4,153	3,988	198	3,000	75	152,238	4,426
Shore fisheries:								
Clams, fresh	1,502,080	43,551	57,820	2,321	2,051,940	70,657	8,705,800	273,515
Clams, salted	181,600	37,220	.....	.....	17,000	340	628,200	46,908
Scallops	109,345	8,999	2,707	241	8,075	850	150,271	13,126
Total	1,793,025	89,770	60,527	2,562	2,077,015	71,847	9,484,271	333,549
Total vessel and shore	1,938,275	93,923	64,515	2,760	2,080,015	71,922	9,636,509	337,975

Table showing, by counties, the catch of eels and lobsters with pots in Maine in 1898.

Species.	Penobscot.		Waldo.		Knox.		Lincoln.		Sagadahoc.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Lobsters	1,264	$118	.....	.....	286,688	$29,395	48,872	$4,157	.....	.....
Shore fisheries:										
Eels, fresh	.....	.....	.....	.....	1,800	144	.....	.....	39,025	$2,947
Lobsters	.....	.....	17,766	$1,713	2,165,256	186,968	2,106,645	181,617	384,900	30,392
Total	.....	.....	17,766	1,713	2,167,056	187,112	2,106,645	181,617	423,925	33,339
Total vessel and shore	1,264	118	17,766	1,713	2,453,744	216,507	2,155,517	185,774	423,925	33,339

Species.	Washington.		Hancock.		Cumberland.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Eels	.....	.....	7,700	$347	.....	.....	.....	.....	7,700	$347
Lobsters	82,809	$7,312	444,704	47,101	22,253	$2,000	21,241	$1,841	907,831	91,924
Total	82,809	7,312	452,404	47,448	22,253	2,000	21,241	1,841	915,531	92,271
Shore fisheries:										
Eels, fresh	4,600	348	2,316	185	.....	.....	.....	.....	47,741	3,624
Eels, salted	3,200	320	.....	.....	.....	.....	.....	.....	3,200	320
Lobsters	1,545,895	132,877	2,198,518	204,390	1,401,338	118,616	455,145	44,358	10,275,463	900,931
Total	1,553,695	133,545	2,200,834	204,575	1,401,338	118,616	455,145	44,358	10,326,404	904,875
Total vessel and shore	1,636,504	140,857	2,653,238	252,023	1,423,591	120,616	476,386	46,199	11,241,935	997,146

Table showing, by counties, the catch of sword-fish with harpoons in the vessel fisheries of Maine in 1898.

Counties.	Lbs.	Value.
Hancock	35,710	$2,500
Knox	58,547	2,815
Cumberland	648,233	32,412
York	135,800	6,668
Total	878,290	44,395

THE SALMON FISHERY OF THE PENOBSCOT RIVER AND BAY.

The principal salmon fishery on the Atlantic seaboard is centered upon the Penobscot River and bay. During the progress of the last canvass data were secured to show the condition of the fishery during the years 1897, 1898, and 1899. As data for the years 1895 and 1896 had been secured previously, the whole has been combined in the three following tables in order to show in a condensed form, by townships, the status of the fishery during each of the years named. As the fishery has been prosecuted on the river for a number of years by people owning the shore line, naturally but slight changes are noted in the number of persons employed and the weirs and traps used. In 1895, 133 persons were employed, while 102 were engaged in 1899. In 1895, 193 weirs and traps were used, while 167 were employed in 1899. Gill nets occupy a very insignificant position in this fishery, only 12 being used in 1899. The total investment in the fishery in 1895 was $16,268, while in 1899 it was $14,392. The catch from year to year has fluctuated considerably. In 1895, 4,395 salmon were taken, while 3,515 were secured in 1899. The highest catch was in 1896, when 6,403 salmon were secured.

Persons employed in the salmon fishery of Penobscot River and Bay.

Towns.	1895.	1896.	1897.	1898.	1899.
Brooksville (Cape Rosier)	4	2	2	2	2
Bucksport	10	9	9	9	9
Camden	2	2	3	3	1
Castine	3	2	4	4	4
Hampden	1	1	1	1	1
Islesboro	7	6	3	4	4
Lincolnville	7	7	4	4	5
Matinicus and Ragged Islands	4	8	4	2	2
Northport	7	6	4	2	2
Orland	17	22	11	12	12
Orrington	5	5	3	3	3
Penobscot	16	15	15	15	17
Searsport	3	2	2	2	1
South Brewer	2	2	1	1	3
Stockton and Prospect	17	15	15	15	15
Verona	21	21	18	19	19
Winterport	7	8	2	2	2
Bangor	.....	.....	2	2	.....
Total	133	133	103	102	102

Apparatus, boats, etc., employed in the salmon fishery of Penobscot River and Bay.

Apparatus and towns.	1895.		1896.		1897.		1898.		1899.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Weirs and traps.										
Brooksville (Cape Rosier)	7	$420	4	$240	4	$300	4	$300	4	$300
Bucksport	13	511	11	455	11	490	13	640	11	490
Camden	5	200	5	200	7	380	7	380	3	165
Castine	4	252	3	201	6	525	5	425	5	425
Islesboro	17	925	16	875	12	600	16	800	18	900
Lincolnville	12	650	14	700	14	700	14	700	18	900
Matinicus and Ragged Islands	1	1,000	2	2,500	2	1,600	1	800	1	800
Northport	15	1,155	12	1,005	9	475	8	400	8	400
Orland	19	664	26	888	13	780	15	930	15	930
Orrington	2	99	2	99	3	150	3	150	3	150
Penobscot	24	1,587	22	1,421	19	1,350	18	1,290	20	1,390
Searsport	4	213	3	152	4	400	4	400	3	300
Stockton and Prospect	26	1,530	20	1,183	20	1,590	21	1,730	22	1,760
Verona	37	2,801	37	2,760	37	2,365	37	2,455	34	2,210
Winterport	7	467	7	467	3	200	3	200	2	150
Total	193	12,474	184	13,146	164	11,905	169	11,600	167	11,260
Gill nets.										
Hampden	2	26	2	26	2	60	2	60	2	60
Orrington	5	58	5	58	4	60	4	60	4	60
South Brewer	3	105	3	105	3	115	3	115	6	235
Winterport	.....	.....	1	10	.....	.....	.....	.....	.....	.....
Bangor	.....	.....	.....	.....	3	90	3	90	.....	.....
Total	10	189	11	199	12	325	12	325	12	355
Boats, scows, and rafts.										
Brooksville (Cape Rosier)	3	30	2	20	2	30	2	30	2	30
Bucksport	16	270	14	238	16	232	16	232	16	232
Camden	2	45	2	45	3	35	3	35	1	15
Castine	5	25	4	20	10	76	10	76	10	86
Hampden	1	12	1	12	1	8	1	8	1	8
Islesboro	7	94	6	79	3	55	4	85	5	100
Lincolnville	7	132	7	117	4	100	4	100	5	122
Matinicus and Ragged Islands	2	75	5	195	4	100	2	80	2	80
Northport	8	163	7	138	4	90	2	50	2	50
Orland	25	467	32	535	13	121	14	131	14	131
Orrington	2	11	2	11	5	85	5	85	5	85
Penobscot	30	436	28	413	33	589	33	589	37	654
Searsport	6	145	4	125	4	95	4	95	3	75
South Brewer	1	6	1	6	1	5	1	5	2	10
Stockton and Prospect	33	413	31	383	25	366	28	441	27	426
Verona	35	1,100	36	1,110	31	503	35	608	35	608
Winterport	10	181	11	189	6	65	6	65	6	65
Bangor	.....	.....	.....	.....	1	5	1	5	.....	.....
Total	193	3,605	193	3,636	166	2,560	171	2,720	178	2,777

Towns.	Total investment.				
	1895.	1896.	1897.	1898.	1899.
Brooksville (Cape Rosier)	$450	$260	$330	$330	$330
Bucksport	781	693	722	872	722
Camden	245	245	415	415	180
Castine	277	221	601	501	511
Hampden	38	38	68	68	68
Islesboro	1,019	954	655	885	1,000
Lincolnville	782	817	800	800	1,022
Matinicus and Ragged Islands	1,075	2,695	1,700	880	880
Northport	1,318	1,143	565	450	450
Orland	1,131	1,423	901	1,061	1,061
Orrington	168	168	295	295	295
Penobscot	2,023	1,834	1,939	1,879	2,044
Searsport	358	277	495	495	375
South Brewer	111	111	120	120	245
Stockton and Prospect	1,943	1,566	1,956	2,171	2,176
Verona	3,901	3,870	2,868	3,063	2,818
Winterport	648	666	265	265	215
Bangor	.....	.....	95	95	.....
Total	16,268	16,981	14,790	14,645	14,392

NOTE.—The value of accessories is included with that of apparatus.

Catch of salmon in the Penobscot River and Bay.

Towns.	1895.			1896.			1897.		
	No.	Lbs.	Value.	No.	Lbs.	Value.	No.	Lbs.	Value.
Brooksville (Cape Rosier)	163	2,092	$283	146	1,626	$190	24	360	$72
Bucksport	205	2,885	448	245	2,729	471	179	2,327	349
Camden	64	964	136	71	990	139	151	1,963	294
Castine	77	1,150	207	93	1,166	156	120	1,440	288
Hampden	30	510	102	32	448	90	21	270	49
Islesboro	474	6,551	1,042	643	8,265	1,318	295	4,720	944
Lincolnville	205	3,240	583	297	3,503	525	302	3,926	589
Matinicus and Ragged Islands	65	780	109	182	1,627	176	174	1,740	174
Northport	286	4,066	697	418	5,401	810	154	2,002	310
Orland	78	1,077	202	152	1,802	306	88	1,144	194
Orrington	65	1,101	165	82	1,150	161	74	1,062	160
Penobscot	485	7,270	1,313	959	12,483	1,992	536	6,968	1,185
Searsport	458	7,278	1,456	426	5,112	818	239	2,868	373
South Brewer	63	1,071	161	170	2,380	309	39	390	70
Stockton and Prospect	629	10,067	1,713	829	10,471	1,590	570	7,289	915
Verona	908	12,555	2,337	1,421	17,761	3,172	889	11,557	1,734
Winterport	140	2,354	402	237	3,311	499	98	1,176	153
Bangor	.....	.....	.....	.....	.....	.....	32	320	58
Total	4,395	65,011	11,356	6,403	80,225	12,716	3,985	51,522	7,911

Towns.	1898.			1899.		
	No.	Lbs.	Value.	No.	Lbs.	Value.
Brooksville (Cape Rosier)	45	765	$115	39	585	$129
Bucksport	158	2,054	411	153	1,989	498
Camden	111	1,388	263	67	871	174
Castine	122	1,464	293	146	1,898	380
Hampden	24	312	62	4	52	13
Islesboro	326	4,890	978	269	4,035	1,009
Lincolnville	229	2,977	566	454	5,902	1,180
Matinicus and Ragged Islands	28	280	28	38	380	88
Northport	130	1,625	309	188	2,444	489
Orland	65	845	169	62	806	202
Orrington	59	855	204	50	724	181
Penobscot	468	6,084	1,217	534	6,942	1,736
Searsport	197	2,627	565	221	2,707	593
South Brewer	36	360	72	61	610	153
Stockton and Prospect	452	6,016	1,089	512	6,456	1,344
Verona	656	8,528	1,706	672	8,736	2,184
Winterport	90	1,200	228	45	551	121
Bangor	29	290	67	.....	.....	.....
Total	3,225	42,560	8,342	3,515	45,688	10,424

THE CANNING INDUSTRY.

The canning of herring and other species is the most important shore industry connected with the fisheries of Maine. The principal feature of the business in most of the canneries is the preparation of small herring as sardines. Clams are canned extensively, and plain herring, mackerel, and menhaden in limited quantities incidentally. In a few instances smoked and pickled herring also form a part of the output. When not preparing fishery products a number of the canneries engage in canning fruit and vegetables in their season. The canning of lobsters was formerly an important part of the business, but in 1895 the State enacted a law prohibiting the catching of lobsters under 10½ inches in length. The large lobsters being too expensive for canning purposes, that branch of the industry was discontinued. The number of lobster canneries had, however, been gradually decreasing for years, the packers finding it more profitable to locate their canneries in the British provinces, where the supply of lobsters was more constant and labor much cheaper than in Maine.

In 1889 there were 49 sardine and other canneries in operation,

employing 4,017 persons, while in 1898 there were 78 canneries, with 6,829 employees. There has been a considerable increase in the pack of sardines. In 1889 the sardines packed were valued at $1,676,105, and in 1898 the value of the pack was $3,103,723. There were no mackerel canned in 1889, but in 1898 the pack of canned mackerel was valued at $44,848. There has also been an increase in the value of the pack of canned clams from $43,050 in 1889 to $206,087 in 1898.

There has recently been considerable change in the management of the sardine industry. In 1899 two companies were formed which included a large majority of the sardine canneries of the State, and the result has apparently been favorable to the interests of the business.

Table showing, by counties, the canneries, cash capital, cost of materials, wages paid, and number of persons employed in the canning industry of Maine in 1898.

Counties.	Canneries.		Cash capital.	Cost of materials.	Wages paid.	Persons employed.
	No.	Value.				
Washington	51	$397,000	$669,850	$1,322,865	$813,251	5,435
Hancock	10	64,200	100,000	111,696	82,922	727
Knox	4	6,800	18,500	11,792	7,480	113
Lincoln	5	58,800	105,000	96,756	62,974	407
Cumberland	8	39,500	21,500	18,650	21,080	147
Total	78	566,300	914,850	1,561,759	987,707	6,829

Table showing, by counties, the products of the canning industry of Maine in 1898.

Products.	Knox.		Lincoln.		Cumberland.	
	No.	Value.	No.	Value.	No.	Value.
Raw products:						
Herring ..... pounds			4,188,000	$14,040	273,700	$1,369
Mackerel ..... do			45,900	230	10,000	50
Menhaden ..... do	202,200	$708				
Clams ..... bushels	58,890	17,862	24,855	6,490	54,257	18,260
Total		18,570		20,760		19,679
Manufactured products:						
Sardines in oil—						
Quarters ..... cases			24,400	64,080		
Halves ..... do			6,500	25,800		
Sardines in mustard—						
Quarters ..... do			5,100	16,775		
Three-quarters ..... do			23,700	68,050		
Sardines in spices—						
Three-quarters ..... do			750	2,063		
Plain herring—						
One pound ..... do			500	1,125	3,405	10,595
Mackerel—						
Three-quarters ..... do			610	2,440		
One pound ..... do			100	550	100	280
Menhaden—						
One pound ..... do	1,896	4,929				
Clams—						
One pound ..... do	8,871	23,255	6,060	15,383	12,334	35,710
Two pound ..... do	7,992	15,185	200	400	1,781	3,562
Clam juice—						
One pound ..... do					600	1,380
Two pound ..... do	7,917	15,834			200	320
Clam chowder—						
Three pound ..... do	200	500	300	840	9,070	24,956
Total		59,703		197,506		76,803
Secondary products:						
Oil ..... gallons			2,784	725		
Pomace ..... tons			184	1,104		
Total				1,829		
Total of manufactured and secondary products		59,703		199,335		76,803

Table showing the products of the canning industry of Maine in 1898—Continued.

Products.	Washington.		Hancock.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Raw products:						
Herring ..... pounds..	57,670,100	$269,009	3,690,300	$14,736	65,722,100	$299,154
Mackerel ..... do....	45,070	160	471,200	3,158	572,170	3,598
Menhaden ..... do....					202,200	708
Clams ..... bushels..	3,643	711	37,386	9,205	178,931	52,528
Total.....		269,880		27,099		355,988
Manufactured products:						
Sardines in oil—						
Quarters ..... cases..	810,988	2,072,714	23,573	80,581	858,961	2,217,375
Halves ..... do....	140	560	194	970	6,834	27,330
Sardines in mustard—						
Quarters..... do....	30,476	82,386	4,768	18,140	40,344	117,301
Three-quarters ..... do....	232,195	555,596	34,654	99,127	290,549	722,773
Sardines in spices—						
Quarters..... do....	1,000	4,188	108	351	1,108	4,539
Three-quarters ..... do....	800	2,600	873	2,307	2,423	6,970
Sardines in tomato sauce—						
Quarters..... do....			438	1,435	438	1,435
Three-quarters ..... do....	1,000	3,000			1,000	3,000
Sardines soused—						
Three-quarters ..... do....	1,000	3,000			1,000	3,000
Brook trout (herring)—						
One pound ..... do....			357	1,428	357	1,428
Two pound..... do....			71	249	71	249
Three pound ..... do....			71	284	71	284
Plain herring—						
One pound ..... do....	1,100	3,080			5,005	14,800
Mackerel—						
Three-quarters ..... do....	740	2,960	1,957	7,371	3,307	12,771
One pound ..... do....	13	42	5,192	28,556	5,405	29,428
Two pound..... do....			450	2,025	450	2,025
Three pound ..... do....			104	624	104	624
Menhaden—						
One pound ..... do....					1,896	4,929
Russian sardines..... barrels..	200	750	2,000	7,000	2,200	7,750
Pickled herring ..... do....	4,850	16,995			4,850	16,995
Smoked herring—						
Bloaters..... boxes..	23,753	9,588			23,753	9,588
Medium, etc..... do....	363,919	32,753			363,919	32,753
Clams—						
One pound..... cases..	4,650	15,892	12,301	37,560	44,216	127,800
Two pound..... do....			2,400	6,000	12,373	25,147
Clam juice—						
One-quarter-pint ..... do....	250	1,000			250	1,000
One pound ..... do....	1,000	3,000			1,600	4,380
Two pound..... do....					8,117	16,154
One gallon ..... do....	100	300			100	300
Clam chowder—						
Three pound ..... do....			1,550	4,610	11,120	30,906
Clam extract—						
Eight ounce ..... do....			200	400	200	400
Total.....		2,810,404		299,018		8,443,434
Secondary products:						
Oil..... gallons..	9,888	1,391			12,672	2,116
Pomace..... tons..	601	4,806			785	5,910
Scrap ..... barrels..	31,214	2,328			31,214	2,328
Total.....		8,525				10,354
Total of manufactured and secondary products.....		2,818,929		299,018		3,453,788

Number of canneries engaged in each branch of canning in Maine in 1898.

Counties.	Sardine.	Herring.	Mackerel.	Menhaden.	Clam.	Total.*
Washington.....	50	1	9	.....	2	51
Hancock	7	1	4	.....	4	10
Knox	.....	.....	.....	1	3	4
Lincoln	4	1	3	.....	3	5
Cumberland	.....	3	1	.....	7	8
Total.....	61	6	17	1	19	78

* Number of canneries in each county without duplication.

WHOLESALE FISH TRADE AND SMOKED-FISH INDUSTRY.

The wholesale trade in fishery products, and the preparation of smoked herring and haddock, the latter being known as "Finnan haddie," are of considerable importance in many of the fishing localities on the coast of Maine. The fishery trade, though widely distributed, is centered chiefly at Portland, in Cumberland County, and at Rockland and Vinal Haven, in Knox County. The fish sold in a salted condition are purchased from fishermen fresh, and afterwards cured by dealers, or salted on board vessels before landing. Fresh fish, lobsters, clams, scallops, and a variety of secondary products are also handled extensively. The greater part of the pack of "Finnan haddie" is prepared at Portland, while the smoking of herring is carried on principally at Eastport and Lubec, in Washington County.

In 1898, exclusive of fishermen and sardine canners who prepare considerable quantities of smoked and pickled herring and Russian sardines, there were 124 firms, employing 748 persons in these two branches of industry. Their shore property was valued at $271,570. The cost of materials utilized in the preparation of fishery products was $89,645. The wages paid to employees aggregated $112,449, and the cash capital employed in the business amounted to $410,625. The products of the wholesale trade were valued at $1,899,191, and those prepared in connection with the smoked-fish industry at $154,992.

Table showing the number of firms, investment, wages, and persons employed in the wholesale fishery trade and smoked-fish industry of Maine in 1898.

Counties.	No. of firms.	Value of shore property.	*Cost of materials.	Cash capital.	Wages.	Persons employed.
Washington	53	$35,815	$34,166	$39,650	$20,937	324
Hancock	12	14,160	8,875	32,200	6,502	60
Knox	14	73,425	16,421	76,100	22,966	128
Lincoln and Sagadahoc	8	8,200	4,445	7,000	5,840	48
Cumberland	34	136,570	25,358	245,600	54,765	178
York	3	3,400	385	10,075	1,439	10
Total	124	271,570	89,645	410,625	112,449	748

*Includes salt, ice, wood, etc.

Table showing the products of the smoked-fish industry of Maine in 1898.

Products.	Washington.		Knox.		Lincoln.		Cumberland.		Total.	
	No.	Value.	No.	Val.	No.	Val.	No.	Value.	No.	Value.
Raw products:										
Haddock.....lbs.	.....	.....	2,500	$25	.....	.....	1,285,000	$22,113	1,287,500	$22,138
Herring.....do...	7,668,500	$25,987	.....	.....	912,000	$3,625	.....	.....	8,580,500	29,612
Total	7,668,500	25,987	2,500	25	912,000	3,625	1,285,000	22,113	9,868,000	51,750
Manufactured products:										
Smoked haddock—										
Finnan haddie ...lbs.	.....	.....	2,000	80	.....	.....	800,000	36,000	802,000	36,080
Smoked herring—										
Bloaters.....boxes..	6,900	3,450	.....	.....	.....	.....	.....	.....	6,900	3,450
Medium, etc.....do...	748,150	67,344	.....	.....	121,200	9,696	.....	.....	869,350	77,040
Pickled herring ...bbls..	9,150	35,572	.....	.....	.....	.....	.....	.....	9,150	35,572
Russian sardines ...do...	950	2,850	.....	.....	.....	.....	.....	.....	950	2,850
Total value	.....	109,216	.....	80	.....	9,696	.....	36,000	.....	154,992

Table showing the quantity and selling value of the products handled in the wholesale fishery trade of Maine in 1898.

Products.	Washington.		Hancock.		Sagadahoc.		Lincoln.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Fish, fresh			210,915	$4,999				
Fish, salted	870,800	$19,916	2,214,751	59,659	100,000	$3,000	792,800	$12,160
Fish, pickled	37,000	861						
Smoked herring, boneless			63,750	5,626				
Sounds, green							10,000	440
Sounds, dried	1,134	243	12,014	2,581				
Tongues, dried	1,200	41	4,685	187			1,200	48
Oil ..... galls.	4,584	1,127	10,058	2,967			8,400	2,450
Clam meat, fresh, barrels			375	2,063				
Clam meat, salted, barrels	440	2,310	3,190	15,950				
Total		24,497		94,032		3,000		15,098

Products.	Knox.		Cumberland.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Fish, fresh	960,510	$32,921	16,208,348	$341,868	900,000	$27,000	18,279,768	$406,788
Fish, salted	6,175,002	146,574	5,976,573	208,117	720,000	28,800	16,849,926	478,225
Fish, pickled	2,786	279	652,000	14,600			691,786	15,740
Smoked herring, boneless							63,750	5,626
Sounds, green	67,969	3,543					77,969	3,983
Sounds, dried			10,725	2,464			23,873	5,288
Tongues, dried	2,000	40	2,360	96			11,445	412
Livers	255,200	2,321					255,200	2,321
Oil ..... galls.	13,192	3,926	12,960	3,240	3,756	1,132	52,950	14,842
Fish skins ..... tons.	44	1,848	6	210			50	2,058
Scrap ..... do.	181	1,629	37	334			218	1,963
Lobsters, live	847,859	97,135	5,356,477	696,344			6,204,326	793,479
Lobsters, boiled	197,815	26,705	515,518	82,483			713,333	109,188
Scallops ..... galls.	551	419					551	419
Clams, fresh ... bush.	20,385	11,286	19,128	14,580			39,513	25,866
Clam meat, fresh, barrels	80	550	200	1,000			655	3,613
Clam meat, salted, barrels	65	890	1,880	10,730			5,575	29,380
Total		329,566		1,376,066		56,932		1,899,191

SMOKED HERRING.

The smoked herring prepared by the fishermen are shown as such in the general-products table for the State. The American-caught herring smoked by the canners and regular smokers are included in the statistics relating to the canning and smoked-fish industries, but are shown as fresh herring in the general-products table, that being the condition in which they were sold by the fishermen. It is customary for many of the fishermen to smoke a part of their own catch, but other classes of smokers utilize both American and Canadian caught herring for smoking purposes.

Table showing the quantity and value of smoked herring prepared in Maine in 1898.

Designation.	Lbs.	Value.
Smoked by fishermen	3,738,500	$63,005
Smoked by canners	2,413,420	42,341
Smoked by regular smokers	4,519,250	80,490
Total	10,671,170	185,836

Table showing the quantity and value of smoked herring prepared in Maine in various years from 1880 to 1898.

Years.	Lbs.	Value.
1880	4,434,111	$99,978
1887	3,419,485	100,488
1888	4,360,435	140,154
1889	5,090,425	159,830
1892	10,151,695	232,036
1898	10,671,170	185,836

THE MENHADEN INDUSTRY.

There has been considerable increase in the menhaden industry since 1889. In that year there were three factories, valued at $22,200, while in 1898 there were four factories, valued at $190,000. The products have increased from 282,465 gallons of oil, valued at $62,405, and 2,305 tons of scrap, valued at $24,735 in 1889, to 765,000 gallons of oil, valued at $191,250, and 9,120 tons of scrap, valued at $91,200 in 1898. In 1899, however, the factories were not operated, as no menhaden appeared along the coast of Maine during that year.

With the exception of the preparation of menhaden for bait by fishermen and dealers, the following table shows the extent of the menhaden industry of Maine in 1898:

Table showing the extent of the menhaden industry of Maine in 1898.

Items.	No.	Value.
Factories in operation	4	$190,000
Cash capital	.....	100,000
Wages paid factory employees	.....	73,000
Employees in factories	446	.....
Fishermen on vessels	41	.....
Steam vessels employed	3	21,000
Net tonnage of vessels ..... tons.	76	.....
Outfits of vessels	.....	6,010
Menhaden utilized ..... pounds.	*52,392,400	.....
Oil made ..... gallons.	765,000	191,250
Scrap prepared ..... tons.	9,120	91,200

*A considerable quantity of the menhaden utilized were caught by vessels owned in other States.

FISHERIES OF NEW HAMPSHIRE.

The commercial fisheries of New Hampshire are confined to Rockingham County, that being the only one in the State touching the Atlantic seaboard.

In 1898 the number of persons employed was 154. There were 5 vessels employed, valued with their outfits at $7,358, and 123 boats valued at $5,395. The value of the fishing apparatus was $12,120. The value of the pound nets and weirs represented more than half of this amount, being $6,960. The shore property and cash capital aggregated $27,775, the total investment being $52,648. The fisheries of this State have decreased in the amount of capital invested and in the value of the products about 50 per cent since 1889.

The products in 1898 were worth $48,987. The greater part of this value was derived from the yield of cod, hake, haddock, cusk, and pollock, which were worth $29,473. The yield of the lobster fishery was valued at $9,372 and that of the mackerel fishery at $3,207. The remaining products had a value of $6,935.

The three tables which follow show the extent of the fisheries in detail for the year 1898.

Persons employed.

How engaged.	No.
On vessels fishing	28
In shore or boat fisheries	115
Shoresmen	11
Total	154

Table of products.

Species.	Vessel fisheries.		Shore fisheries.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh			25,000	$250	25,000	$250
Alewives, salted			200,000	2,500	200,000	2,500
Cod, fresh	129,300	$1,958	559,850	8,798	689,150	10,756
Cod, salted			2,000	70	2,000	70
Cusk	62,000	620	35,500	375	97,500	995
Haddock, fresh	303,000	3,045	1,076,750	11,507	1,379,750	14,552
Haddock, salted			4,000	100	4,000	100
Hake, fresh	2,500	13	112,900	1,366	115,400	1,379
Hake, salted			1,500	38	1,500	38
Herring			65,000	650	65,000	650
Mackerel	42,000	2,220	16,750	987	58,750	3,207
Perch, white			1,650	165	1,650	165
Pollock, fresh	88,700	444	91,500	1,115	180,200	1,559
Pollock, salted			1,200	24	1,200	24
Striped bass			850	85	850	85
Lobsters			108,515	9,372	108,515	9,372
Clams, soft			6,000	360	*6,000	360
Irish moss			70,000	2,450	70,000	2,450
Oil	8,250	275	6,000	200	†14,250	475
Total	635,750	8,575	2,384,965	40,412	3,020,715	48,987

*600 bushels. †1,900 gallons.

Table of apparatus and capital.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	5	$3,900	Apparatus—shore fisheries:		
Tonnage	79	.....	Pound nets and weirs	17	6,960
Outfit	.....	3,458	Gill nets	20	244
Boats	123	5,395	Lines, hand and trawl	.....	1,393
Apparatus—vessel fisheries:			Pots, lobster	1,675	1,666
Seines	1	500	Rakes	10	32
Gill nets	40	600	Shore property	.....	12,775
Lines, trawl	.....	725	Cash capital	.....	15,000
			Total	.....	52,648

PRODUCTS WITH EACH APPARATUS.

The yield of the vessel fisheries by seines, gill nets, and hand and trawl lines was valued at $8,575. In the shore fisheries the yield of the gill nets was valued at $537; that of pound nets and weirs, $4,550; of trawl and hand lines, $23,143; and of all other apparatus, $12,182; the total value being $40,412.

Table showing the yield of the vessel fisheries of New Hampshire in 1898.

Apparatus.	Species.	Lbs.	Value.
Seines	Mackerel	30,000	$1,500
Gill nets	do	12,000	720
Lines, trawl	Cod	129,300	1,958
Do	Cusk	62,000	620
Do	Haddock	303,000	3,045
Do	Hake	2,500	13
Do	Pollock	88,700	444
Do	Oil	8,250	275
Total		593,750	6,355
Grand total		635,750	8,575

Table showing the yield of the shore fisheries of New Hampshire in 1898.

Apparatus and species.	Lbs.	Value.	Apparatus and species.	Lbs.	Value.
Gill nets:			Lines, trawl and hand:		
Herring	5,000	$50	Cod, fresh	529,850	$8,348
Mackerel	6,750	487	Cod, salted	2,000	70
Total	11,750	537	Cusk	35,500	375
Pound nets and weirs:			Haddock, fresh	1,076,750	11,507
Alewives, fresh	25,000	250	Haddock, salted	4,000	100
Alewives, salted	200,000	2,500	Hake, fresh	112,900	1,366
Cod	30,000	450	Hake, salted	1,500	88
Herring	60,000	600	Pollock, fresh	91,500	1,115
Mackerel	10,000	500	Pollock, salted	1,200	24
Perch, white	1,650	165	Oil	6,000	200
Striped bass	850	85	Total	1,861,200	23,143
Total	327,500	4,550	Rakes:		
Pots:			Clams, soft	6,000	360
Lobsters	108,515	9,372	Irish moss	70,000	2,450
			Total	76,000	2,810
			Grand total	2,384,965	40,412

FISHERIES OF MASSACHUSETTS.

Massachusetts has over two-thirds of the investment, more than half of the quantity, and nearly half of the value of the products of the coast fisheries of New England. It is the leading fishing State of New England, and in the items of investment and value of products it surpasses any other State. It had until recent years more persons employed in the fishing industry than any other New England State, but is now exceeded by Maine in this respect. The most important branches of fishing prosecuted by vessels are the offshore bank fisheries for cod, haddock, hake, halibut, and other ground species; the mackerel fishery, and the whale fishery. The shore, or boat, fisheries embrace a large number of species, but yield only about 20 per cent of the total value of the fishery products of the State, a smaller percentage than any other New England State except Connecticut.

The principal fishing ports, where the largest fleets of vessels are owned and operated, are Gloucester, Boston, Provincetown, and New Bedford. A considerable number of vessels, mostly of small size, are owned in various other localities, while the shore or boat fisheries are prosecuted to a greater or less extent along the entire coast. The whale fishery was engaged in by vessels from Boston and Provincetown, but is centered principally at New Bedford. Some of the whaling vessels owned at New Bedford have headquarters at San Francisco, Cal., but are included in the statistics for Massachusetts.

The products of the fisheries of this State are derived chiefly from the numerous offshore fishing banks extending along the North American coast from Nantucket Shoals, Massachusetts, to the Grand Banks of Newfoundland. The products taken by boats in the shore fisheries and by the smallest class of vessels represent practically all that are obtained from jurisdictional waters. A very large percentage of the principal species taken by vessels in the cod fisheries is from offshore grounds. The mackerel fishery is also prosecuted along the coast, to a greater or less extent, from Florida to the Gulf of St. Lawrence.

The halibut supply has for many years been obtained mainly from the banks off the New England coast, and from La Have, Banquereau, Western, Grand, and other eastern banks. Since about 1895 large quantities of halibut have been secured on grounds located to the northeast of Newfoundland, in latitude 48° to 50° N. and longitude 50° to 51° W. The great demand for halibut in 1898 induced a Boston firm to send a steam vessel on a voyage to the halibut grounds in the North Pacific Ocean. These grounds are principally in latitude 50° to 55° N. and longitude 135° to 140° W. This vessel had a crew of 28 men, and during October, November, and December secured 411,011 pounds of fresh halibut which, after being landed, was packed in refrigerator cars and shipped to Boston by railroad, where it arrived in good condition. It is interesting to note that the fishing-grounds in the North Atlantic

and Pacific oceans on which halibut have been found to be abundant in the past few years are in approximately the same latitude.

In the whale fishery one bark from Boston took 400 barrels of sperm oil in the Okotsk Sea, north of Japan; one brig made a similar catch in West Indian waters; one bark, the *Swallow*, visited Kerguelen, or Desolation Island, to obtain sea-elephant oil, and one schooner was at the close of the year in those waters on a sealing voyage. There were also four vessels from Provincetown fishing in the South Atlantic Ocean, and the whaling fleet from New Bedford fished in the North and South Atlantic, North and South Pacific, and Arctic oceans.

The bark *Swallow*, of 310 tons, above referred to, with a crew of 34 men, sailed from Boston in July and arrived at Kerguelen Island in December, 1897. This island is in the Southern Ocean in latitude 49° S. and longitude 69° E. Within three months about 4,000 sea-elephants were secured, which yielded 63,000 gallons of oil having a value of $20,790. It being summer in that locality, no difficulty was experienced from ice, but heavy fogs prevailed the greater part of the time. The younger sea-elephants were taken in December, the larger ones later in the season. They were all killed on shore by the use of rifles, lances, and harpoons. Only the oil from the animals was saved. It is used chiefly in tanning morocco and other leather. The vessel left the island in March and returned to Massachusetts on July 20, 1898, after an absence of about a year. The captain reports that at Kerguelen Island the young sea-elephants are chiefly produced in November, as very few were born after his arrival there, and that they shed their hair in December. The voyage of the *Swallow* is noteworthy, as the Kerguelen Island sea-elephant fishery has not been regularly prosecuted for a long period, the only other vessel visiting the island in recent years being the *Francis Allen*, of New London, Conn., in about 1894.

The herring fisheries furnish another instance in which the products are derived largely from waters outside of State jurisdiction, the Newfoundland herring fishery alone yielding about half of the entire catch of this species. This fishery is apparently increasing in importance. In 1896 it was engaged in by 43 vessels from Gloucester, 3 from Beverly, and 1 from Provincetown; a total of 47 vessels, with a net tonnage of 4,981 tons and a value of $239,316; the value of their outfit, seines and gill nets, was $29,123 and the number of fishermen was 440. The quantity of fresh frozen herring secured was 8,441,842 pounds, valued at $117,649, and of salted herring 1,807,575 pounds, valued at $18,150. In 1898 the Newfoundland herring fleet had increased to 56 vessels, valued at $281,028. Of these, 51 were from Gloucester, 2 from Beverly, and 3 from Boston; their net tonnage was 4,542 tons, the value of their outfit, seines and gill nets, $48,650, and the number of fishermen 450. The quantity of fresh frozen herring obtained was 9,398,872 pounds, valued at $197,490, and of salted herring 5,545,199 pounds, valued at $72,862; a total of 14,944,071 pounds, valued at $270,352.

GENERAL STATISTICS.

In 1898 14,363 persons were employed in the coast fisheries of Massachusetts—on vessels fishing, 6,962; on vessels transporting fishery products, 14; in the shore or boat fisheries, 3,365; and as shoresmen in the various branches of fishery industry, 4,022.

The vessels engaged in fishing and transporting numbered 637, worth $1,776,025. Their net tonnage was 30,558 tons, and the value of their outfits $939,772. The number of boats used in the shore fisheries was 2,625, valued at $178,082. The apparatus of capture, consisting of seines, gill nets, pound nets, trap nets, fyke nets, drag nets, dip nets, hand and trawl lines, lobster and eel pots, harpoons, dredges, tongs, rakes, and various minor apparatus, was valued at $556,525. Of this amount $337,082 belong to the vessel and $219,443 to shore fisheries. This is exclusive of harpoons, guns, and other means of capture used in the whale fisheries, the value of which is included in the outfits of vessels. The shore and accessory property employed in the fisheries and fishery industries was valued at $5,125,248, and the cash capital amounted to $4,797,250, the total investment being $13,372,902.

The products of the fisheries aggregated 202,257,817 pounds, valued at $4,463,727. About 70 per cent of this quantity and nearly 50 per cent of the value were comprised of the five principal species obtained in the cod fisheries. These, combining the fresh and the salted of each species, were cod, 71,314,978 pounds, $1,407,039; cusk, 5,954,036 pounds, $63,514; haddock, 35,581,514 pounds, $419,818; hake, 21,331,816 pounds, $163,634; and pollock, 7,084,037 pounds, $43,045; the five species totalizing 141,266,381 pounds, and having a value of $2,097,050. Other important species, with the quantity and value of fresh and salted, were halibut, 10,523,297 pounds, $547,440; mackerel, 6,703,364 pounds, $361,864; herring, 22,363,497 pounds, $332,547; sword-fish, 597,186 pounds, $35,280, and alewives, fresh, salted, and smoked, 2,535,201 pounds, $31,288. The principal species disposed of wholly in a fresh condition were blue-fish, 832,849 pounds, $38,089; eels, 425,846 pounds, $17,635; flounders, 1,168,876 pounds, $14,793; menhaden, 1,497,367 pounds, $10,544; scup, 1,043,625 pounds, $14,253, and squeteague, 1,371,910 pounds, $39,518. Lobsters yielded 1,693,741 pounds, worth $147,702. The more important mollusks were oysters, 101,225 bushels, $156,235; clams, hard and soft, 210,912 bushels, $153,318, and scallops, 145,919 bushels, $94,971. The yield of the whale fisheries, consisting of whale, sperm, and sea-elephant oil, and whalebone, was valued at $285,688.

A comparison of the statistics for 1898 with those for 1889 shows that there has been a decrease of 2,875 in the number of persons employed. The decrease in the number of vessel fishermen is 3,875, and in shore or boat fishermen, 383. This has been partly offset by an increase of 1,383 in the number of shoresmen.

The vessels have decreased 199, or nearly 24 per cent, in number,

and $1,332,320, or 43 per cent, in value. The net tonnage has also decreased about 48 per cent. An instance of the gradual decrease in vessels during the past nine years is furnished by the fishing fleet at Gloucester, Mass. From July 1, 1897, to November 15, 1898, 27 vessels were sold and 24 lost; in the same period 11 vessels were purchased and 7 built; the net decrease in the fleet in the 17½ months being 33 vessels. The vessels sold and lost have generally been larger in size than those taking their places and the percentage of decrease in number has therefore not been so large as in value and tonnage. The decrease in boats is nearly 25 per cent in number and 30 per cent in value, and in the value of the apparatus of capture about 44 per cent. In the meantime there has been an increase of $2,067,041 in the value of shore and accessory property, and of $513,050 in the cash capital; resulting in an increase in the total investment of $127,673.

The products in 1898 as compared with 1889, if the various species of algae gathered by fishermen are included, have decreased 96,959,852 pounds in quantity and $1,394,547 in value. In 1889 the algae consisted of seaweed and Irish moss, and amounted to 117,993,900 pounds, valued at $66,034, and in 1898 of 700,000 pounds of Irish moss, worth $22,375. Eliminating these items for both years, the fishery products proper in 1898 show an increase of 20,334,048 pounds in quantity and a decrease of $1,350,888 in value.

The following tables show the persons employed, the number and value of vessels, boats, and apparatus of capture, the value of shore and accessory property, the amount of cash capital, and the quantity and value of the products of the fisheries of Massachusetts in 1898.

Persons employed.

How engaged.	No.
On vessels fishing	6,962
On vessels transporting	14
In shore or boat fisheries	3,365
Shoresmen	4,022
Total	14,363

Table of apparatus and capital.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	629	$1,772,725	Apparatus—shore fisheries:		
Tonnage	30,494		Seines	52	$3,386
Outfit		939,369	Gill nets	1,671	18,291
Vessels transporting	8	3,300	Pound nets and trap nets	126	141,835
Tonnage	64		Dip nets	213	272
Outfit		403	Fyke nets	88	1,124
Boats	2,625	178,082	Drag nets	21	1,260
Apparatus—vessel fisheries:			Lines, hand and trawl		7,403
Seines	220	84,996	Pots, lobster	24,462	29,387
Gill nets	2,961	32,021	Pots, eel	1,250	2,336
Trap nets	4	900	Dredges	2,263	7,638
Drag nets	6	350	Tongs, rakes, and forks		6,147
Lines, hand and trawl		213,962	Minor apparatus		364
Pots, lobster	1,792	2,094	Shore and accessory property		5,125,248
Pots, eel	40	40	Cash capital		4,797,250
Harpoons *a*	338	1,200			
Dredges	350	1,414	Total		18,372,902
Minor apparatus		105			

a The harpoons, guns, etc., used on whaling vessels are included with the "outfits" of vessels fishing.

Table of products.

Species.	Vessel fisheries.		Shore fisheries.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore			36,090	$912	36,090	$912
Alewives, fresh	2,000	$20	1,875,061	22,248	1,877,061	22,268
Alewives, salted			586,700	6,790	586,700	6,790
Alewives, smoked			71,440	2,230	71,440	2,230
Blue-fish	455,615	22,227	377,234	15,862	832,849	38,089
Bonito	18,000	520	71,136	1,890	89,136	2,410
Butter-fish	100	5	30,520	813	30,620	818
Cat-fish	5,200	110			5,200	110
Cod, fresh	38,046,353	637,747	2,585,798	50,974	40,632,151	688,721
Cod, salted	29,573,631	684,186	1,109,196	34,132	30,682,827	718,318
Gunners	100	5	85,250	5,245	85,350	5,250
Cusk, fresh	5,766,173	60,708	59,000	600	5,825,173	61,308
Cusk, salted	128,863	2,206			128,863	2,206
Eels	76,667	1,900	349,179	15,735	425,846	17,635
Flounders	289,225	4,490	879,651	10,303	1,168,876	14,793
Haddock, fresh	34,460,284	403,999	1,001,000	14,527	35,451,284	418,526
Haddock, salted	128,886	1,268	1,344	24	130,230	1,292
Hake, fresh	20,738,753	158,668	360,675	2 827	21,099,428	161,495
Hake, salted	232,388	2,139			232,388	2,139
Halibut, fresh	8,663,443	487,714			8,663,443	487,714
Halibut, salted	1,859,854	59,726			1,859,854	59,726
Herring, fresh	10,348,422	206,956	6,213,916	49,379	16,562,338	256,335
Herring, salted	5,801,159	76,212			5,801,159	76,212
Hickory shad			1,000	15	1,000	15
King-fish			245	22	245	22
Mackerel, fresh	2,501,360	144,672	1,289,873	52,667	3,791,233	197,339
Mackerel, salted	2,905,681	164,150	6,450	375	2,912,131	164,525
Menhaden	919,887	5,992	577,480	4,552	1,497,367	10,544
Perch			57,523	3,662	57,523	3,662
Pollock, fresh	5,160,198	29,137	1,406,190	9,119	6,566,388	38,256
Pollock, salted	486,617	4,231	31,032	558	517,649	4,789
Pompano			150	15	150	15
Salmon			60	30	60	30
Scup	21,700	364	1,021,925	13,889	1,043,625	14,253
Sea bass	24,700	746	74,600	4,200	99,300	4,946
Shad			29,333	1,426	29,333	1,426
Smelt			7,079	515	7,079	515
Spanish mackerel			210	30	210	30
Squeteague	56,800	642	1,315,110	38,876	1,371,910	39,518
Striped bass	3,649	349	9,299	590	12,948	939
Sturgeon			8,490	402	8,490	402
Sword-fish, fresh	569,916	34,465			569,916	34,465
Sword-fish, salted	27,270	815			27,270	815
Tautog	29,430	879	260,075	6,688	289,505	7,567
Whiting or silver hake			37,200	492	37,200	492
Squid, fresh	300,275	9,008	764,150	5,562	1,064,425	14,570
Squid, salted	5,000	50			5,000	50
Lobsters	70,941	6,552	1,622,800	141,150	1,693,741	147,702
Shrimp			25,200	1,183	25,200	1,183
Clams, hard			510,536	50,724	[a]510,536	50,724
Clams, soft			1,470,951	102,594	[b]1,470,951	102,594
Mussels			7,400	130	[c]7,400	130
Oysters	210	50	708,365	156,185	[d]708,575	156,235
Scallops	110,984	12,866	764,528	82,105	[e]875,512	94,971
Irish moss			700,000	22,375	700,000	22,375
Winkles	9,500	475			[f]9,500	475
Cod sounds and tongues	34,855	889			34,855	889
Hake sounds	32,707	1,914			32,707	1,914
Haddock spawn	700	18			700	18
Halibut fins	21,900	384			21,900	384
Oil, fish	354,427	13,843	4,500	120	[g]358,927	13,963
Oil, sea-elephant	472,500	20,790			[h]472,500	20,790
Oil, whale	3,119,450	199,023			[i]3,119,450	199,023
Whalebone	27,100	65,875			27,100	65,875
Total	173,852,873	3,528,985	28,404,944	934,742	202,257,817	4,463,727

[a] 63,817 bushels.
[b] 147,095 bushels.
[c] 700 bushels.
[d] 101,225 bushels.
[e] 145,919 bushels.
[f] 950 bushels.
[g] 47 857 gallons.
[h] 63,000 gallons.
[i] 416,927 gallons.

THE FISHERIES BY COUNTIES.

There are eight counties on the coast of this State, all of which are interested in the fishing industry. These are Essex, Suffolk, Norfolk, Plymouth, Barnstable, Nantucket, Dukes, and Bristol. The fisheries of Essex County are the most extensive. The number of persons employed in this county was 7,025. There were 4,853 in the vessel fisheries, 740 in the shore or boat fisheries, and 1,432 in the wholesale trade in fishery products and other shore industries connected with the fisheries. The number of vessels fishing was 352, valued at $1,220,420, and their outfits at $655,893; the number of boats was 451, valued at $18,051; the fishing apparatus was valued at $262,403, the shore and accessory property at $1,758,311, and the cash capital at $2,346,000, the total investment being $6,261,078. The products amounted to 134,744,667 pounds, having a value of $2,578,806. The extent of the fisheries of this county will be better appreciated when it is stated that they represent practically one-half the fishery interests of the State and are nearly equal in value to the fisheries of Maine, while they exceed those of either of the other New England States.

The county next in importance is Suffolk. Its fisheries center at Boston and gave employment to 3,027 persons, of whom 963 were vessel fishermen, 129 shore or boat fishermen, and 1,935 shoresmen. The number of vessels fishing was 60, valued at $313,300, their outfits having a value of $188,275. There were 99 boats used in the shore fisheries, worth $5,590. The fishing apparatus was valued at $62,372, the shore and accessory property at $3,160,910, and the cash capital at $2,251,750, a total investment of $5,982,197. The quantity of products obtained was 27,780,143 pounds, valued at $529,835.

In addition to considerable quantities of other species, the fisheries of these two counties produced 87 per cent of the quantity and 85 per cent of the value of the fresh and salted cod, cusk, haddock, hake, and pollock; 94 per cent of the quantity and 91 per cent of the value of the halibut; 60 per cent of the quantity and 72 per cent of the value of the mackerel, and 85 per cent of the quantity and 91 per cent of the value of the herring taken in the fisheries of the entire State. The products in both of these counties are derived mainly from the vessel fisheries. The investment is also exceptionally large, especially in the items of shore property and cash capital, which is due chiefly to the extensive wholesale trade in fishery products at Gloucester and Boston.

Barnstable County had 2,307 persons engaged in the fisheries. Of these 905 were on vessels fishing and transporting, 1,126 in the shore fisheries, and 276 were shoresmen. The number of vessels employed was 157, valued at $186,755; and of boats in the shore fisheries, 929, valued at $61,242. The fishing apparatus was valued at $177,318. Of this amount $132,683 is the value of the apparatus in the shore fisheries,

which are more extensive than in any other county in the State. The more important forms of apparatus used were seines, gill nets, and lines in the vessel fisheries, and pound nets in the shore fisheries. The total investment, including outfits of vessels, shore property, and cash capital, was $608,158; and the products amounted to 26,761,104 pounds, valued at $741,826.

Provincetown is the principal fishing port in this county. It had 62 vessels engaged in the food fisheries and 4 in the whale fishery, a total of 66 vessels, valued at $134,950. The greater part of the fleet in the food fisheries fished on Georges and other banks off the New England coast, and six of the largest vessels made trips to the Grand Banks of Newfoundland. The catch was marketed chiefly at Boston. There were also 205 boats of various classes used in the shore fisheries. The persons employed numbered 912, of whom 650 were vessel fishermen, 149 shore fishermen, and 113 shoresmen. The total investment was $376,020, and the value of the products obtained by vessels and boats was $355,907.

Besides the usual branches of fishing by vessels and boats, a fishery for flounders is carried on in the harbor during the winter by boats and by the smaller class of vessels with drag nets. These nets are similar in construction to a beam trawl. They are 30 feet wide at the mouth, 5 feet wide at the extreme end, and the length is 35 feet. The method of operating them is to throw them overboard and drag them on the bottom like a dredge, drawing them up at intervals to empty the catch on the deck of the boat or vessel. They have been used in this locality only a few years, and seldom take any other species than flounders.

In each of the five remaining counties the fisheries are less extensive. The aggregate number of persons employed was 2,004; the investment, $521,469; and the quantity of the products, 12,971,903 pounds, valued at $613,260.

The following statistical statements of the value of the fishing apparatus, and the quantity and value of the products of the vessel and the shore fisheries will serve to illustrate the importance of each of these branches of fishing in the various counties:

Value of fishing apparatus in the vessel and shore fisheries.

Counties.	Vessel fisheries.	Shore fisheries.
Essex	$232,963	$29,440
Suffolk	50,845	11,527
Norfolk		2,480
Plymouth	3,739	12,863
Barnstable	44,635	132,683
Nantucket	3,240	8,990
Dukes	706	17,963
Bristol	954	8,497

Quantity and value of products of the vessel and shore fisheries.

Counties.	Vessel fisheries.		Shore fisheries.	
	Lbs.	Value.	Lbs.	Value.
Essex	127,013,794	$2,383,054	7,780,873	$195,752
Suffolk	26,096,218	470,285	1,683,925	59,550
Norfolk			298,000	10,800
Plymouth	1,064,050	21,044	1,809,950	103,670
Barnstable	15,708,541	384,980	11,052,563	356,846
Nantucket	364,587	15,802	1,213,795	44,267
Dukes	186,580	6,663	3,298,505	102,432
Bristol	3,419,103	247,157	1,317,333	61,425

The three tables which follow show in detail the extent of the fisheries in each county of Massachusetts in 1898:

Number of persons employed in the fisheries of Massachusetts in 1898.

Counties.	On vessels fishing.	On vessels transporting.	In shore or boat fisheries.	Shoresmen.	Total.
Essex	4,853		740	1,432	7,025
Suffolk	963		129	1,935	8,027
Norfolk			37		37
Plymouth	62		495	193	750
Barnstable	899	6	1,126	276	2,307
Nantucket	43		136	50	229
Dukes	25	1	295	46	367
Bristol	117	7	407	90	621
Total	6,962	14	3,365	4,022	14,363

Table showing, by counties, the vessels, boats, apparatus, and capital employed in the fisheries of Massachusetts in 1898.

Items.	Essex.		Suffolk.		Norfolk.		Plymouth.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	352	$1,220,420	60	$313,300			9	$18,250
Tonnage	21,812		4,199				155	
Outfit		655,893		188,275				6,080
Boats	451	18,051	99	5,590	31	$1,500	399	40,122
Apparatus—vessel fisheries:								
Seines	168	65,150	13	6,100			2	800
Gill nets	1,145	12,433	40	400			70	700
Trap nets	4	900						
Lines, hand and trawl		153,692		43,950				2,078
Pots, lobster	300	300						
Harpoons	147	423	79	395			11	76
Dredges							24	85
Minor apparatus		65						
Apparatus—shore fisheries:								
Seines							1	17
Gill nets	567	6,480	25	250	50	900	38	380
Pound nets and trap nets	16	12,920	3	6,000				
Dip nets	83	95					29	36
Lines, hand and trawl		3,812						37
Pots, lobster	5,375	5,495	4,055	5,187	1,200	1,500	6,813	8,662
Pots, eel	140	280						
Dredges							667	2,333
Tongs, rakes, and forks		328		50		80		1,398
Minor apparatus		30		40				
Shore and accessory property		1,758,311		3,160,910		600		13,010
Cash capital		2,346,000		2,251,750				
Total		6,261,078		5,982,197		4,580		94,064

Table showing, by counties, the vessels, boats, apparatus, and capital employed in the fisheries of Massachusetts in 1898—Continued.

Items.	Barnstable.		Nantucket.		Dukes.		Bristol.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	154	$186,005	17	$14,000	12	$6,000	25	$14,750
Tonnage	3,746		130		75		377	
Outfit		a 78,502		1,218		769		8,632
Vessels transporting	3	750			1	1,500	4	1,050
Tonnage	15				6		43	
Outfit		68				110		225
Boats	929	61,242	154	5,270	240	18,872	822	27,435
Apparatus—vessel fisheries:								
Seines	32	12,300	3	450	2	196		
Gill nets	1,563	16,183	142	2,260	1	45		
Drag nets	6	350						
Lines, hand and trawl		13,499		107		120		516
Pots, lobster	1,122	1,359	210	210	60	75	100	150
Pots, eel					40	40		
Harpoons	39	174	4	10	13	32	45	90
Dredges	128	742	78	191	61	198	59	198
Minor apparatus		28		12				
Apparatus—shore fisheries:								
Seines	15	780	3	520	12	489	21	1,580
Gill nets	853	7,965	138	2,316				
Pound nets and trap nets	81	109,940			26	12,976		
Dip nets	97	134			4	7		
Fyke nets	88	1,124						
Drag nets	21	1,260						
Lines, hand and trawl		2,905		279		139		231
Pots, lobster	3,167	3,763	488	488	1,714	2,089	1,650	2,203
Pots, eel	310	410			520	1,234	280	420
Dredges	413	949	122	305	201	603	860	3,448
Tongs, rakes, and forks		3,289		60		327		615
Minor apparatus		172		22		100		
Shore and accessory property		71,273		5,905		9,586		105,653
Cash capital		33,000						166,500
Total		608,158		33,623		55,506		383,696

a The harpoons, guns, etc., used on whaling vessels are included under "outfit."

Table showing, by counties, the products of the fisheries of Massachusetts in 1898.

Species.	Nantucket.		Suffolk.		Norfolk.		Plymouth.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh							122,495	$1,357
Alewives, salted							133,000	1,538
Blue-fish	317,750	$12,630						
Bonito	20,600	598						
Butter-fish			2,000	$100				
Cod, fresh	123,100	2,412	6,387,900	111,405			418,950	8,053
Cod, salted	765,490	20,663	48,000	1,555			28,000	1,240
Cunners			72,000	4,800			5,000	200
Cusk, fresh			559,300	7,004			7,800	98
Cusk, salted			6,000	150				
Eels	40,001	1,720						
Flounders	12,000	360	1,500	15				
Haddock, fresh	80,000	2,150	11,904,800	148,528			355,250	5,142
Haddock, salted	500	6						
Hake, fresh			3,954,827	39,502			85,500	885
Halibut, fresh			694,966	80,396				
Halibut, salted			250,000	10,000				
Herring, fresh			984,400	11,122	100,000	$1,500	170,800	1,706
Herring, salted			843,600	9,300				
Mackerel, fresh	13,175	686	143,500	9,080			28,150	1,080
Mackerel, salted			128,800	9,660				
Menhaden			138,000	1,040				
Pollock, fresh			297,700	2,301			97,300	5,015
Pollock, salted	11,400	228						
Pompano	150	15						
Scup	7,300	396						
Squeteague	2,800	84						
Sword-fish, fresh	1,800	140	142,400	11,192			35,500	1,715
Lobsters	37,100	3,782	346,625	30,355	48,000	4,800	498,610	39,991
Clams, hard	6,400	640					24,000	2,600
Clams, soft			210,600	10,530			62,500	4,125
Mussels							7,400	130
Oysters							48,545	9,844
Scallops	138,816	18,659					195,200	22,120
Irish moss					150,000	4,500	550,000	17,875
Oil, sea-elephant			472,500	20,790				
Oil, whale			190,725	11,010				
Total	1,578,882	60,069	27,780,143	529,885	298,000	10,800	2,874,000	124,714

Table showing, by counties, the products of the fisheries of Massachusetts in 1898—Cont'd.

Species.	Essex.		Dukes.		Bristol.		Barnstable.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore							36,090	$912
Alewives, fresh	106,600	$1,013	392,561	$5,690	853,744	$4,338	901,661	9,870
Alewives, salted			10,000	150	170,000	1,975	273,700	3,127
Alewives, smoked			30,000	750			41,440	1,480
Blue-fish	15	1	24,660	1,239			490,424	24,219
Bonito			49,811	1,374			18,725	438
Butter-fish	2,300	83	4,600	84			21,720	551
Cat-fish	2,000	40					3,200	70
Cod, fresh	28,517,742	449,174	53,140	1,176	105,231	3,021	5,026,088	113,480
Cod, salted	27,274,654	619,035	28,000	1,400	491,321	9,926	2,047,362	64,499
Cunners	8,350	250						
Cusk, fresh	4,948,673	51,112					809,400	8,094
Cusk, salted	122,863	2,056						
Eels	57,000	2,850	67,790	3,016	11,000	330	250,055	9,719
Flounders	16,875	258	130,649	2,011	4,000	80	1,003,852	12,069
Haddock, fresh	19,351,974	207,893	1,000	50	2,500	75	3,914,771	65,635
Haddock, salted	75,386	722			51,000	510	3,344	54
Hake, fresh	15,625,101	110,000			500	15	1,433,500	11,093
Hake, salted	140,914	1,224			91,474	915		
Halibut, fresh	7,413,265	362,191					556,212	45,127
Halibut, salted	1,609,854	49,726						
Herring, fresh	12,641,438	220,512	9,400	87			2,656,300	21,408
Herring, salted	4,702,199	63,552					255,360	3,360
Hickory shad							1,000	15
King-fish			245	22				
Mackerel, fresh	1,848,839	107,792	65,060	3,941	147,000	6,057	1,326,498	53,056
Mackerel, salted	2,403,181	134,091			6,000	300	374,150	20,474
Menhaden	551,517	4,373	6,350	40			801,500	5,091
Perch	14,500	725	34,273	2,499	8,750	438		
Pollock, fresh	4,382,758	25,289	200	4	1,000	30	1,847,430	10,417
Pollock, salted	373,113	2,906			25,500	255	107,636	1,400
Salmon							60	30
Scup			887,175	11,504	17,000	315	132,150	2,038
Sea bass			86,300	4,366			13,000	590
Shad	8,000	225	445	30	16,188	818	9,700	353
Smelt			2,479	211	4,200	254	400	50
Spanish mackerel			110	20			100	10
Squeteague			1,209,530	36,195	24,000	960	135,580	2,279
Striped bass	149	9	420	48	2,500	113	9,879	769
Sturgeon							8,490	402
Sword-fish, fresh	278,341	15,555	9,318	467	16,760	1,006	85,797	4,390
Sword-fish, salted	27,000	810	270	5				
Tautog	1,500	58	36,118	1,091	170,300	4,895	81,592	1,523
Whiting	8,200	57					29,000	435
Squid, fresh	312,275	9,102	11,000	153			741,150	5,315
Squid, salted	5,000	50						
Lobsters	336,207	33,646	147,634	10,649	95,812	8,909	183,753	15,570
Shrimp							25,200	1,188
Clams, hard			110,400	11,295	151,280	14,791	218,456	21,398
Clams, soft	1,186,240	87,242					11,611	697
Oysters					28,000	2,000	632,030	144,891
Scallops			76,152	9,528	198,440	19,844	266,904	29,820
Winkles							9,500	475
Cod sounds and tongues	34,855	889						
Hake sounds	32,707	1,914						
Haddock spawn	700	18						
Halibut fins	21,900	384						
Oil, fish	305,482	11,979					53,445	1,984
Oil, whale					2,515,836	160,537	412,889	27,476
Whalebone					27,100	65,875		
Total	134,744,667	2,578,806	3,485,085	109,095	4,736,436	308,582	26,761,104	741,826

THE FISHERIES BY APPARATUS.

The quantity of products secured in the vessel fisheries of Massachusetts in 1898 was 173,852,873 pounds, valued at $3,528,985; and by boats in the shore fisheries, 28,404,944 pounds, valued at $934,742. The forms of apparatus of capture, exclusive of those employed in the whale fisheries, in which the greatest amount of capital is invested and with which the largest quantity and value of products were taken were seines, gill nets, pound nets, and trap nets, hand and trawl lines, lobster and eel pots, and the group including dredges, tongs, rakes, etc.

The following table shows in a condensed manner the pounds and value of products obtained with each form or group of apparatus:

Apparatus.	Vessel fisheries.		Shore fisheries.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Seines	20,795,080	$521,644	1,434,307	$27,413	22,229,387	$549,057
Gill nets	2,927,435	87,548	897,030	17,712	3,824,465	105,260
Pound nets and trap nets	124,701	4,105	10,294,637	164,223	10,419,338	168,328
Dip nets			2,947,635	23,747	2,947,635	23,747
Fyke nets			59,984	2,892	59,984	2,892
Drag nets	272,500	4,256	494,350	4,308	766,850	8,564
Minor apparatus	316,667	9,500	168,201	9,210	484,868	18,710
Lines	145,003,619	2,560,871	6,149,280	121,842	151,152,899	2,682,713
Pots	85,441	7,177	1,797,740	149,282	1,883,181	156,459
Harpoons	597,186	35,280			597,186	35,280
Dredges, tongs, etc	111,194	12,916	4,161,780	414,113	4,272,974	427,029
Whaling apparatus	3,619,050	285,688			3,619,050	285,688
Total	173,852,873	3,528,985	28,404,944	934,742	202,257,817	4,463,727

Seines were used chiefly in the capture of herring and mackerel, and to some extent for other species. The entire catch was 22,229,387 pounds, valued at $549,057, of which 20,795,080 pounds, valued at $521,644, represent the catch by vessels, and 1,434,307 pounds, valued at $27,413, the catch by boats in the shore fisheries. The catch of herring by vessels with seines was 9,279,397 pounds fresh, valued at $187,545, and 5,581,559 pounds salted, valued at $72,747; and of mackerel, 1,650,373 pounds fresh, valued at $96,480, and 2,633,381 pounds salted, valued at $147,525. The catch of blue-fish was 137,750 pounds, $6,564; menhaden, 918,900 pounds, $5,962; and pollock, 458,860 pounds, $2,295. The most important species secured with seines in the shore fisheries were alewives, 967,127 pounds fresh, $12,214, and 234,300 pounds salted, $3,072; and blue-fish, 122,752 pounds, $6,138.

Gill nets took 2,927,435 pounds of fish, valued at $87,548, in the vessel fisheries, and 897,030 pounds, valued at $17,712, in the shore fisheries; a total of 3,824,465 pounds, valued at $105,260. The species caught in largest quantities by vessels were blue-fish, 301,950 pounds, $15,058; cod, 673,900 pounds, $12,374; herring, 1,012,175 pounds fresh, $18,691, and 219,600 pounds salted, $3,465; mackerel, 472,260 pounds fresh, $27,036, and 167,300 pounds salted, $9,571. In the shore fisheries the catch consisted principally of blue-fish, 137,190 pounds, $3,691; herring, 635,000 pounds, $7,675, and mackerel, 104,840 pounds, $5,932.

Pound nets and trap nets are set in only four counties, Essex, Suffolk, Barnstable, and Dukes, but the catch consisted of a large variety of species and amounted to 10,419,338 pounds, valued at $168,328. These apparatus are fished chiefly by the use of small boats, but some of the trap nets were operated by vessels and secured 124,701 pounds of fish, valued at $4,105. The more prominent species obtained by boats in this fishery were alewives, 204,139 pounds, $2,110; cod, fresh and salted, 367,662 pounds, $6,945; flounders, 196,213 pounds, $3,029; mackerel, fresh and salted, 1,070,973 pounds, $41,476; herring, 3,758,916 pounds, $31,829; menhaden, 577,480 pounds, $4,552; pollock,

fresh and salted, 697,390 pounds, $4,172; scup, 957,225 pounds, $12,104; squeteague, 1,277,760 pounds, $37,595, and squid, 764,150 pounds, $5,562. The menhaden, squid, and a large part of the herring are utilized for bait by vessels in the cod fisheries.

Hand and trawl lines are by far the most important apparatus used in the fisheries of this State, the yield being larger both in quantity and value than that of all the other means of capture combined. The products of the vessels with lines were 145,003,619 pounds, valued at $2,560,871, and by boats 6,149,280 pounds, valued at $121,842, a total of 151,152,899 pounds, valued at $2,682,713, as compared with 51,104,918 pounds, valued at $1,781,014, with all other kinds of apparatus. The leading species in the vessel fisheries were cod, 37,349,753 pounds fresh, $624,924, and 29,573,631 pounds salted, $684,186; cusk, 5,766,173 pounds fresh, $60,708, and 128,863 pounds salted, $2,206; haddock, 34,405,684 pounds fresh, $403,503, and 128,886 pounds salted, $1,268; hake, 20,738,703 pounds fresh, $158,667, and 232,388 pounds salted, $2,139; halibut, 8,663,428 pounds fresh, $487,713, and 1,859,854 pounds salted, $59,726; mackerel, fresh and salted, 420,807 pounds, $24,925; and pollock, 4,701,338 pounds fresh, $26,842, and 486,617 pounds salted, $4,231. In the shore fisheries the same species predominate, in smaller quantities. The most important were cod, 2,234,358 pounds fresh, $44,501, and 1,090,474 pounds salted, $33,597; cusk, fresh, 59,000 pounds, $600; mackerel, fresh, 120,510 pounds, $5,634; hake, fresh, 351,250 pounds, $2,733; and pollock, 710,800 pounds fresh, $4,967, and 29,032 pounds salted, $538.

Lobster pots were employed in every county having fisheries, while eel pots were less widely distributed. The catch of lobsters by vessels was 70,941 pounds, worth $6,552, and by boats 1,622,800 pounds, worth $141,150. There were also secured in lobster pots at Chatham, in Barnstable County, 9,500 pounds (the weight being exclusive of shells), or 950 bushels of winkles, valued at $475. These are used by the fishermen as bait for cod, and are said to be very good for that purpose. The catch of eels in pots by vessels was 5,000 pounds, valued at $150, and by boats 174,940 pounds, valued at $8,132; the total catch with pots being 1,883,181 pounds, valued at $156,459.

Dredges, tongs, rakes, etc., constituted the means of capture in the molluscan fisheries. About 18,498 bushels of scallops, valued at $12,866, and oysters to the value of $50 were obtained by vessels. In the shore or boat fisheries the products secured were scallops, 127,421 bushels, $82,105; clams, hard, 63,817 bushels, $50,724; clams, soft, 147,095 bushels, $102,594; mussels, 700 bushels, $130; oysters, 101,195 bushels, $156,185, and Irish moss, 700,000 pounds, $22,375, the total quantity in pounds, by vessels and boats, being 4,272,974, valued at $427,029. The mussels and part of the scallops and soft clams were disposed of for bait in the line fisheries.

Large quantities of products were also taken with other forms of

apparatus. Dip nets were used extensively in the alewife and herring fisheries, the yield being 1,127,635 pounds of alewives, fresh, salted, and smoked, valued at $13,872, and 1,820,000 pounds of herring, fresh, valued at $9,875. Fyke nets for eels caught 59,984 pounds of that species, worth $2,892. The catch of minor apparatus of various kinds by vessels was 316,667 pounds of eels and squid, $9,500, and by boats 168,201 pounds of cunners, eels, flounders, and perch, $9,210. Drag nets for flounders were fished only in Barnstable County, the catch by vessels being 272,500 pounds, $4,256, and by boats 494,350 pounds, $4,308. The catch of sword-fish by vessels with harpoons was 597,186 pounds, $35,280. The products secured by guns, harpoons, etc., in the whale fisheries consisted of whale oil, including sperm and black-fish oils, 415,927 gallons, $199,023; sea-elephant oil, 63,000 gallons, $20,790; and whalebone, 27,100 pounds, $65,875, a total of 3,619,050 pounds, worth $285,688. Included in this are the products of vessels from New Bedford, Mass., which sail from San Francisco, Cal.

The following series of tables shows, by counties, species, and apparatus, the quantity and value of the products taken in the vessel and shore fisheries of Massachusetts in 1898:

Table showing, by counties, the yield of the seine fisheries of Massachusetts in 1898.

Species.	Essex.		Suffolk.		Plymouth.		Nantucket.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish							65,000	$3,412
Herring, fresh	8,953,397	$183,539	164,400	$2,676	69,800	$696	.....	.....
Herring, salted	4,482,599	60,087	843,600	9,300	.....	.....	.....	.....
Mackerel, fresh	1,391,978	78,654	63,500	5,080	60,000	4,800	.....	.....
Mackerel, salted	2,220,781	122,672	128,800	9,660	.....	.....	.....	.....
Menhaden	340,900	2,350	.....	.....	.....	.....	.....	.....
Pollock	20,520	103	.....	.....	.....	.....	.....	.....
Oil, fish	450	18	.....	.....	.....	.....	.....	.....
Total	17,410,625	447,423	1,200,300	26,716	129,800	5,496	65,000	3,412
Shore fisheries:								
Alewives, fresh	.....	.....	.....	.....	50,000	600	.....	.....
Alewives, salted	.....	.....	.....	.....	5,600	70	.....	.....
Blue-fish	.....	.....	.....	.....	.....	.....	110,000	5,500
Scup	.....	.....	.....	.....	.....	.....	1,000	30
Squeteague	.....	.....	.....	.....	.....	.....	1,600	48
Total	.....	.....	.....	.....	55,600	670	112,600	5,578
Total vessel and shore	17,410,625	447,423	1,200,300	26,716	185,400	6,166	177,600	8,990

Species.	Barnstable.		Dukes.		Bristol.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	71,750	$3,092	1,000	$60	.....	.....	137,750	$6,564
Cod	21,660	433	.....	.....	.....	.....	21,660	433
Eels	60,000	1,300	.....	.....	.....	.....	60,000	1,300
Flounders	.....	.....	10,000	125	.....	.....	10,000	125
Herring, fresh	91,800	634	.....	.....	.....	.....	9,279,397	187,545
Herring, salted	255,360	3,360	.....	.....	.....	.....	5,581,559	72,747
Mackerel, fresh	134,895	7,946	.....	.....	.....	.....	1,650,373	96,480
Mackerel, salted	283,800	15,193	.....	.....	.....	.....	2,633,381	147,525
Menhaden	578,000	3,612	.....	.....	.....	.....	918,900	5,962
Pollock	438,340	2,192	.....	.....	.....	.....	458,860	2,295
Squeteague	.....	.....	40,000	400	.....	.....	40,000	400
Striped bass	2,750	250	.....	.....	.....	.....	2,750	250
Oil, fish	.....	.....	.....	.....	.....	.....	450	18
Total	1,938,355	38,012	51,000	585	.....	.....	20,795,080	521,644

Table showing, by counties, the yield of the seine fisheries of Massachusetts in 1898—Cont'd.

Species.	Barnstable.		Dukes.		Bristol.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives, fresh	273,000	$3,111	290,383	$4,165	353,744	$4,338	967,127	$12,214
Alewives, salted	48,700	877	10,000	150	170,000	1,975	234,300	3,072
Blue-fish	12,752	638					122,752	6,138
Cod					2,500	63	2,500	63
Perch			34,273	2,499	8,750	438	43,023	2,937
Scup							1,000	30
Shad					16,188	818	16,188	818
Smelt			2,479	211	4,200	254	6,679	465
Squeteague	6,300	126					7,900	174
Striped bass	3,000	240					3,000	240
Tautog	3,000	45	1,638	34			4,638	79
Shrimp	25,200	1,188					25,200	1,183
Total	371,952	6,220	338,773	7,059	555,382	7,886	1,434,307	27,413
Total vessel and shore	2,310,307	44,232	389,773	7,644	555,382	7,886	22,229,387	549,057

Table showing, by counties, the yield of the gill-net fisheries of Massachusetts in 1898.

Species.	Essex.		Suffolk.		Norfolk.		Plymouth.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Cod	631,300	$11,667	17,500	$305				
Haddock			9,400	141				
Herring, fresh	924,575	17,781					81,000	$810
Herring, salted	219,600	3,465						
Mackerel, fresh	101,080	11,246					14,400	576
Mackerel, salted	97,000	5,391						
Total	1,973,555	49,450	26,900	446			95,400	1,386
Shore fisheries:								
Herring	175,000	1,575	300,000	4,000	100,000	$1,500	20,000	200
Mackerel	34,850	2,550					5,200	260
Total	209,850	4,125	300,000	4,000	100,000	1,500	25,200	460
Total vessel and shore	2,183,405	53,575	326,900	4,446	100,000	1,500	120,600	1,846

Species.	Barnstable.		Nantucket.		Dukes.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	263,350	$13,056	38,600	$2,002			301,950	$15,058
Bonito			18,000	520			18,000	520
Cod	25,100	502					673,900	12,374
Haddock	35,200	355					44,600	496
Herring, fresh	6,600	100					1,012,175	18,691
Herring, salted							219,600	3,465
Mackerel, fresh	345,280	14,824	11,500	390			472,260	27,036
Mackerel, salted	70,300	4,180					167,300	9,571
Squeteague	4,800	122			12,000	$120	16,800	242
Striped bass	850	95					850	95
Total	751,480	33,234	68,100	2,912	12,000	120	2,927,435	87,548
Shore fisheries:								
Blue-fish	47,240	2,489	89,950	1,202			137,190	3,691
Bonito			2,600	78			2,600	78
Herring	40,000	400					635,000	7,675
Mackerel	63,915	2,982	875	140			104,840	5,932
Pompano			150	15			150	15
Squeteague	4,050	105	1,200	36			5,250	141
Tautog	12,000	180					12,000	180
Total	167,205	6,156	94,775	1,471			897,030	17,712
Total vessel and shore	918,685	39,390	162,875	4,383	12,000	120	3,824,465	105,260

Table showing, by counties, the yield of the pound-net and trap-net fisheries of Massachusetts in 1898.

Species.	Essex.		Suffolk.		Barnstable.		Dukes.		Total.	
	Lbs.	Value.	Lbs.	Val.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Alewives	2,000	$20							2,000	$20
Butter-fish	100	5							100	5
Cod	1,040	16							1,040	16
Cunners	100	5							100	5
Flounders	300	9							300	9
Herring	56,850	720							56,850	720
Mackerel	62,920	3,285							62,920	3,285
Menhaden	987	30							987	30
Other fish	129	7							129	7
Squid	275	8							275	8
Total	124,701	4,105							124,701	4,105
Shore fisheries:										
Albacore					36,090	$912			36,090	912
Alewives	104,600	993			77,161	784	22,378	$333	204,139	2,110
Blue-fish					82,920	4,286	3,160	149	86,080	4,435
Bonito					18,725	438	49,811	1,374	68,536	1,812
Butter-fish	2,200	78	2,000	$100	21,720	551	4,600	84	30,520	813
Cod, fresh	18,550	338	13,200	264	317,050	5,802	140	6	348,940	6,410
Cod, salted					18,722	535			18,722	535
Cunners	4,000	117							4,000	117
Eels					37,034	1,167	2,020	119	39,054	1,286
Flounders	10,650	113	1,500	15	120,914	1,878	63,149	1,023	196,213	3,029
Hake	9,425	94							9,425	94
Herring	711,616	7,022	520,000	4,446	2,517,900	20,274	9,400	87	3,758,916	31,829
Hickory shad					1,000	15			1,000	15
King-fish							245	22	245	22
Mackerel, fresh	196,955	9,569	80,000	4,000	776,348	26,770	11,220	762	1,064,523	41,101
Mackerel, salted					6,450	375			6,450	375
Menhaden	209,630	1,993	138,000	1,040	223,500	1,479	6,350	40	577,480	4,552
Pollock, fresh	10,200	130			685,190	4,022			695,390	4,152
Pollock, salted					2,000	20			2,000	20
Salmon					60	30			60	30
Scup					108,350	1,324	848,875	10,780	957,225	12,104
Sea bass							44,750	2,941	44,750	2,941
Shad	3,000	225			9,700	353	445	80	13,145	608
Smelt					400	50			400	50
Spanish mackerel					100	10	110	20	210	30
Squeteague					120,430	1,926	1,157,330	35,669	1,277,760	37,595
Striped bass	100	5			1,279	84	420	48	1,799	137
Sturgeon					8,490	402			8,490	402
Tautog	1,500	58			38,250	538	1,975	57	41,725	653
Whiting	8,200	57			29,000	435			37,200	492
Squid	12,000	94			741,150	5,315	11,000	153	764,150	5,562
Total	1,302,626	20,886	754,700	9,865	5,999,933	79,775	2,237,378	53,697	10,294,637	164,223
Total vessel and shore	1,427,327	24,991	754,700	9,865	5,999,933	79,775	2,237,378	53,697	10,419,338	168,328

Table showing, by counties, the catch by dip nets and fyke nets in Massachusetts in 1898.

Species.	Essex.		Plymouth.		Barnstable.		Dukes.		Total.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:										
Dip nets—										
Alewives, fresh			72,495	$757	551,500	$5,975	79,800	$1,192	703,795	$7,924
Alewives, salted			127,400	1,468	225,000	2,250			352,400	3,718
Alewives, smoked					41,440	1,480	30,000	750	71,440	2,230
Herring	1,820,000	$9,875							1,820,000	9,875
Total	1,820,000	9,875	199,895	2,225	817,940	9,705	109,800	1,942	2,947,635	23,747
Fyke nets—										
Eels					59,984	2,892			59,984	2,892
Grand total	1,820,000	9,875	199,895	2,225	877,924	12,597	109,800	1,942	3,007,619	26,639

Table showing, by counties, the catch by minor apparatus in Massachusetts in 1898.

Species.	Suffolk.		Plymouth.		Barnstable.		Dukes.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Cunners	72,000	$4,800	5,000	$200				
Eels					33,867	$1,745	12,000	$360

Species.	Essex.		Nantucket.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Eels	1,000	$50	10,667	$400	11,667	$450
Squid, fresh	300,000	9,000			300,000	9,000
Squid, salted	5,000	50			5,000	50
Total	306,000	9,100	10,667	400	316,667	9,500
Shore fisheries:						
Cunners					77,000	5,000
Eels			29,334	1,320	75,201	3,425
Flounders	1,500	60			1,500	60
Perch	14,500	725			14,500	725
Total	16,000	785	29,334	1,320	168,201	9,210
Total vessel and shore	322,000	9,885	40,001	1,720	484,868	18,710

Table showing the yield of the hand and trawl line fisheries of Massachusetts in 1898.

Species.	Essex.		Suffolk.		Plymouth.		Nantucket.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Val.	Lbs.	Value.
Vessel fisheries:								
Blue-fish							14,200	$514
Cat-fish	2,000	$40						
Cod, fresh	26,522,752	414,371	6,357,200	$110,836	343,950	$6,403	118,100	2,312
Cod, salted	27,274,654	619,035	48,000	1,555			10,740	315
Cusk, fresh	4,889,673	50,512	559,300	7,004	7,800	98		
Cusk, salted	122,863	2,056	6,000	150				
Flounders	925	6						
Haddock, fresh	18,823,974	201,106	11,895,400	148,387	338,250	4,852	30,000	900
Haddock, salted	75,386	722					500	6
Hake, fresh	15,347,376	107,672	3,954,827	39,502	85,500	885		
Hake, salted	140,914	1,224						
Halibut, fresh	7,413,250	362,190	694,966	80,396				
Halibut, salted	1,609,854	49,726	250,000	10,000				
Mackerel, fresh	54,806	1,988			550	44	800	56
Mackerel, salted	85,400	6,028						
Pollock, fresh	3,751,238	20,639	297,700	2,301	27,300	165		
Pollock, salted	373,113	2,906					400	8
Scup							300	6
Cod sounds and tongues	34,855	889						
Hake sounds	32,707	1,914						
Haddock spawn	700	18						
Halibut fins	21,900	384						
Oil, fish	805,032	11,961						
Total	106,883,372	1,855,387	24,063,393	400,131	803,350	12,447	175,040	4,117
Shore fisheries:								
Cod, fresh	1,344,100	22,882			75,000	1,650	5,000	100
Cod, salted					28,000	1,240	754,750	20,348
Cunners	4,250	128						
Cusk	59,000	600						
Flounders	8,500	70					12,000	360
Haddock, fresh	528,000	6,787			17,000	290	50,000	1,250
Hake	268,250	2,233						
Mackerel	6,250	500			8,000	200		
Pollock, fresh	600,800	4,417			10,000	50		
Pollock, salted							11,000	220
Scup							6,000	360
Total	2,814,150	37,617			138,000	3,430	838,750	22,638
Vessel and shore	109,697,522	1,893,004	24,063,393	400,131	941,350	15,877	1,013,790	26,755

Table showing yield of hand and trawl line fisheries of Massachusetts in 1898—Continued.

Species.	Barnstable.		Dukes.		Bristol.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Blue-fish	1,200	$60	500	$30	.....	.....	15,900	$604
Cat-fish	3,200	70	.....	.....	.....	.....	5,200	110
Cod, fresh	3,904,420	87,922	28,000	670	75,331	$2,410	37,349,753	624,924
Cod, salted	1,746,916	53,245	7,000	310	486,321	9,726	29,573,631	684,186
Cusk, fresh	309,400	3,094	.....	.....	.....	.....	5,766,173	60,708
Cusk, salted	.....	.....	.....	.....	.....	.....	128,863	2,206
Flounders	4,800	80	.....	.....	700	14	6,425	100
Haddock, fresh	3,314,560	48,133	1,000	50	2,500	75	34,405,684	403,503
Haddock, salted	2,000	30	.....	.....	51,000	510	128,886	1,268
Hake, fresh	1,350,500	10,593	.....	.....	500	15	20,738,703	158,667
Hake, salted	.....	.....	.....	.....	91,474	915	232,388	2,139
Halibut, fresh	555,212	45,127	.....	.....	.....	.....	8,663,428	487,713
Halibut, salted	.....	.....	.....	.....	.....	.....	1,859,854	59,726
Mackerel, fresh	159,011	10,947	28,640	1,779	72,000	3,057	315,807	17,871
Mackerel, salted	13,600	726	.....	.....	6,000	300	105,000	7,054
Pollock, fresh	623,900	3,703	200	4	1,000	30	4,701,338	26,842
Pollock, salted	87,604	1,062	.....	.....	25,500	255	486,617	4,231
Scup	7,100	174	9,300	109	5,000	75	21,700	364
Sea bass	6,500	250	18,200	496	.....	.....	24,700	746
Tautog	6,930	154	.....	.....	22,500	725	29,430	879
Cod sounds and tongues	.....	.....	.....	.....	.....	.....	34,855	889
Hake sounds	.....	.....	.....	.....	.....	.....	32,707	1,914
Haddock spawn	.....	.....	.....	.....	.....	.....	700	18
Halibut fins	.....	.....	.....	.....	.....	.....	21,900	384
Oil, fish	48,945	1,864	.....	.....	.....	.....	353,977	13,825
Total	12,145,798	267,234	92,840	3,448	839,826	18,107	145,003,619	2,560,871
Shore fisheries:								
Blue-fish	11,212	598	20,000	1,000	.....	.....	31,212	1,598
Cod, fresh	757,858	18,821	25,000	500	27,400	548	2,234,358	44,501
Cod, salted	281,724	10,719	21,000	1,090	5,000	200	1,090,474	33,597
Cunners	.....	.....	.....	.....	.....	.....	4,250	128
Cusk	.....	.....	.....	.....	.....	.....	59,000	600
Flounders	111,288	1,547	57,500	863	3,300	66	187,588	2,906
Haddock, fresh	406,000	6,200	.....	.....	.....	.....	1,001,000	14,527
Haddock, salted	1,344	24	.....	.....	.....	.....	1,344	24
Hake	83,000	500	.....	.....	.....	.....	351,250	2,733
Mackerel	6,060	534	25,200	1,400	75,000	3,000	120,510	5,634
Pollock, fresh	100,000	500	.....	.....	.....	.....	710,800	4,967
Pollock, salted	18,032	318	.....	.....	.....	.....	29,032	538
Scup	16,700	540	29,000	615	12,000	240	63,700	1,755
Sea bass	6,500	330	23,350	929	.....	.....	29,850	1,259
Squeteague	.....	.....	200	6	24,000	960	24,200	966
Striped bass	2,000	100	.....	.....	2,500	113	4,500	213
Tautog	21,412	606	32,500	1,000	147,800	4,170	201,712	5,776
Oil, fish	4,500	120	.....	.....	.....	.....	4,500	120
Total	1,827,630	41,457	233,750	7,403	297,000	9,297	6,149,280	121,842
Total vessel and shore	13,973,428	308,691	326,590	10,851	1,136,826	27,404	151,152,899	2,682,713

Table showing the catch of flounders by drag nets in Barnstable County in 1898.

Fisheries.	Lbs.	Value.
Vessel	272,500	$4,256
Shore	494,350	4,308
Total	766,850	8,564

Table showing, by counties, the catch by lobster and eel pots in Massachusetts in 1898.

Species.	Essex.		Suffolk.		Norfolk.		Plymouth.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Lobsters	10,200	$1,224						
Shore fisheries:								
Eels	56,000	2,800						
Lobsters	326,007	32,422	346,625	$30,355	48,000	$4,800	498,610	$39,991
Total	382,007	35,222	346,625	30,355	48,000	4,800	498,610	39,991
Total vessel and shore	392,207	36,446	346,625	30,355	48,000	4,800	498,610	39,991

Species.	Barnstable.		Nantucket.		Dukes.		Bristol.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Eels					5,000	$150			5,000	$150
Lobsters	41,100	$3,730	7,500	$750	4,000	360	8,141	$488	70,941	6,552
Winkles	9,500	475							9,500	475
Total	50,600	4,205	7,500	750	9,000	510	8,141	488	85,441	7,177
Shore fisheries:										
Eels	59,170	2,615			48,770	2,387	11,000	330	174,940	8,132
Lobsters	142,653	11,840	29,600	3,032	143,634	10,289	87,671	8,421	1,622,800	141,150
Total	201,823	14,455	29,600	3,032	192,404	12,676	98,671	8,751	1,797,740	149,282
Total vessel and shore	252,423	18,660	37,100	3,782	201,404	13,186	106,812	9,239	1,883,181	156,495

Table showing, by counties, the catch by dredges, tongs, rakes, and forks in Massachusetts in 1898.

Species.	Essex.		Suffolk.		Norfolk.		Plymouth.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Clams, hard							24,000	$2,600
Clams, soft	1,186,240	$87,242	210,600	$10,530			62,500	4,125
Mussels							7,400	130
Oysters							48,545	9,844
Scallops							195,200	22,120
Irish moss					150,000	$4,500	550,000	17,875
Total	1,186,240	87,242	210,600	10,530	150,000	4,500	887,645	56,694

Species.	Barnstable.		Nantucket.		Dukes.		Bristol.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Oysters	210	$50							210	$50
Scallops	50,912	6,123	36,480	$4,071	12,152	$1,528	11,440	$1,144	110,984	12,866
Total	51,122	6,173	36,480	4,071	12,152	1,528	11,440	1,144	111,194	12,916
Shore fisheries:										
Clams, hard	218,456	21,398	6,400	640	110,400	11,295	161,280	14,791	510,536	50,724
Clams, soft	11,611	697							1,470,951	102,594
Mussels									7,400	130
Oysters	631,820	144,341					28,000	2,000	708,365	156,185
Scallops	215,992	23,697	102,336	9,588	64,000	8,000	187,000	18,700	764,528	82,105
Irish moss									700,000	22,375
Total	1,077,879	190,133	108,736	10,228	174,400	19,295	366,280	35,491	4,161,780	414,113
Total vessel and shore	1,129,001	196,306	145,216	14,299	186,552	20,823	377,720	36,635	4,272,974	427,029

Table showing, by counties, the products of the whale fisheries of Massachusetts in 1898.

Species.	Suffolk.		Barnstable.		Bristol.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Oil, whale	190,725	$11,010	412,889	$27,476	2,515,836	$160,537	3,119,450	$199,023
Oil, sea-elephant	472,500	20,790	.....	.....	.....	.....	472,500	20,790
Whalebone	.....	.....	.....	.....	27,100	65,875	27,100	65,875
Total	663,225	31,800	412,889	27,476	2,542,936	226,412	3,619,050	285,688

Table showing, by counties, the catch of sword-fish by harpoons in the vessel fisheries of Massachusetts in 1898.

Counties.	Fresh.		Salted.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Essex	278,341	$15,555	27,000	$810	305,341	$16,365
Suffolk	142,400	11,192	.....	.....	142,400	11,192
Plymouth	35,500	1,715	.....	.....	35,500	1,715
Barnstable	85,797	4,390	.....	.....	85,797	4,390
Nantucket	1,800	140	.....	.....	1,800	140
Dukes	9,318	467	270	5	9,588	472
Bristol	16,760	1,006	.....	.....	16,760	1,006
Total	569,916	34,465	27,270	815	597,186	35,280

WHOLESALE FISHERY TRADE OF BOSTON AND GLOUCESTER.

The wholesale trade in fishery products in Massachusetts centers chiefly at Boston and Gloucester. These two cities are also the principal receiving and distributing points for fishery products in the New England States.

Boston is especially important as a fresh-fish market, but large quantities of salted, smoked, and canned fish, oysters, lobsters, and other products are also handled. The supply is derived from a variety of sources. The ocean species, disposed of in a fresh and salted condition, and as otherwise prepared, are caught and landed chiefly by the fleet of vessels owned at Boston, and by vessels from Gloucester and Provincetown, Mass., and from Portland, Me., and other localities on the New England coast. Large quantities of fish are received from other sections of the Atlantic coast, and from the Great Lakes, the Gulf of Mexico, and the Pacific coast. There is also a considerable quantity of fishery products of various kinds imported from the British provinces and from a number of European countries.

The number of firms in the various branches of the wholesale fishery trade of Boston in 1898 was 93; the number of persons engaged as proprietors, managers, and employees, 1,086; the amount of wages paid, $601,593; and the investment in shore property and cash capital, $4,029,060. The products sold consisted of fresh fish, 111,212,669 pounds, $4,118,922; salted fish, including boneless, 25,926,505 pounds, $1,150,185; smoked fish, 3,659,750 pounds, $235,614; lobsters, fresh, cooked, and pickled, 9,096,572 pounds, $1,239,210; canned fish, 105,669 cases, $442,205; and a large quantity of other products, including oys-

ters, clams, quahogs, scallops, fish oil, glue, etc., valued at $1,764,518; the total value of the trade being $8,951,653.

In comparing the statistics of this trade for 1889 and 1898, so far as such a comparison is practicable, it should be remembered that the business done by firms handling fish on commission was included in the former year, but not in the latter. The data for 1898 show a considerable increase in the quantity and value of fresh fish, but a decrease in some of the other products; the total value of the trade being $2,148,606 less than in 1889.

Gloucester is one of the most important fish-producing centers in the United States, but its wholesale fishery trade is much less extensive than that of Boston. It consists principally in the preparation and distribution of salted and smoked fish and a large variety of secondary products, such as fish oil, glue, isinglass, and fertilizer. In December, 1897, the fresh-fish business, which has now become an important feature of the fishery trade at Gloucester, was established and carried on by a company known as "The Gloucester Fresh Fish Company." Prior to that time halibut was almost the only food species handled extensively in a fresh condition. The greater part of the fish utilized in all branches of the fishery trade at Gloucester is caught and landed by vessels owned there. A limited quantity is also obtained from other sources.

The number of firms in the wholesale trade in 1898 was 59. There were 4 firms in the fresh-fish business, 39 in the salted, smoked, and boneless fish trades, 10 in the manufacturing of fish oil, glue, isinglass, and fertilizer, and 6 in box-making and other related industries. The number of persons engaged in the trade, as proprietors and employees, was 1,425; the amount of wages paid, $574,342; and the investment in shore property and cash capital, $3,055,776. The products embraced fresh fish, 28,229,677 pounds, $793,505; salted fish 26,131,752 pounds, $1,011,177; boneless fish prepared from the salted fish and stated separately on account of the importance of the quantity and value, 24,680,404 pounds, $1,356,796; smoked fish, 4,796,794 pounds, $220,047; and other products, including canned fish, fish oil, glue, isinglass, fertilizer, etc., 19,176,774 pounds, $705,456; the total quantity of products handled in all branches of the trade being 103,015,401 pounds, having a value of $4,086,981.

There was a decrease in the total products of the trade in 1898, as compared with 1889, of 15,160,990 pounds in quantity and $1,534,175 in value. The fresh, smoked, and canned fish, glue, isinglass, and fertilizer products have increased, but the quantity of salted and boneless fish decreased 42,021,835 pounds and the value $1,825,311. There was also a slight decrease in the quantity and value of fish oil.

The extent of the wholesale fishery trade of Boston and Gloucester is presented in the following tables for the year 1898.

Extent of the wholesale fishery trade of Boston in 1898.

Branches of trade.	No. of firms.	Persons engaged.				Wages paid.	Shore property.	Cash capital.
		Proprietors, etc.	Clerks.	Other employees.	Total.			
Fresh fish	41	71	62	203	336	$232,270	$930,000	$928,000
Salted, canned, and smoked fish	17	19	67	299	385	159,220	547,360	322,600
Oyster	18	24	21	106	151	75,660	325,300	252,650
Lobster	11	15	12	42	69	45,606	170,450	93,000
Fish oil and glue	6	9	29	107	145	88,837	254,200	205,500
Total	93	138	191	757	1,086	601,593	2,227,310	1,801,750

Products sold.	Quantity.	Value.	Products sold.	Quantity.	Value.
Fresh fish ....pounds..	111,212,669	$4,118,922	Oysters....bush..	160,858	$264,698
Salted fish ....do...	25,199,005	1,077,585	Oysters....galls..	627,627	660,759
Smoked fish....do...	3,659,750	235,614	Clams....bush..	73,047	81,548
Boneless fish....do...	727,500	72,600	Clams....galls..	99,506	50,053
Lobsters, fresh ....do...	5,425,205	688,505	Quahogs ....bush..	8,567	12,294
Lobsters, cooked ....do...	3,634,701	545,205	Fish oils and glue..galls..	1,546,562	547,980
Lobsters, pickled....do...	36,666	5,500	Other products		97,064
Canned fish ....cases..	105,669	442,205			
Scallops ....galls..	51,443	51,121	Total		8,951,653

Extent of the wholesale fishery trade and related industries of Gloucester in 1898.

Branches of trade.	Number of firms.	Persons engaged.				Wages paid.	Shore property.	Cash capital.
		Proprietors.	Clerks.	All others.	Total.			
Fresh fish	4	7	20	87	114	$49,241	$147,674	$112,000
Salted, smoked, and boneless	39	66	90	801	957	400,766	1,019,502	804,500
Oil, glue, and isinglass *a*	10	20	17	234	271	80,035	283,900	363,500
Related industries	6	10	6	67	83	44,300	258,700	66,000
Total	59	103	133	1,189	1,425	574,342	1,709,776	1,346,000

Products sold.	Lbs.	Value.	Products sold.	Lbs.	Value.
Fresh:			Salted:		
Blue-fish	20,153	$1,008	Cod	10,068,936	356,146
Cat-fish	62,151	1,392	Cusk	616,503	20,893
Cod	4,928,327	147,850	Eels	10,000	550
Cusk	349,771	5,306	Haddock	946,514	29,025
Flounders	31,828	339	Hake	3,170,961	64,062
Haddock	6,328,684	80,805	Herring	4,382,535	93,008
Hake	2,854,450	43,939	Mackerel	5,251,190	396,994
Halibut	4,309,345	271,253	Pollock	1,353,312	32,535
Herring	6,123,571	147,774	Salmon	210,200	11,831
Mackerel	667,218	48,943	Sword-fish	31,588	1,679
Pollock	2,340,890	31,551	Trout	54,200	2,802
Rose fish or Norway haddock	40,100	602	Halibut fins	30,818	1,527
Shad	3,120	250	Squid	5,000	125
Sword-fish	160,152	11,452	Total	26,131,752	1,011,177
Lobsters	9,917	1,041			
Total	28,229,677	793,505			
Boneless:					
Cod	17,185,142	1,070,174	Other products:		
Cusk	1,070,626	65,478	Canned fish	132,104	9,438
Hake	3,600,680	120,716	Herring spiced	5,000	425
Haddock	1,952,349	74,105	Tongues and sounds	209,946	9,179
Pollock	871,607	26,323	Cod cheeks	21,557	773
Total	24,680,404	1,356,796	Isinglass	271,824	135,912
			Fish fertilizer	10,862,000	103,513
Smoked:			Fish glue, dry	1,926	914
Finnan haddie	207,164	10,766	Fish glue, liquid	*b* 2,294,865	232,121
Halibut	1,869,270	134,352	Fish oil	*c* 5,377,552	218,181
Herring	2,720,360	74,929	Total	19,176,774	705,456
Total	4,796,794	220,047	Grand total	103,015,401	4,086,981

a Included in these figures are two firms at Rockport, Mass. *b* Gallons, 235,371. *c* Gallons, 717,007.

FISHERIES OF RHODE ISLAND.

The fisheries of Rhode Island in 1898 gave employment to 1,687 persons, of whom 444 were on vessels, 896 in the boat or shore fisheries, and 347 were shoresmen. The investment in vessels, boats, fishing apparatus, shore property, and cash capital amounted to $957,142. The products aggregated 32,854,396 pounds, valued at $955,058.

The number of fishing and transporting vessels employed was 93, having a net tonnage of 1,454 tons and a value of $167,850. The value of their outfits was $46,597. There were 854 boats in the shore fisheries, valued at $72,381. The apparatus of capture in the vessel fisheries was valued at $50,763, and in the shore fisheries at $99,902. The value of shore and accessory property was $439,149 and the cash capital amounted to $80,500.

The products consisted of 20,728,529 pounds of fish, including food species, refuse fish, and menhaden, valued at $333,789; 457,378 bushels of oysters, valued at $505,378; 46,227 bushels of clams and quahogs, valued at $52,385; 19,231 bushels of scallops, valued at $10,471; 578,066 pounds of lobsters, valued at $43,290, and a variety of other species and secondary products having a value of $9,745.

Since 1889, the year covered by the last general canvass, there has been a slight decrease in the number of persons employed and of $63,036 in the investment. The products have also decreased 94,511,079 pounds in quantity, but have increased $19,914 in value. There has been a large increase in both the quantity and value of food species, while the menhaden catch has decreased from 112,580,000 pounds, valued at $281,450, to 3,140,000 pounds, valued at $7,591.

There has been a tendency toward decline in the menhaden fishery for a number of years. In 1892, for which a special canvass of some of the important species was made, the catch of menhaden had decreased to 34,045,230 pounds, valued at $115,992. The great falling off in the catch in 1898 is due principally to the fact that in the early part of that year the menhaden industry was consolidated under the control of a company having headquarters in New York City, and most of the vessels which had formerly been engaged in the menhaden fisheries of Rhode Island were transferred to New York and have therefore been credited with their crews and catch to that State. This also accounts for the decrease in the number of persons employed and the amount of capital invested. The fish utilized by the menhaden factories in Rhode Island were practically all supplied by vessels owned by the company above referred to.

The scallop and clam fisheries have both declined as compared with the statistics for the year 1892, the catch of the former in 1898 being 19,231 bushels, valued at $10,471, and of the latter 15,015 bushels, valued at $20,569, while in 1892 the yield of scallops was 52,690 bushels and of clams 33,950 bushels. Quahogs were more abundant during 1898

than either scallops or clams, the yield amounting to 31,212 bushels, valued at $31,816, against 19,950 bushels in 1892. The supply of clams in 1898 was not equal to the local demand, a large proportion of the yield being used for clambakes.

The lobster fishery, as compared with 1892, shows a decrease in products, but an increase in the quantity of apparatus employed. The catch of lobsters in 1892 was 774,100 pounds, valued at $53,762, and in 1898 it was 578,066 pounds, valued at $43,290. The number of pots used in the former year was 6,341 and in the latter 10,312. The season for catching lobsters is principally from May to August, inclusive, but more or less fishing is carried on throughout the year. While the law prohibits the capture of lobsters under 9 inches in length, little attention is paid to this provision. The cost of bait used in lobster pots is not very great, as the lobstermen utilize all kinds of fish refuse, which is often obtained from the trap-net fishermen and the local fish markets without cost.

Scup is the most important species, next to oysters, obtained in the fisheries of the State. The catch of scup in 1898 was 6,390,225 pounds, valued at $75,596, all of which, except 2,300 pounds, worth $68, taken with hand lines, was secured with trap nets and pound nets. It is said that this fish has been phenomenally abundant every season since 1894. Some years ago about 7,000 barrels of scup were held in a large pound for several months pending a rise in prices. They were fed chiefly on ground menhaden and mussels. It was found that they greatly preferred the menhaden to anything else, the quantity fed to them a day being 100 barrels. When sold they were in good condition, and the experiment proved a success, although a good many of the fish escaped through a break in the pound. They will live, it is said, an entire summer in a pound without being fed, but will become poorer than when first impounded.

Squeteague or weak-fish are also very plentiful, and appear to be getting more so each year. The catch in 1898 amounted to 3,125,635 pounds, valued at $63,976. At Wickford the sounds, or swim-bladders, are taken from the squeteague, and after being dried are sold as a secondary product. It requires about 35 of these, when prepared for market, to make a pound, the average selling price of which was 30 cents, the total quantity sold being 2,100 pounds, valued at $630.

Alewives are taken in Point Judith Pond and other waters of the State, but the catch was not so large as in former years. In 1889 the product of fresh, salted, and smoked alewives aggregated 1,046,250 pounds, valued at $18,138; in 1892 it was 1,189,593 pounds, valued at $18,216, and in 1898, 838,622 pounds, valued at $10,273. The trade in salted alewives was very much injured in 1898 by the Spanish-American war, the West Indies being the principal market for this product. Shipments were made by only two persons, and amounted to 368 barrels. In 1899 3,000 barrels were shipped and prices were considerably better.

The fishery for hard and soft shell crabs is carried on by several persons to a limited extent in Narrow River, between Wickford and Narragansett Pier, the season being from about the middle of June to the last of August. Soft crabs were the more valuable, the price received in 1898 being $1 a dozen, while the hard crabs brought only about 25 cents a dozen. The catch of hard and soft crabs was 12,895 pounds, valued at $2,250.

The sword-fish fishery, which centers at Block Island, appears to have declined during recent years, owing, it is said, to the scarcity of fish. In former years 15 fish have been caught in a day by one vessel, but a vessel is now considered lucky if she brings in 3 or 4, the chances being that the result of her day's cruise will be only 1 or 2 fish, and possibly none. In 1898 the total catch amounted to 55,875 pounds, valued at $2,935. Their average weight, dressed, is about 200 pounds. It is said that the largest specimen ever taken by the fishermen of Block Island weighed 618 pounds and was captured about five years ago. The fishery is carried on chiefly by 5 schooners, ranging from 13 to 25 tons net register. The season is from the middle of June to about the 10th of August. In suitable weather the vessels leave the harbor in the morning about 4 o'clock, returning in the afternoon about 5 or 6 o'clock. Before being shipped (and generally before the vessel returns to port) the fish are dressed by removing the head, viscera, and fins, including the caudal, the ventral cavity being washed out with sea water and the carcass wrapped in bagging. Boston and Providence are the principal markets for this product.

The oyster industry is the most important branch of fisheries in the State, its products at the present time having a greater value than all the other fishery products combined. There has been a substantial increase in this industry during the past few years, the yield in 1898 being larger than in any previous year, except 1879, for which data are available. The quantity of market and seed oysters taken from the private and public grounds in 1889 was 203,450 bushels, valued at $271,939; in 1892 it was 174,446 bushels, valued at $259,242, and in 1898, 457,378 bushels, valued at $505,378.

The three tables which follow show the number of persons engaged, the number and value of vessels and boats, the quantity and value of fishing apparatus, the value of shore and accessory property and the amount of cash capital employed, and the quantity and value of the products of the fisheries of Rhode Island in 1898:

Persons employed.

How engaged.	No.
On vessels fishing	365
On vessels transporting	79
Boat or shore fishermen	896
Shoresmen	847
Total	1,687

Table of apparatus and capital.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	69	$121,600	Apparatus—shore fisheries:		
Tonnage	894		Pound nets and trap nets	175	$68,495
Outfit		43,441	Seines	42	3,243
Vessels transporting	24	46,250	Gill nets	134	7,085
Tonnage	560		Fyke nets	329	2,462
Outfit		3,156	Lines, hand and trawl		875
Boats	854	72,381	Pots, lobster	8,692	10,677
Apparatus—vessel fisheries:			Pots, eel	2,942	1,888
Pound nets and trap nets	27	41,900	Spears, eel	29	46
Purse seines	7	4,000	Minor apparatus		43
Snap nets	4	20	Dredges, tongs, diggers, hoes, etc		5,088
Lines, hand and trawl		1,135	Shore and accessory property		439,149
Pots, lobster	1,620	2,039	Cash capital		80,500
Pots, eel	197	99			
Harpoons		109	Total		957,142
Dredges, tongs, diggers, hoes, etc		1,461			

Table of products.

Species.	Vessel fisheries.		Shore fisheries.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	8,500	$68	619,632	$6,553	628,132	$6,621
Alewives, salted			74,100	940	74,100	940
Alewives, smoked			136,390	2,712	136,390	2,712
Blue-fish	65,800	3,280	264,490	12,241	330,290	15,521
Bonito	1,250	25	123,200	2,590	124,450	2,615
Bullheads			300	24	300	24
Butter-fish	89,200	2,405	117,800	3,210	207,000	5,615
Cod, fresh	705,486	15,447	406,325	8,109	1,111,811	23,556
Cod, salted	181,376	7,544	133,725	5,610	315,101	13,154
Cunners	3,300	100			3,300	100
Eels	23,200	1,318	420,174	18,712	443,374	20,030
Flounders and flat-fish	736,950	10,503	973,107	17,073	1,710,057	27,576
Haddock	316,800	7,319	49,725	1,054	366,525	8,373
Herring			2,000	10	2,000	10
Hickory shad			13,000	328	13,000	328
King-fish	120	18	1,850	110	1,970	128
Mackerel	184,900	8,359	175,000	6,645	359,900	15,004
Menhaden	3,100,000	7,350	40,000	241	3,140,000	7,591
Minnows			3,728	356	3,728	356
Perch			48,475	1,920	48,475	1,920
Pickerel			200	20	200	20
Pollock			50,000	500	50,000	500
Scup	3,859,500	39,635	2,530,725	35,961	6,390,225	75,596
Sea bass	236,450	6,489	204,500	5,446	440,950	11,935
Shad	124	8	24,988	1,617	25,112	1,625
Smelt			4,100	215	4,100	215
Spanish mackerel			700	104	700	104
Squeteague	579,000	11,290	2,546,635	52,686	3,125,635	63,976
Squid			124,000	1,375	124,000	1,375
Striped bass	6,900	533	95,050	9,978	101,950	10,511
Sword-fish	55,875	2,935			55,875	2,935
Tautog	37,700	1,110	210,429	6,104	248,129	7,214
Tomcod			8,000	240	8,000	240
Miscellaneous fish	70,450	1,379	175,300	4,143	245,750	5,522
Refuse fish	156,000	195	856,000	1,027	1,012,000	1,222
Shrimp			2,250	750	2,250	750
Lobsters	92,333	6,683	485,733	36,607	578,066	43,290
Crabs, hard			7,875	575	7,875	575
Crabs, soft			5,020	1,675	5,020	1,675
Crabs, fiddler			128	78	128	78
Clams	9,060	1,256	141,090	19,313	[a] 150,150	20,569
Quahogs	16,040	1,905	233,656	29,911	[b] 249,696	31,816
Mussels	300	24	15,250	670	[c] 15,550	694
Scallops	11,520	1,349	103,866	9,122	[d] 115,386	10,471
Oysters, market	2,467,500	394,700	624,596	105,448	[e] 3,092,096	500,148
Oysters, seed			109,550	5,230	[f] 109,550	5,230
Oyster shells	5,370,000	2,810	2,304,000	1,158	[g] 7,674,000	3,968
Squeteague sounds			2,100	630	2,100	630
Total	18,385,634	536,037	14,468,762	419,021	32,854,396	955,058

[a] 15,015 bushels. [c] 1,555 bushels. [e] 441,728 bushels (season of 1898–99). [g] 127,900 bushels.
[b] 31,212 bushels. [d] 19,231 bushels. [f] 15,650 bushels.

THE FISHERIES BY COUNTIES.

The five counties having fishery interests are Newport, Bristol, Providence, Kent, and Washington, the first named taking precedence over all others in the number of persons employed and in the quantity and value of fish proper, although Bristol County ranks first in the total value of products, owing to the large oyster yield, this fishery being conducted chiefly in Bristol, Providence, and Kent counties.

The molluscan fisheries of Newport County are mainly for quahogs, clams, and mussels, most of the quahogs in 1898 being from Coddington Cove, near Newport, where 2,640 bushels were secured, valued at $3,080. The price received for them was $1 per bushel in summer and $1.25 in the winter. Of the clams shown for this county 1,500 bushels were obtained from "Salt Pond," on Block Island.

In the lobster fishery Newport County ranks first and Washington second, the entire lobster catch of the State being taken in these two counties, except 2,500 pounds, valued at $188, in Bristol County,

Newport County is also prominent in the number of vessels employed and in the trap-net and pound-net fisheries. The number of vessels in its fisheries was 53, valued at $70,550, and the number of trap nets and pound nets was 111, valued at $83,550; being over half the number of vessels and of trap nets and pound nets in the State. The catch of trap nets and pound nets in this county aggregated 10,561,019 pounds, valued at $151,729, or about 73 per cent of the total catch for the State by these apparatus.

Block Island, in Newport County, is the principal center of the line and sword-fish fisheries. The products in 1898 aggregated 2,327,026 pounds, valued at $64,399, consisting chiefly of cod, haddock, blue-fish, mackerel, and sword-fish in the vessel fisheries, and of squeteague, flat-fish and flounders, bonito, pollock, alewives, sea bass, and scup in the shore fisheries.

In the vessel fisheries there were 8 schooners, of from 13 to 25 tons net register, valued at $19,100, and 13 smaller vessels, valued at $8,000; a total of 21 vessels, valued at $27,100, with 239 net tons.

Besides quite a number of small rowboats, there were in the shore fisheries 25 sailboats, valued at $7,850. The principal apparatus in the shore fisheries were pound nets, gill nets, lobster pots, and lines.

The vessel fisheries of Block Island have undergone some change during recent years with respect to types of vessels. The old style "pinky" or "Block Island boat" is no longer built, being superseded by the "catboat." Five old pinky boats still remain in the business, but no vessels of this type have been built during the past 18 or 20 years. The "Block Island boat" was especially well adapted for withstanding a heavy sea, being deep and double-ended; they are easily managed and fast sailers, but somewhat lacking in accommodations; 23 of these vessels were employed in the fisheries at Block Island in 1879.

Kent County has smaller fishery interests than any of the others, the most valuable products being oysters, quahogs, and scallops, in the order named. Practically the entire catch of scallops is credited to this county. The catch of Bristol and Providence counties, like that of Kent County, consists chiefly of shellfish.

Washington County ranks second in the yield of products, exclusive of the molluscan fisheries. In this county 76 pound nets, valued at $25,120, are used. Quite a number of these are set in the salt-water ponds that fringe the coast between Point Judith and Watch Hill. Some of them are of comparatively small value and are used for catching eels and other fish that enter these ponds from the sea.

Table showing the number of persons employed in the fisheries of Rhode Island in 1898.

Counties.	On vessels fishing.	On vessels transporting.	Boat or shore fishermen.	Shoresmen.	Total.
Newport	275	21	350	213	859
Bristol	22	13	131	36	202
Providence	52	4	86	96	238
Kent	14	9	111	1	135
Washington	2	32	218	1	253
Total	365	79	896	347	1,687

Table showing, by counties, the vessels, boats, apparatus, and capital employed in the fisheries of Rhode Island in 1898.

Items.	Newport.		Bristol.		Providence.		Kent.		Washington.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	45	$61,800	4	$18,200	13	$36,350	6	$4,450	1	$800
Tonnage	544	.....	73	.....	210	.....	60	.....	7	.....
Outfit	.....	38,287	.....	1,949	.....	7,635	.....	570	.....	.....
Vessels transporting	8	8,750	4	16,000	2	7,000	3	10,000	7	4,500
Tonnage	81	.....	174	.....	62	.....	171	.....	72	.....
Outfit	.....	1,650	.....	672	.....	190	.....	125	.....	519
Boats	346	31,010	122	14,385	74	3,910	122	13,721	190	9,355
Apparatus—vessel fisheries:										
Pound nets and trap nets	27	41,900	.....	.....	.....	.....	.....	.....	.....	.....
Purse seines	7	4,000	.....	.....	.....	.....	.....	.....	.....	.....
Snap nets	4	20	.....	.....	.....	.....	.....	.....	.....	.....
Lines, hand and trawl	.....	1,134	.....	.....	.....	.....	.....	.....	.....	1
Pots, lobster	1,600	1,999	.....	.....	.....	.....	.....	.....	20	40
Pots, eel	.....	.....	.....	.....	100	50	97	49	.....	.....
Harpoons	.....	109	.....	.....	.....	.....	.....	.....	.....	.....
Dredges, tongs, diggers, hoes, etc	.....	.....	.....	230	.....	939	.....	292	.....	.....
Apparatus—shore fisheries:										
Pound nets and trap nets	84	41,650	10	1,175	.....	.....	5	550	76	25,120
Seines	.....	.....	.....	.....	11	538	4	250	27	2,455
Gill nets	57	3,725	1	20	.....	.....	10	510	66	2,830
Fyke nets	117	602	3	40	.....	.....	140	1,072	69	748
Lines, hand and trawl	.....	587	.....	15	.....	19	.....	1	.....	253
Pots, lobsters	6,667	8,374	100	100	.....	.....	.....	.....	1,725	2,203
Pots, eel	383	351	237	119	792	396	474	237	1,106	785
Spears, eel	8	8	1	2	10	22	4	6	6	8
Minor apparatus	.....	.....	.....	.....	.....	27	.....	7	.....	9
Dredges, tongs, diggers, hoes, etc	.....	261	.....	1,396	.....	963	.....	2,241	.....	227
Shore and accessory property	.....	356,660	.....	16,475	.....	48,700	.....	4,535	.....	12,779
Cash capital	.....	65,000	.....	.....	.....	15,500	.....	.....	.....	.....
Total	.....	662,877	.....	70,778	.....	122,239	.....	38,616	.....	62,632

Table showing, by counties, the products of the fisheries of Rhode Island in 1898.

Species.	Newport.		Bristol.		Providence.		Kent.		Washington.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Val.	Lbs.	Value.
Alewives, fresh	342,000	$3,767	30,000	$430	17,000	$295	1,000	$25	238,132	$2,104
Alewives, salted			500	20					73,600	920
Alewives, smoked									136,390	2,712
Blue-fish	261,400	12,733					25,500	840	43,390	1,948
Bonito	124,450	2,615								
Bullheads									300	24
Butter-fish	165,000	4,520	6,500	248					35,500	847
Cod, fresh	1,056,486	22,432							55,325	1,124
Cod, salted	233,876	9,644							81,225	3,510
Cunners	3,300	100								
Eels	42,000	1,806	50,066	1,992	178,201	10,272	43,632	2,040	129,575	3,920
Flounders and flat-fish	1,232,050	18,258	65,000	1,200			59,554	1,037	353,453	7,081
Haddock	336,800	7,869							29,725	504
Herring	2,000	10								
Hickory shad	6,000	180							7,000	148
King-fish	570	58							1,400	70
Mackerel	251,800	11,974							108,100	3,030
Menhaden	3,100,000	7,350			28,000	220	12,000	21		
Minnows					3,600	340	128	16		
Perch									48,475	1,920
Pickerel									200	20
Pollock	50,000	500								
Scup	4,802,800	52,078	1,600	40					1,585,925	28,478
Sea bass	379,100	10,384							61,850	1,551
Shad	3,124	195	12,800	800	48	6			9,140	624
Smelt									4,100	215
Spanish mackerel	700	104								
Squeteague	2,148,575	44,111	159,900	3,641	1,300	62	41,875	1,592	773,985	14,570
Squid	64,000	675							60,000	800
Striped bass	36,900	2,427							65,050	8,084
Sword-fish	55,875	2,935								
Tautog	161,300	4,032	17,600	680	1,000	50	13,875	467	54,354	1,985
Tomcod									8,000	240
Miscellaneous fish	221,050	5,003							24,700	519
Refuse fish	748,000	958							264,000	264
Shrimp					2,010	670	240	80		
Lobsters	461,033	33,991	2,500	188					114,533	9,111
Crabs, hard									7,875	575
Crabs, soft									5,020	1,675
Crabs, fiddler					53	40	75	88		
Clams	25,750	2,605	24,760	3,095	78,000	11,825	15,490	1,886	6,150	1,208
Quahogs	32,120	4,495	52,240	6,625	48,800	6,075	114,480	14,260	2,056	381
Mussels	10,000	350	1,500	30	750	50	3,300	264		
Scallops			1,650	247	3,600	300	110,136	9,924		
Oysters, market			1,932,336	310,686	969,500	151,775	164,500	33,300	25,760	4,387
Oysters, seed			86,450	4,315	19,600	715	3,500	200		
Oyster shells			4,236,000	2,143	3,000,000	1,600	402,000	219	86,000	6
Squeteague sounds									2,100	630
Total	16,358,059	268,059	6,681,302	336,380	4,351,462	184,295	1,011,185	66,159	4,452,388	100,165

THE VESSEL AND SHORE FISHERIES.

The number of vessels fishing was 69, valued at $121,600; their net tonnage being 894 tons and the value of their outfits $43,441. The number engaged in transporting, comprised almost wholly of sail vessels, was 24, valued at $46,250, their net tonnage being 560 tons and the value of their outfits $3,156.

The vessels included 20 steamers, 14 of which were engaged in the oyster and 6 in the trap-net fisheries. A number of vessels employed in the fisheries of this State during a part of the year have been credited to other States where they were owned and used in the fisheries. The products of the vessel fisheries aggregated 18,385,634 pounds, valued at $536,037, the more important species being oysters, scup, cod, squeteague, flat-fish and flounders, mackerel, menhaden, haddock,

lobsters, and sea bass. The yield of the shore fisheries was 14,468,762 pounds, valued at $419,021, the principal species, in the order of their importance, being oysters, squeteague, lobsters, scup, quahogs, clams, eels, flat-fish and flounders, blue-fish, striped bass, cod, scallops, alewives, mackerel, and tautog.

The most valuable and effective forms of apparatus employed for the capture of fish proper in the vessel and shore fisheries were trap nets and pound nets. In the vessel fisheries 27 trap nets were operated, having a value of $41,900. The value of all other forms of apparatus used by the vessels, including purse seines, snap nets, lines, pots, harpoons, dredges, tongs, etc., was $8,863. In the shore fisheries there were 175 trap nets and pound nets used, valued at $68,495; all other apparatus, consisting of seines, gill nets, fyke nets, lines, pots, spears, dredges, tongs, etc., being valued at $31,407.

Some of the ocean trap nets have a weight, including the leader but exclusive of anchors, of about 3,000 pounds. The construction of one of these trap nets requires about 2,000 pounds of rope, varying from 2-inch to the large cable size, and costing 7 cents a pound, and 8,000 corks or floats worth $3 a hundred. About eighteen anchors, weighing from 200 to 700 pounds each, are also necessary for setting one of these nets. The names "trap" and "pound" are often used interchangeably by the fishermen, but the former relates more properly to the floating trap net held in place by anchors, and the latter to the pound net set with stakes.

The trap-net fishery centering at Sakonnet Point and in the vicinity of Newport is of considerable importance. In addition to the small boats ordinarily used in the fishery, there were nine steamboats (some of them not owned in the State) engaged in tending the nets and transporting the fish. Three steamboats not owned in the State were employed in the pound-net fishery between Point Judith and Watch Hill, in Washington County. The trap nets, with perhaps a few exceptions, were set in deep water.

The season for fishing trap nets and pound nets extends from the latter part of April to about the 15th of July, the best fishing being from May 1 to June 15. There is also more or less pound-net fishing carried on in different parts of the State in the summer and fall, but the catch is not so large as it is in the spring. The spring fishing is often called "scup fishing," on account of the predominance of that species in May and the early part of June. A large deep-water trap net is capable of holding thousands of barrels of fish at one time; but the scup were so abundant in 1898 that some of the nets were closed at times to allow them to pass by. When the fish are so plentiful prices are very low and shipments can not be made with profit. The products secured with trap nets and pound nets in 1898 aggregated 14,385,126 pounds, valued at $220,791. Of this quantity 6,387,925 pounds, valued at $75,528, were scup, and 7,997,201 pounds, valued at $145,263,

consisted of flat-fish and flounders, squeteague, sea bass, butter-fish, and various other species.

The most important group of apparatus employed in the fisheries of the State, as determined by the value of the catch, was comprised of dredges, tongs, clam diggers, and hoes. The products obtained with these consisted of oysters and oyster shells, clams, quahogs, and scallops, and were valued at $572,896. A considerable quantity of products was also taken with other forms of apparatus. The yield of seines amounted to 3,630,143 pounds, valued at $21,978, the more important species being mackerel, menhaden, and alewives. Gill nets secured 330,770 pounds, valued at $11,828, consisting principally of blue-fish and squeteague. The catch of fyke nets was 141,645 pounds, valued at $3,385, the greater part of which was flat-fish. The hand and trawl line catch was 1,972,116 pounds, valued at $60,076, the more abundant species being cod, haddock, mackerel, tautog, and blue-fish. The catch with lobster and eel pots consisted of 578,066 pounds of lobsters, valued at $43,290, and 291,225 pounds of eels, valued at $13,271. In the vessel fisheries harpoons were used for the capture of sword-fish, the catch being 55,875 pounds, valued at $2,935. The remainder of the products was taken with spears, snap nets, and minor apparatus, and was valued at $4,608.

The following series of tables shows by counties, species, and apparatus the quantity and value of products obtained in the vessel and shore fisheries of Rhode Island in 1898:

Table showing, by counties, the yield of the seine fisheries of Rhode Island in 1898.

Species.	Newport.		Providence.		Kent.		Washington.		Total.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Value.
Vessel fisheries:										
Mackerel	80,000	$2,843	.....	.....	.....	.....	.....	.....	80,000	$2,843
Menhaden	3,100,000	7,350	.....	.....	.....	.....	.....	.....	3,100,000	7,350
Total	3,180,000	10,193	.....	.....	.....	.....	.....	.....	3,180,000	10,193
Shore fisheries:										
Alewives, fresh	.....	.....	2,000	$70	1,000	$25	83,232	$408	86,232	503
Alewives, salted	.....	.....	.....	.....	.....	.....	73,600	920	73,600	920
Alewives, smoked	.....	.....	.....	.....	.....	.....	93,790	1,860	93,790	1,860
Blue-fish	.....	.....	.....	.....	5,000	200	.....	.....	5,000	200
Bullheads	.....	.....	.....	.....	.....	.....	800	24	800	24
Cod	.....	.....	.....	.....	.....	.....	1,500	45	1,500	45
Eels	.....	.....	36,533	2,172	.....	.....	2,700	135	39,233	2,307
Flounders	.....	.....	.....	.....	.....	.....	19,375	748	19,375	748
Mackerel	.....	.....	.....	.....	.....	.....	8,300	120	8,300	120
Menhaden	.....	.....	28,000	220	12,000	21	.....	.....	40,000	241
Minnows	.....	.....	3,000	260	128	16	.....	.....	3,128	276
Perch	.....	.....	.....	.....	.....	.....	47,475	1,801	47,475	1,801
Pickerel	.....	.....	.....	.....	.....	.....	200	20	200	20
Smelt	.....	.....	.....	.....	.....	.....	1,100	110	1,100	110
Squeteague	.....	.....	1,000	50	17,250	510	.....	.....	18,250	560
Striped bass	.....	.....	.....	.....	.....	.....	11,500	1,298	11,500	1,298
Tautog	.....	.....	.....	.....	4,875	157	.....	.....	4,875	157
Shrimp	.....	.....	1,785	595	.....	.....	.....	.....	1,785	595
Total	.....	.....	72,318	3,367	39,753	929	338,072	7,489	450,143	11,785
Total vessel and shore	3,180,000	10,193	72,318	3,367	39,753	929	338,072	7,489	3,680,143	21,978

Table showing, by counties, the yield of the gill-net fisheries of Rhode Island in 1898.

Species.	Newport.		Bristol.		Kent.		Washington.		Total.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Value.
Shore fisheries:										
Blue-fish	119,600	$5,653	.....	.....	20,500	$640	32,890	$1,368	172,990	$7,661
Bonito	1,000	20	.....	.....	.....	.....	.....	.....	1,000	20
Spanish mackerel	400	80	.....	.....	.....	.....	.....	.....	400	80
Squeteague	82,400	2,332	400	$16	3,750	82	69,830	1,637	156,380	4,067
Total	203,400	8,085	400	16	24,250	722	102,720	3,005	330,770	11,828

Table showing the yield of the pound-net and trap-net fisheries of Rhode Island in 1898.

Species.	Newport.		Bristol.		Kent.		Washington.		Total.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Value.
Vessel fisheries:										
Alewives	8,500	$68	.....	.....	.....	.....	.....	.....	8,500	$68
Blue-fish	8,600	420	.....	.....	.....	.....	.....	.....	8,600	420
Bonito	1,250	25	.....	.....	.....	.....	.....	.....	1,250	25
Butter-fish	89,200	2,405	.....	.....	.....	.....	.....	.....	89,200	2,405
Cod	218,000	3,620	.....	.....	.....	.....	.....	.....	218,000	3,620
Flounders and flat-fish	709,000	10,060	.....	.....	.....	.....	.....	.....	709,000	10,060
King-fish	120	18	.....	.....	.....	.....	.....	.....	120	18
Mackerel	13,600	1,020	.....	.....	.....	.....	.....	.....	13,600	1,020
Scup	3,859,500	39,635	.....	.....	.....	.....	.....	.....	3,859,500	39,635
Sea bass	218,800	5,575	.....	.....	.....	.....	.....	.....	218,800	5,575
Shad	124	8	.....	.....	.....	.....	.....	.....	124	8
Squeteague	579,000	11,290	.....	.....	.....	.....	.....	.....	579,000	11,290
Striped bass	6,900	533	.....	.....	.....	.....	.....	.....	6,900	533
Tautog	10,500	253	.....	.....	.....	.....	.....	.....	10,500	253
Miscellaneous fish	70,450	1,379	.....	.....	.....	.....	.....	.....	70,450	1,379
Refuse fish	156,000	195	.....	.....	.....	.....	.....	.....	156,000	195
Total	5,949,544	76,504	.....	.....	.....	.....	.....	.....	5,949,544	76,504
Shore fisheries:										
Alewives, fresh	333,500	3,699	30,000	$430	.....	.....	154,900	$1,696	518,400	5,825
Alewives, salted	.....	.....	500	20	.....	.....	.....	.....	500	20
Alewives, smoked	.....	.....	.....	.....	.....	.....	42,600	852	42,600	852
Blue-fish	47,000	2,350	.....	.....	.....	.....	8,000	455	55,000	2,805
Bonito	122,200	2,570	.....	.....	.....	.....	.....	.....	122,200	2,570
Butter-fish	75,800	2,115	6,500	248	.....	.....	35,500	847	117,800	3,210
Cod, fresh	16,000	450	.....	.....	.....	.....	24,600	458	40,600	908
Cod, salted	.....	.....	.....	.....	.....	.....	5,000	230	5,000	230
Eels	8,000	400	800	24	1,333	$50	56,150	1,496	66,283	1,970
Flounders and flat-fish	465,800	6,918	55,000	1,000	8,334	250	278,900	4,425	807,534	12,593
Haddock	.....	.....	.....	.....	.....	.....	9,000	90	9,000	90
Herring	2,000	10	.....	.....	.....	.....	.....	.....	2,000	10
Hickory shad	6,000	180	.....	.....	.....	.....	7,000	148	13,000	328
King-fish	450	40	.....	.....	.....	.....	1,400	70	1,850	110
Mackerel	21,000	1,035	.....	.....	.....	.....	99,000	2,380	120,000	3,415
Perch	.....	.....	.....	.....	.....	.....	1,000	119	1,000	119
Pollock	50,000	500	.....	.....	.....	.....	.....	.....	50,000	500
Scup	943,300	12,443	500	10	.....	.....	1,584,625	23,440	2,528,425	35,893
Sea bass	137,650	3,745	.....	.....	.....	.....	60,300	1,453	197,950	5,198
Shad	3,000	187	12,800	800	.....	.....	9,140	624	24,940	1,611
Smelt	.....	.....	.....	.....	.....	.....	3,000	105	3,000	105
Spanish mackerel	300	24	.....	.....	.....	.....	.....	.....	300	24
Squeteague	1,470,375	29,985	159,500	3,625	20,875	1,000	700,850	12,776	2,351,600	47,386
Squid	64,000	575	.....	.....	.....	.....	60,000	800	124,000	1,375
Striped bass	30,000	1,894	.....	.....	.....	.....	53,550	6,786	83,550	8,680
Tautog	73,000	1,718	6,600	240	8,300	250	27,750	452	115,650	2,660
Miscellaneous fish	150,600	3,624	.....	.....	.....	.....	24,700	519	175,300	4,143
Refuse fish	592,000	768	.....	.....	.....	.....	264,000	264	856,000	1,027
Squeteague sounds	.....	.....	.....	.....	.....	.....	2,100	630	2,100	630
Total	4,611,475	75,225	272,200	6,397	38,842	1,550	3,513,065	61,115	8,435,582	144,287
Vessel and shore	10,561,019	151,729	272,200	6,397	38,842	1,550	3,513,065	61,115	14,385,126	220,791

Table showing, by counties, the yield of the fyke-net fisheries of Rhode Island in 1898.

Species.	Newport.		Bristol.		Kent.		Washington.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Eels	.....	.....	3,000	$120	.....	.....	.....	.....	3,000	$120
Flat-fish	27,500	$835	10,000	200	51,220	$787	41,925	$1,203	130,645	3,025
Tomcod	.....	.....	.....	.....	.....	.....	8,000	240	8,000	240
Total	27,500	835	18,000	320	51,220	787	49,925	1,443	141,645	3,385

Table showing, by counties, the yield of the hand and trawl line fisheries of Rhode Island in 1898.

Species.	Bristol.		Providence.		Kent.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:						
Eels	6,400	$288	6,667	$360	.....	.....
Scup	1,000	30	.....	.....	.....	.....
Squeteague	.....	.....	300	12	.....	.....
Tautog	11,000	440	1,000	50	1,200	$60
Total	18,400	758	7,967	422	1,200	60

Species.	Newport.		Washington.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Blue-fish	57,200	$2,860	.....	.....	57,200	$2,860
Cod, fresh	487,486	11,827	.....	.....	487,486	11,827
Cod, salted	181,376	7,544	.....	.....	181,376	7,544
Flounders	27,250	415	700	$28	27,950	443
Haddock	316,800	7,319	.....	.....	316,800	7,319
Mackerel	91,300	4,496	.....	.....	91,300	4,496
Sea bass	17,650	914	.....	.....	17,650	914
Tautog	26,800	837	400	20	27,200	857
Total	1,205,862	36,212	1,100	48	1,206,962	36,260
Shore fisheries:						
Blue-fish	29,000	1,450	2,500	125	31,500	1,575
Cod, fresh	335,000	6,535	29,225	621	364,225	7,156
Cod, salted	52,500	2,100	76,225	3,280	128,725	5,380
Eels	.....	.....	.....	.....	13,067	648
Flounders and flat-fish	3,000	30	12,553	677	15,553	707
Haddock	20,000	550	20,725	414	40,725	964
Mackerel	45,900	2,580	5,800	530	51,700	3,110
Scup	.....	.....	1,300	38	2,300	68
Sea bass	5,000	150	1,550	98	6,550	248
Squeteague	16,800	504	3,305	157	20,405	673
Tautog	51,000	1,224	26,204	1,513	90,404	3,287
Total	558,200	15,123	179,387	7,453	765,154	23,816
Total vessel and shore	1,764,062	51,335	180,487	7,501	1,972,116	60,076

Table showing, by counties, the catch of eels and lobsters by pots in Rhode Island in 1898.

Species.	Newport.		Bristol.		Washington.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Lobsters	90,333	$6,523	.....	.....	2,000	$160
Shore fisheries:						
Eels	28,700	1,116	39,200	$1,520	70,125	2,265
Lobsters	370,700	27,468	2,500	188	112,533	8,951
Total	399,400	28,584	41,700	1,708	182,658	11,216
Total vessel and shore	489,733	35,107	41,700	1,708	184,658	11,376

Species.	Providence.		Kent.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Eels	13,334	$800	9,866	$518	23,200	$1,318
Lobsters	.....	.....	.....	.....	92,333	6,688
Total	13,334	800	9,866	518	115,533	8,001
Shore fisheries:						
Eels	103,000	5,820	27,000	1,232	268,025	11,953
Lobsters	.....	.....	.....	.....	485,733	36,607
Total	103,000	5,820	27,000	1,232	753,758	48,560
Total vessel and shore	116,334	6,620	36,866	1,750	869,291	56,561

Table showing, by counties, the catch by dredges, tongs, etc., in Rhode Island in 1898.

Species.	Newport.		Bristol.		Providence.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Clams					5,000	$750
Quahogs			400	$50	10,400	1,200
Scallops					600	50
Oysters, market			1,491,000	241,000	934,500	146,050
Oyster shells			2,370,000	1,210	3,000,000	1,600
Total			3,861,400	242,260	3,950,500	149,650
Shore fisheries:						
Clams	25,760	$2,605	24,760	3,095	73,000	11,075
Quahogs	32,120	4,495	51,840	6,575	38,400	4,875
Mussels	10,000	350	1,500	30	750	50
Scallops			1,650	247	3,000	250
Oysters, market			441,336	69,686	35,000	5,725
Oysters, seed			86,450	4,315	19,600	715
Oyster shells			1,866,000	933		
Total	67,870	7,450	2,473,536	84,881	169,750	22,690
Total vessel and shore	67,870	7,450	6,334,936	327,141	4,120,250	172,340

Species.	Kent.		Washington.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Clams	4,060	$506			9,060	$1,256
Quahogs	5,240	655			16,040	1,905
Mussels	300	24			300	24
Scallops	10,920	1,299			11,520	1,349
Oysters, market	42,000	7,050			2,467,500	394,700
Oysters, shell					5,370,000	2,810
Total	62,520	10,134			7,874,420	402,044
Shore fisheries:						
Clams	11,430	1,330	6,150	$1,208	141,090	19,313
Quahogs	109,240	13,605	2,056	361	233,656	29,911
Mussels	3,000	240			15,250	670
Scallops	99,216	8,625			103,866	9,122
Oysters, market	122,500	25,650	25,760	4,387	624,596	105,448
Oysters, seed	3,500	200			109,550	5,230
Oysters shells	402,000	219	36,000	6	2,304,000	1,158
Total	750,886	49,869	69,966	5,962	3,532,008	170,852
Total vessel and shore	813,406	60,003	69,966	5,962	11,406,428	572,896

Table showing, by counties, the catch of eels by spears in Rhode Island in 1898.

Counties.	Lbs.	Value.
Newport	5,300	$290
Bristol	666	40
Providence	18,667	1,120
Kent	5,333	240
Washington	600	24
Total	30,566	1,714

Table showing the catch by harpoons and snap nets in Rhode Island in 1898.

Apparatus.	County.	Species.	Lbs.	Value.
Vessel fisheries:				
Harpoons	Newport	Sword-fish	55,875	$2,935
Snap nets	do	Cunners	3,300	100

Table showing the catch by minor apparatus in the fisheries of Rhode Island in 1898.

Species.	Providence.		Kent.		Washington.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	15,000	$225	.....	.....	.....	.....	15,000	$225
Minnows	600	80	.....	.....	.....	.....	600	80
Shad	48	6	.....	.....	.....	.....	48	6
Shrimp	225	75	240	$80	.....	.....	465	155
Crabs, hard	.....	.....	.....	.....	7,875	$575	7,875	575
Crabs, soft	.....	.....	.....	.....	5,020	1,675	5,020	1,675
Crabs, fiddler	53	40	75	38	.....	.....	128	78
Total	15,926	426	315	118	12,895	2,250	29,136	2,794

THE OYSTER INDUSTRY.

The private cultivation of oysters is carried on under the general supervision of the State, represented by a shellfish commission, from which leases of oyster-grounds are secured. The rental depends upon the depth of water. For a depth of 12 feet and over at mean low tide it is $5 an acre; under 12 feet, $10 an acre. In determining the depth of water a Government chart is used and the acreage is measured by the State surveyor. The revenue accruing to the State from this source during the year 1898 amounted to $7,690.07, and it was estimated that the receipts for the following year would be $20,000 or more. Leases are not granted to persons outside of the State, but a large percentage of the total acreage is planted and controlled by oyster planters living in other States, who obtain leases through the medium of their foremen or other residents. In 1898 the total area held by lessees was 1,922.3 acres, most of which rented for $10 an acre.

The total yield of the private beds was 439,148 bushels of marketable oysters, valued at $497,360, and of the public oyster-grounds 2,580 bushels, valued at $2,788, while 15,650 bushels of native seed were obtained and planted, the value of which was $5,230. In 1892 the total area under cultivation was 700 acres. The yield of marketable oysters from the cultivated areas was about 157,581 bushels, valued at $251,384, and from the public grounds it was approximately 2,000 bushels, valued at $2,075. There were also 14,865 bushels of native seed oysters used for planting purposes, having a value of $5,783.

In the upper waters of Narragansett Bay considerable difficulty is sometimes experienced by the planters in connection with the greening of the oysters. A good deal of the ground formerly occupied in this section has therefore been abandoned, the disposition being to take up land farther down the bay. A considerable area has recently been leased in Mount Hope Bay, most of which rents for $5 an acre, and large plants were made there in 1899.

In addition to the stock already on the beds, there were planted by the cultivators in 1898 420,200 bushels of seed oysters, valued at $268,730 when delivered. The bulk of this supply was from Connecticut waters, sailing vessels being chiefly used as transporters. At one

time seed oysters from Virginia were cultivated by the planters of Narragansett Bay, but the climate has been found to be too severe for the southern product.

The seed supply of 1898 was from the following sources:

States.	Bushels.	Value.
Connecticut	398,050	$257,175
Massachusetts	*11,500	6,325
Native	15,650	5,230
Total	420,200	268,780

*Including a few seed from Greenport, N. Y.

The price for Connecticut seed ranged from 50 cents to 95 cents a bushel, according to age, but the usual cost was 65 cents, including freight, which was generally 5 cents a bushel. Native seed brought from 25 to 40 cents a bushel. Some of these were picked up by hand at low tide along the shores. The Seakonk River is one of the chief sources of native seed supply. These oysters, as well as the seed from Somerset, Mass., are green when first taken from the water, and are only used for planting purposes, but the green color disappears in a short time after they have been transplanted. Some of the oyster-planters from Connecticut raise their own seed oysters and transplant them to the Rhode Island beds in the spring.

Quite a number of oyster-planters sold shells during 1898, which were used on roads, in gas works, and for planting purposes, the total quantity sold by them being 127,900 bushels, worth $3,968. Others did not sell any shells, having need for them on their own beds, and one cultivator found it necessary to buy 80,000 bushels.

Starfish do not appear to be so destructive as formerly, owing to the systematic and persistent manner in which they are destroyed by the oyster-planters, tangles being used for catching them. It would seem that isolated beds suffer most from this enemy. Of 1,200 bushels of seed planted in 1897 at Wickford only 300 bushels of marketable oysters were secured, the remainder being destroyed by starfish. In 1898 27,362 bushels of starfish were caught by the oyster-growers of Narragansett Bay, chiefly by those of Bristol and Providence counties.

The mussel is another source of annoyance to the oyster-planter. The usual method of destroying them is by exposing the oysters to the sun until the mussels which are attached to them die and fall off. The oysters are then returned to the water. This process is effective, but is supposed to be more or less injurious to the oysters. If the mussels are not removed, the oysters become poor and are also very troublesome to open.

The following table shows the extent of the oyster industry of Rhode Island in 1898.

Table showing the extent of the oyster industry of Rhode Island in 1898.

Items.	No.	Value.	Items.	No.	Value.
Persons engaged	*312		Shore and accessory property		$41,800.00
Vessels fishing (steam)	13	$54,900	Oyster ground held by lessees (acres)	1,922.3	
Tonnage	276		Amount of rental paid		7,690.07
Outfit		9,789	Oysters, market, from planted grounds (bushels)	†439,148	497,360.00
Vessels fishing (sail)	1	800	Oysters, market, from natural grounds (bushels)	†2,580	2,788.00
Tonnage	11		Oysters, native seed planted (bushels)	15,650	5,230.00
Vessels transporting (steam)	1	4,000	Oysters, seed from other States, planted (bushels)	404,550	263,500.00
Tonnage	13		Oyster shells sold (bushels)	127,900	3,968.00
Outfit		350	Starfish caught and destroyed (bushels)	27,362	
Vessels transporting (sail)	8	29,000			
Tonnage	394				
Outfit		637			
Boats	111	13,836			
Apparatus on vessels:					
Tongs	46	279			
Dredges	35	910			
Apparatus on boats:					
Tongs	154	798			
Dredges	61	759			

*On vessels fishing, 69; on vessels transporting, 26; on boats, 107; on shore, 110.
†Oyster season of 1898-99.

THE MENHADEN INDUSTRY.

In 1898 there were two menhaden factories in Rhode Island, one of which was in operation only six weeks. 106,838 barrels of menhaden, equivalent to about 35,612,667 fish, were handled at these factories, and the resulting products were 306,960 gallons of oil, valued at $61,407, and 3,576 tons of scrap, valued at $34,982. The largest catches of menhaden are made in June, July, August, and September. The yield of oil varies from ½ to 4 gallons for each barrel of fish, according to their condition, which depends somewhat on where they are obtained and the time of the season in which they are caught.

The following table shows the important features of the menhaden industry in Rhode Island for 1898:

Table showing the extent of the menhaden industry of Rhode Island in 1898.

Items.	Number.	Value.
Factories	2	$328,000
Cash capital		60,000
Wages paid		27,690
Persons employed	206	
Menhaden pressed	35,612,667	53,419
Tons of acidulated scrap prepared	3,576	34,982
Gallons of oil made	306,960	61,407

THE WHOLESALE FISHERY TRADE.

The wholesale trade was conducted by three firms in Providence and one in Newport, the principal products being fresh fish and lobsters. The greater part of the lobsters were handled at Newport. The value of the four establishments was $28,025. The amount of cash capital was $20,500, while $13,180 were paid out in wages, the number of employees being 28. The value of the products as sold amounted to nearly $200,000.

Table showing the extent of the wholesale fishery trade of Rhode Island in 1898.

Items.		No.	Value.
Establishments		4	$28,025
Cash capital			20,500
Wages paid			13,180
Persons engaged		28	
Products:			
Fresh fish	pounds	3,850,000	97,125
Smoked haddock	do	6,000	420
Sword-fish	do	116,400	11,640
Lobsters	do	689,375	71,906
Clams	bushels	720	900
Quahogs	do	3,900	4,825
Scallops	gallons	4,800	5,250
Oysters	do	2,440	3,500

FISHERIES OF CONNECTICUT.

In 1898 there were 2,473 persons employed in the fishery industries of Connecticut. The investment in vessels, apparatus, etc., amounted to $1,241,291, and the products amounted to 31,920,417 pounds, for which the fishermen received $1,559,599.

Compared with 1889, the fisheries were fairly prosperous, and comparatively few changes of importance occurred. A decrease appears in the number of the fishermen, due principally to the use of better equipment both in vessels and apparatus of capture. The value of the capital invested, as shown by the returns, decreased from $2,826,834 in 1889 to $1,241,291 in 1898. This is not due so much to a decrease in the investment as to a change in the manner of reporting it. In the former year the value of the oyster-grounds was included with the item of shore property, whereas in 1898 it was omitted entirely. If that item be excluded from the returns for each year, the decrease in the investment appears to be only $282,818 instead of $1,585,543, as in the tables. The total value of the product shows a fractional increase over that of 1889, when it was $1,557,506, whereas in 1898 it was $1,559,599.

The two principal items in the products, as in 1889, were oysters and lobsters, the yield of the former being valued at $1,249,071, or 80 per cent of the total, and of the latter $83,748, or 5 per cent of the total. In 1889 the oyster yield was valued at $1,055,807 and the lobster product at $83,099. The yield of menhaden and cod, which were respectively third and fourth in rank in 1889, have decreased in value, the former from $100,569 to $26,334 and the latter from $50,018 to $10,978 in the two years under comparison. The yield of blue-fish, flounders, sea bass, squeteague, hard clams, and soft clams shows little change in value, but the fisheries for halibut and red snappers are no longer prosecuted by vessels from this State.

The three tables which follow show the number of persons employed, the amount of capital invested, and the quantity and value of products secured in the fisheries of Connecticut in 1898.

Persons employed.

How engaged.	No.
On vessels fishing	779
On vessels transporting	17
In shore or boat fisheries	1,030
Shoresmen	647
Total	2,473

Table of apparatus and capital.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	187	$428,950	Apparatus—shore fisheries:		
Tonnage	3,488		Seines	63	$4,855
Outfit		130,542	Gill nets	89	5,025
Vessels transporting	8	5,700	Pound nets	66	19,930
Tonnage	117		Fyke nets	410	8,522
Outfit		718	Eel pots and spears	1,369	1,234
Boats	1,214	80,915	Lobster pots	6,250	10,266
Apparatus—vessel fisheries:			Lines		124
Seines	4	1,500	Dredges	250	2,010
Lobster pots	4,580	7,139	Tongs, rakes, and hoes	767	4,498
Lines		1,233	Minor apparatus		700
Harpoons		177	Shore and accessory property		344,380
Dredges	536	8,623	Cash capital		179,250
			Total		1,241,291

Table of products.

Species.	Vessel fisheries.		Shore fisheries.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives			868,400	$7,346	868,400	$7,346
Blue-fish	891,035	$29,147	72,250	3,704	963,285	32,851
Bullheads			3,032	114	3,032	114
Butter-fish			60,280	2,370	60,280	2,370
Carp			910	46	910	46
Cod	445,980	10,764	5,245	214	451,225	10,978
Eels			206,970	14,149	206,970	14,149
Flounders	26,250	978	417,644	12,410	443,864	13,383
Haddock	112,800	856			112,800	856
Mackerel, fresh	7,850	573	33,063	1,180	40,913	1,753
Mackerel, salted	28,000	2,000			28,000	2,000
Menhaden	6,428,010	16,947	4,754,900	9,387	11,182,910	26,334
Perch, white			13,822	671	13,822	671
Perch, yellow			1,750	89	1,750	89
Pickerel			5,420	271	5,420	271
Scup	5,020	216	96,020	3,288	101,040	3,504
Sea bass	217,019	10,554	30,770	1,628	247,789	12,182
Shad			499,325	21,215	499,325	21,215
Smelt			5,600	837	5,600	837
Spanish mackerel			66	12	66	12
Squeteague	500	15	193,143	5,436	193,643	5,451
Striped bass			13,845	1,662	13,845	1,662
Sturgeon			700	33	700	33
Suckers			53,373	2,068	53,373	2,068
Sword-fish	85,980	7,520			85,980	7,520
Tautog	15,500	620	55,040	2,498	70,540	3,118
Tomcod or frost-fish			88,750	1,677	88,750	1,677
Whiting			3,850	185	3,850	185
Squid			6,900	150	6,900	150
Lobsters	421,627	30,282	676,565	53,466	1,098,192	83,748
Oysters	18,277,668	1,140,958	1,855,620	108,118	a14,683,283	1,249,071
Clams, hard			234,000	29,900	b234,000	29,900
Clams, soft			199,800	19,039	c199,800	19,039
Scallops			50,160	5,016	d50,160	5,016
Total	21,963,284	1,251,420	9,957,183	308,179	31,920,417	1,559,599

a 2,090,469 bushels. b 29,250 bushels. c 19,980 bushels. d 8,360 bushels.

THE FISHERIES BY COUNTIES.

Five counties in Connecticut have commercial fisheries, viz, Fairfield, New Haven, Middlesex, New London, and Hartford. All of these except Middlesex border Long Island Sound, and Middlesex, Hartford, and New London border the Connecticut River. The following tables indicate the extent to which each of these was interested in the fishing industries in 1898. New Haven and Fairfield counties, with their important oyster industries, rank first and second, respectively, in the items of persons employed, investment, and value of products, but of fish proper New London yields far more than all other counties combined:

Table showing, by counties, the number of persons employed in the fisheries of Connecticut in 1898.

Counties.	On vessels fishing.	On vessels transporting.	In shore or boat fisheries.	Shoresmen.	Total.
Fairfield	360	3	291	68	722
New Haven	180	6	222	557	965
Middlesex	.....	.....	208	.....	208
Hartford	.....	.....	89	.....	89
New London	239	8	220	22	489
Total	779	17	1,030	647	2,473

Table showing, by counties, the vessels, boats, apparatus, and capital employed in the fisheries of Connecticut in 1898.

Items.	Fairfield.		New Haven.		Middlesex.		Hartford.		New London.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	103	$207,570	28	$149,025	.....	.....	.....	.....	56	$72,355
Tonnage	1,491	.....	1,025	.....	.....	.....	.....	.....	922	.....
Outfit	.....	49,975	.....	54,425	.....	.....	.....	.....	.....	26,142
Vessels transporting	1	800	3	2,050	.....	.....	.....	.....	4	2,850
Tonnage	16	.....	40	.....	.....	.....	.....	.....	61	.....
Outfit	.....	50	.....	180	.....	.....	.....	.....	.....	488
Boats	429	28,020	295	15,005	207	$9,112	47	$1,050	236	27,728
Apparatus—vessel fisheries:										
Seines	.....	.....	1	500	.....	.....	.....	.....	3	1,000
Lobster pots	105	200	.....	.....	.....	.....	.....	.....	4,475	6,939
Lines	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,233
Harpoons	.....	.....	.....	.....	.....	.....	.....	.....	.....	177
Dredges	428	5,937	108	2,686	.....	.....	.....	.....	.....	.....
Apparatus—shore fisheries:										
Seines	13	765	1	40	18	990	30	2,990	1	70
Gill nets	2	110	.....	.....	54	3,200	14	380	19	1,335
Pound nets	.....	.....	16	8,680	6	2,990	.....	.....	44	8,260
Fyke nets	13	385	14	133	17	207	5	60	361	2,737
Eel pots and spears	318	449	433	391	182	103	.....	.....	436	291
Lobster pots	345	755	950	1,644	736	1,204	.....	.....	4,219	6,663
Lines	.....	82	.....	10	.....	52	.....	.....	.....	80
Dredges	217	1,715	33	295	.....	.....	.....	.....	.....	.....
Tongs, rakes, and hoes	400	3,016	250	1,041	85	327	.....	.....	32	114
Minor apparatus	.....	700	.....	.....	.....	.....	.....	.....	.....	.....
Shore and accessory property	.....	110,150	.....	217,250	.....	1,625	.....	655	.....	14,700
Cash capital	.....	20,000	.....	151,250	.....	.....	.....	.....	.....	8,000
Total	.....	430,629	.....	604,605	.....	19,810	.....	5,135	.....	181,112

Table showing, by counties, the products of the fisheries of Connecticut in 1898.

Species.	Fairfield.		New Haven.		Middlesex.		Hartford.		New London.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives			12,300	$161	227,455	$2,193	583,945	$4,690	44,700	$302
Blue-fish	4,000	$300	1,750	87	61,300	3,055			896,235	29,409
Bullheads					610	27	1,422	57	1,000	30
Butter-fish			6,910	202	2,000	68			51,370	2,100
Carp					530	27	380	19		
Cod	4,000	160	445	16	620	31			446,160	10,771
Eels	53,100	4,615	33,800	2,682	46,520	2,501	100	7	73,450	4,344
Flounders	5,900	299	46,850	1,596	12,150	406			378,964	11,082
Haddock									112,800	856
Mackerel, fresh			100	10					40,813	1,743
Mackerel, salted									28,000	2,000
Menhaden			5,983,410	12,169	510,000	1,110			4,689,500	13,065
Perch, white					3,135	157	7,964	398	2,723	116
Perch, yellow					1,750	89				
Pickerel					1,500	80	1,230	65	2,690	126
Scup									101,040	3,504
Sea bass	300	30	1,100	58	1,800	108			244,589	11,986
Shad			4,784	349	304,037	12,707	67,568	2,902	122,936	5,257
Smelt	5,500	825	100	12						
Spanish mackerel			30	6					36	6
Squeteague	10,250	618	36,700	929	10,600	287			136,093	8,617
Striped bass	4,700	672	2,950	332	4,200	425	180	24	1,815	209
Sturgeon			500	25					200	8
Suckers					23,250	920	19,503	777	10,620	371
Sword-fish									85,980	7,520
Tautog	11,800	944	5,600	289	2,250	112			50,890	1,773
Tomcod or frost-fish	36,250	1,585	1,300	52					1,200	40
Whiting									3,850	185
Squid									6,900	150
Lobsters	45,260	4,741	36,120	4,253	31,980	3,804			984,832	70,950
Oysters	4,902,142	456,334	9,606,541	783,037	89,600	4,850			35,000	4,850
Clams, hard	204,800	25,865	27,200	3,785	2,000	250				
Clams, soft	44,300	5,224	138,500	11,870	14,500	1,695			2,500	250
Scallops	50,160	5,016								
Total	5,382,462	507,228	15,946,990	821,910	1,351,787	34,902	682,292	8,939	8,556,886	186,620

THE PRODUCTS BY APPARATUS OF CAPTURE.

As regards the value of the products, the principal forms of apparatus employed in the fisheries of Connecticut are those used in the molluscan fisheries, viz, dredges, tongs, etc. The yield of these in 1898 amounted to $1,303,026, or 83 per cent of the total value. The items entering into this value are oysters, $1,249,071; hard clams, $29,900; soft clams, $19,039, and scallops, $5,016. Pots and spears rank next in importance in this particular, with a yield valued at $98,000, consisting of $83,748 worth of lobsters, $14,004 of eels, and $248 of flounders.

Of the forms of apparatus employed in the capture of fish proper, lines yielded the largest value, viz, $60,574, comprised principally of blue-fish, sea bass, and cod, the catch of each being valued at $32,087, $12,152, and $10,924, respectively. The value of other species taken by lines was $5,411, of which $2,164 represented the value of tautog or black-fish. The seine fishery was second in importance, yielding 7,437,144 pounds, valued at $33,855. Menhaden was the most important item in this product, with a yield of 6,428,010 pounds, worth $16,947. Alewives and shad ranked next, with a return of 810,300 and 94,120 pounds, worth $6,891 and $4,064, respectively.

The pound-net fishery, which is prosecuted only in New Haven, Middlesex, and New London counties, yielded 5,486,670 pounds of fish, for which the fishermen received $32,374—a decrease from 1889,

when the product was 7,556,665 pounds, worth $43,288. The principal items in the returns for 1898 were menhaden, 4,706,900 pounds, worth $9,287; flounders, 277,654 pounds, worth $7,843; squeteague, 179,893 pounds, worth $4,728; scup, 96,020 pounds, worth $3,288; and butterfish, 60,280 pounds, worth $2,370.

The gill-net fishery yielded 401,511 pounds of fish in 1898, valued at $17,074, of which 375,561 pounds, worth $15,680, represented the shad yield. The remaining species taken by means of gill nets were blue-fish, squeteague, striped bass, and alewives.

Although fyke nets are used in every county in the State in which fisheries are prosecuted, the fishery is of comparatively little importance, the total yield amounting to only 213,083 pounds, worth $6,096. The principal item in this total was flounders, the yield of which amounted to 131,760 pounds, worth $4,206.

The following series of eight tables shows, by counties and species, the quantity and value of products taken with each form of apparatus in the vessel and shore fisheries of Connecticut in 1898:

Table showing, by counties, the yield of the seine fisheries of Connecticut in 1898.

Species.	Fairfield.		Middlesex.		Hartford.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:						
Alewives			205,855	$1,881	583,645	$4,685
Blue-fish	300	$30				
Bullheads			390	18	1,422	57
Carp			480	24	880	19
Eels			300	18	100	7
Perch, white			2,535	127	7,464	373
Perch, yellow			150	9		
Pickerel			1,100	60	1,230	65
Shad			35,856	1,517	57,624	2,479
Smelt	5,500	825				
Squeteague	3,600	182				
Striped bass	1,100	132	80	10	180	24
Suckers			17,150	688	16,503	657
Tomcod or frost-fish	10,750	430				
Total	21,250	1,599	263,896	4,352	668,548	8,366

Species.	New Haven.		New London.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Mackerel, salted			28,000	$2,000	28,000	$2,000
Menhaden	1,753,410	$4,091	4,674,600	12,856	6,428,010	16,947
Scup			800	24	800	24
Total	1,753,410	4,091	4,703,400	14,880	6,456,810	18,971
Shore fisheries:						
Alewives	12,000	155	8,800	170	810,300	6,891
Blue-fish					300	30
Bullheads			1,000	30	2,812	105
Carp					860	43
Eels					400	25
Perch, white			1,000	40	10,999	540
Perch, yellow					150	9
Pickerel			800	32	3,130	157
Shad	640	68			94,120	4,064
Smelt					5,500	825
Squeteague					3,600	182
Striped bass					1,360	166
Suckers			2,400	72	36,053	1,417
Tomcod or frost-fish					10,750	430
Total	12,640	223	14,000	344	980,334	14,884
Total vessel and shore	1,766,050	4,314	4,717,400	15,224	7,437,144	33,855

Table showing, by counties, the yield of the gill-net fisheries of Connecticut in 1898.

Species.	Fairfield.		Middlesex.		Hartford.		New London.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Alewives			4,000	$48					4,000	$48
Blue-fish	700	$70	10,600	530					11,300	600
Shad			243,021	10,027	9,944	$423	122,596	$5,230	375,561	15,680
Squeteague	3,650	256	3,000	90					6,650	346
Striped bass			4,000	400					4,000	400
Total	4,350	326	264,621	11,095	9,944	423	122,596	5,230	401,511	17,074

Table showing, by counties, the yield of the pound-net fisheries of Connecticut in 1898.

Species.	New Haven.		Middlesex.		New London.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	300	$6	17,600	$264	35,900	$132	53,800	$402
Blue-fish	1,750	87			900	47	2,650	134
Butter-fish	6,910	202	2,000	68	51,370	2,100	60,280	2,370
Cod	445	16	620	31	180	7	1,245	54
Eels	450	36			1,030	66	1,480	102
Flounders	41,850	1,434	10,950	358	224,854	6,051	277,654	7,848
Mackerel	100	10			31,963	1,050	32,063	1,060
Menhaden	4,182,000	7,968	510,000	1,110	14,900	209	4,706,900	9,287
Scup					96,020	3,288	96,020	3,288
Sea bass	100	8			370	22	470	30
Shad	4,144	281	25,160	1,163	340	27	29,644	1,471
Smelt	100	12					100	12
Squeteague	36,700	929	7,600	197	135,593	3,602	179,893	4,728
Spanish mackerel	30	6			36	6	66	12
Striped bass	600	67			1,815	209	2,415	276
Sturgeon	500	25			200	8	700	33
Tautog	3,100	164	1,050	52	25,090	669	29,240	885
Tomcod or frost-fish	1,300	52					1,300	52
Whiting					3,850	185	3,850	185
Squid					6,900	150	6,900	150
Total	4,280,379	11,303	574,980	3,243	631,311	17,828	5,486,670	32,374

Table showing, by counties, the yield of the fyke-net fisheries of Connecticut in 1898.

Species.	Fairfield.		New Haven.		Middlesex.		Hartford.		New London.		Total.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:												
Alewives							300	$5			300	$5
Bullheads					220	$9					220	9
Carp					50	3					50	3
Eels									350	$18	350	18
Flounders	900	$54	5,000	$162					125,860	3,990	131,760	4,206
Menhaden			48,000	100							48,000	100
Perch, white					600	30	500	25	1,723	76	2,823	131
Perch, yellow					1,600	80					1,600	80
Pickerel					400	20			1,890	94	2,290	114
Striped bass	3,600	540	650	65	120	15					4,370	620
Suckers					6,100	232	3,000	120	8,220	299	17,320	651
Tautog									1,800	69	1,800	69
Tomcod or frost-fish	1,000	50							1,200	40	2,200	90
Total	5,500	644	53,650	327	9,090	389	3,800	150	141,043	4,586	213,083	6,096

Table showing, by counties, the yield of the line fisheries of Connecticut in 1898.

Species.	Fairfield.		New Haven.		Middlesex.		New London.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Blue-fish							891,035	$29,147	891,035	$29,147
Cod							445,980	10,764	445,980	10,764
Flounders							26,250	973	26,250	973
Haddock							112,800	856	112,800	856
Mackerel							7,850	573	7,850	573
Scup							4,220	192	4,220	192
Sea bass							217,019	10,554	217,019	10,554
Squeteague							500	15	500	15
Tautog							15,500	620	15,500	620
Total							1,721,154	53,694	1,721,154	53,694
Shore fisheries:										
Blue-fish	3,000	$200			50,700	$2,525	4,300	215	58,000	2,940
Cod	4,000	160							4,000	160
Flounders	1,000	45					2,000	68	3,000	113
Mackerel							1,000	120	1,000	120
Sea bass	300	30	1,000	$50	1,800	108	27,200	1,410	30,300	1,598
Squeteague	3,000	180							3,000	180
Striped bass			1,700	200					1,700	200
Tautog	11,800	944	2,500	125	1,200	60	8,500	415	24,000	1,544
Tomcod or frost-fish	500	25							500	25
Total	23,600	1,584	5,200	375	53,700	2,693	43,000	2,228	125,500	6,880
Total vessel and shore	23,600	1,584	5,200	375	53,700	2,693	1,764,154	55,922	1,846,654	60,574

Table showing, by counties, the catch by pots and spears in the fisheries of Connecticut in 1898.

Species.	Fairfield.		New Haven.		Middlesex.		New London.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Lobsters	8,320	$926					413,307	$29,356	421,627	$30,282
Shore fisheries:										
Eels	53,100	4,615	33,350	$2,646	46,220	$2,483	72,070	4,260	204,740	14,004
Flounders	4,000	200			1,200	48			5,200	248
Lobsters	36,940	3,815	36,120	4,253	31,980	3,804	571,525	41,594	676,565	53,466
Total	94,040	8,630	69,470	6,899	79,400	6,335	643,595	45,854	886,505	67,718
Total vessel and shore	102,360	9,556	69,470	6,899	79,400	6,335	1,056,902	75,210	1,308,132	98,000

NOTE.—The flounders and part of the eels shown in the above table were caught by spears.

Table showing, by counties, the catch by dredges, tongs, rakes, etc., in Connecticut in 1898.

Species.	Fairfield.		New Haven.		Middlesex.		New London.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Oysters	4,356,002	$409,194	8,921,661	$731,759					13,277,663	$1,140,953
Shore fisheries:										
Oysters	546,140	47,140	684,880	51,278	89,600	$4,850	35,000	$4,850	1,335,620	108,118
Clams, hard	204,800	25,865	27,200	3,785	2,000	250			234,000	29,900
Clams, soft	44,300	5,224	138,500	11,870	14,500	1,695	2,500	250	199,800	19,039
Scallops	50,160	5,016							50,160	5,016
Total	845,400	83,245	850,580	66,933	106,100	6,795	37,500	5,100	1,839,580	162,073
Total vessel and shore	5,201,402	492,439	9,772,241	798,692	106,100	6,795	37,500	5,100	15,117,243	1,303,026

Table showing, by counties, the catch of sword-fish by harpoons and of tomcod by minor apparatus in Connecticut in 1898.

Fisheries.	Species.	Fairfield.		New London.	
		Lbs.	Value.	Lbs.	Value.
Vessel	Sword-fish			85,980	$7,520
Shore	Tomcod	24,000	$1,080		

THE MENHADEN INDUSTRY.

There were three menhaden factories in Connecticut in 1898 as compared with four in 1889; but the value of those three was only $24,000 and they employed 52 men, whereas the four factories in 1889 were valued at $83,200, and the factory employees numbered 82. A greater decrease has occurred in the number of steamers employed, of which there were six worth $61,500 in 1889, and in 1898 there were but two, valued at $14,000. The quantity of fish utilized at the factories in the latter year was 13,259,350 in number, from which $39,763 worth of oil and scrap was prepared.

Table showing the extent of the menhaden industry of Connecticut in 1898.

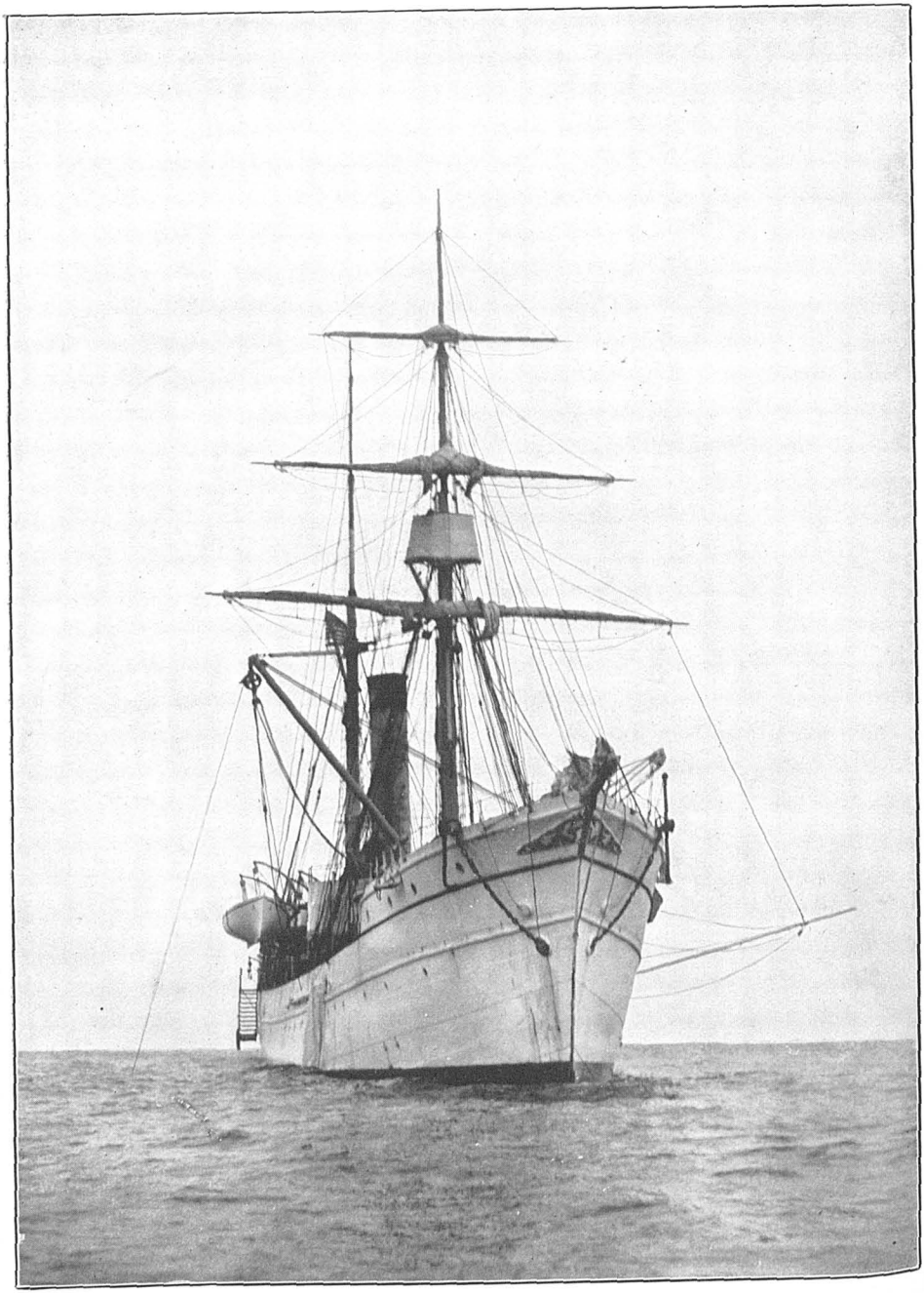
Item.	No.	Value.
Factories in operation	3	$24,000
Cash capital		12,500
Wages paid factory employees		5,750
Factory employees	52	
Men on vessels	38	
Steam vessels fishing	2	14,000
Tonnage	183	
Outfit		5,225
Seines used on vessels	2	1,000
Menhaden utilized	13,259,350	19,597
Products prepared:		
Oil, gallons	104,916	21,813
Dry scrap, tons	445	9,790
Acidulated scrap, do	636	8,160
Value of products		39,763

THE WHOLESALE TRADE IN OPENED OYSTERS.

The shucking of oysters is the most extensive of the industries of Connecticut dependent on the fisheries. In 1898 this gave employment to 575 persons, and the quantity of oysters handled in the 39 establishments aggregated 509,326 gallons, worth $487,327.

Table showing the wholesale trade in opened oysters in Connecticut in 1898.

Items.	No.	Value.
Establishments	39	$204,500
Cash capital		166,750
Wages paid		66,750
Employees	575	
Oysters sold, opened, gallons	509,326	487,327



THE ALBATROSS DREDGING, SHOWING PORT BOOM RIGGED FOR SURFACE TOWING.

DREDGING AND OTHER RECORDS

OF THE

UNITED STATES FISH COMMISSION STEAMER ALBATROSS,

WITH

BIBLIOGRAPHY RELATIVE TO THE WORK OF THE VESSEL.

COMPILED BY C. H. TOWNSEND,
Chief of Division of Fisheries, U. S. Fish Commission.

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DREDGING AND OTHER RECORDS OF THE STEAMER ALBATROSS, WITH BIBLIOGRAPHY RELATIVE TO THE WORK OF THE VESSEL.

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PREFACE.

The records of observations connected with the dredging, sounding, and other operations conducted on board the *Albatross* since the first voyage of the vessel in 1883 have been published in full from year to year in the reports of the United States Fish Commission; but being scattered through a series of bulky volumes, many of which can no longer be supplied, it has become desirable to bring them together in order to secure complete data respecting these operations. The writer, on account of his familiarity with the work of the ship, having served as naturalist during most of the cruises from 1886 to 1900, has been requested to compile the records and bibliography.

There has been a demand for the station records of the *Albatross*, not only as an aid in identifying the large collections of the vessel placed in the hands of specialists for study or deposited in museums, but as a reference book for use in connection with the numerous reports which have already appeared relating to them. In certain papers based on *Albatross* material localities are referred to by station numbers only, which the complete dredging records presented herewith will render intelligible.

The dredging records include data connected with 1,786 hauls of the dredge, beam trawl, etc., at all depths from the shore down to 4,173 fathoms (the deepest), and cover areas extending from the Banks of Newfoundland along both coasts of North and South America to Bering Sea, with limited areas in the tropical Pacific and the region from Japan to Kamchatka. The data accompanying the serial numbers of the stations show the date, position, depth, temperature of surface and bottom, the character of bottom, and the instrument used.

The hydrographic records are included here as an aid in the identification of specimens of bottom deposits. As the 4,000 or more soundings made by the vessel have already found their way upon the various charts of the Atlantic and Pacific oceans, their positions have not been platted on the accompanying maps in connection with those of the dredging stations.

The serial numbers of *Albatross* dredging and hydrographic stations, the former beginning at 2001 and the latter at 1, were carried without change or duplication from 1883 until 1899, when the series "A. A." (A. Agassiz) was added temporarily. During the cruise through the tropical Pacific all of the specimens received "A. A." numbers; these are shown, both in the dredging and hydrographic series, in columns parallel with the regular serial numbers, which are still continued.

The records of tow-net stations—not kept systematically during the earlier work of the *Albatross*—are presented for the period from 1887 to 1900 only. The numbers identifying them are not, unfortunately, continuous from year to year. They are frequently identical with the nearest dredging or hydrographic stations.

The oceanic areas explored by the *Albatross* have been platted upon the accompanying series of charts. As the vessel returned to certain regions year after year, it will be noticed that the serial numbers of the dredging stations are much scattered. Two of the maps show the positions of dredging stations in depths greater than 100 fathoms, the dredgings of less than 100 fathoms being shown on a separate map.

A list of dredging stations, by Sanderson Smith, published in 1888, contains, with earlier dredging records, several maps which show the positions of dredging stations. It is numbered 58 in the accompanying catalog of publications. Other maps showing the positions of *Albatross* dredging and hydrographic stations will be found in the papers numbered 52, 59, 71, 86, 87, 89, 117, 159, and 198. The most important of these, with respect to deep-sea dredging, is No. 86 (same map as in No. 198), showing the positions of stations from Panama to the Gulf of California.

The catalog of papers relating wholly or in part to the work of the *Albatross* numbers nearly 300 titles, including those in preparation. It is annotated briefly, the names of new genera and species described in each paper being given in full.

The yearly reports of the commanding officer of the *Albatross* contain accounts of the daily movements of the vessel. They present not only the dredging and hydrographic data, but the records on ocean temperatures, specific gravities, and other observations made on board, with many notes on the general character of dredge hauls. Reference should be made to these reports[1] for many details respecting the work of the *Albatross* and for numerous records not presented in this paper.

Special papers on the results of *Albatross* investigations have been published in the reports and bulletins of the U. S. Fish Commission, the proceedings, bulletins, and reports of the U. S. National Museum, the bulletins and memoirs of the Museum of Comparative Zoology, the proceedings of the Biological Society of Washington, the transactions of the Connecticut Academy of Arts and Sciences, and in the American Journal of Science. In the proceedings of the U. S. National Museum

[1] Numbers 14, 35, 45, 46, 52, 53, 70, 87, 99, 132, 159, 160, 185, 190.

will be found a series entitled "Scientific results of explorations by the U. S. Fish Commission steamer *Albatross*"; the bulletin and memoirs of the Museum of Comparative Zoology contain a series of "reports on the dredging operations off the west coast of Central America and Mexico to the Galapagos Islands and in the Gulf of California, under the direction of Alexander Agassiz."

The bibliographical matter is arranged chronologically and is composed almost entirely of American papers, although the titles of a few European publications will be found near the end of the catalog. The explorations of the vessel have been referred to from time to time in the reports of the *Challenger* and other European deep-sea exploring expeditions, and in the journals of geographical societies, but very few contain more than brief notes on the subject.

It has not been thought desirable to include the titles of certain official documents relating to the naval patrol of Bering Sea, in which the *Albatross* was much employed; and some unimportant references in periodicals have also been disregarded. A considerable amount of deep-sea exploration was accomplished by the U. S. Fish Commission steamer *Fish Hawk*, both before and after the launching of the *Albatross*, which has been the subject of numerous reports in the publications of the Fish Commission and elsewhere. In some reports the results of the work of the two vessels were combined.

The *Albatross* has been regularly in charge of naval commanders whose periods of service have been as follows: November, 1882, to May, 1894, Z. L. Tanner; May, 1894, to May, 1896, F. J. Drake; May, 1896, to the present time, J. F. Moser. Occasionally, when employed in special investigations, the work of the ship was placed under the direction of other persons.

During the work of the *Albatross*, which was primarily the investigation of the fisheries and fishing-grounds, dredging was carried on more or less regularly as opportunity afforded, but it has been by no means continuous from year to year. For several years, from about 1892 to 1898, comparatively little work of this character was accomplished, owing to the vessel having been frequently detailed for special lines of work in other departments of the public service. In 1889 the *Albatross* was assigned for a time to the service of the Senate Committee on Indian Affairs in Alaskan waters, and in 1891 was engaged for several months in the survey of the cable route between California and the Hawaiian Islands. In 1898 it was detailed to the Navy Department for service in the war with Spain. During the long period of the Bering Sea controversy the vessel was much employed in connection with the naval patrol of Bering Sea and in the service of the commissions created for the investigation of the fur-seal fisheries. The surveys of fishing-grounds, always accompanied with considerable use of the dredge, and the special voyages for deep-sea exploration were thus so frequently interrupted that dredging was practically discontinued for long periods.

The work of the *Albatross* from her first voyage to the present time may be stated briefly as follows:

1883. Fishery and deep-sea investigations off the coasts of the Middle Atlantic and New England States.
1884. Fishery, hydrographic, and deep-sea investigations along the Atlantic coast of the United States and in the Caribbean Sea.
1885. Fishery and deep-sea investigations along the Gulf and Atlantic coasts of the United States and northward to Newfoundland.
1886. Fishery, hydrographic, and deep-sea investigations among the Bahama Islands and along the Atlantic coast of the United States northward to Newfoundland.
1887. Deep-sea explorations among the Lesser Antilles and along the Atlantic coast of South America on voyage to the Pacific coast.
1888. Voyage around South America continued, with deep-sea explorations off the Pacific coasts of South America and Mexico and fishery investigations off the United States and Alaskan coasts.
1889. Fishery and deep-sea investigations off the coast of the United States and Lower California.
1890. Fishery investigations off the west coast of the United States and in Bering Sea.
1891. Deep-sea explorations, west coast of Mexico and Central America and off the Galapagos Islands (winter).
Cruise with Bering Sea Commission to the Pribilof Islands (summer).
Fishery investigations off the coast of Washington and survey of cable route between California and Hawaiian Islands (fall).
1892. Hawaiian cable survey continued. Fur-seal and fishery investigations, Alaskan coast, and voyage to Commander Islands.
1893. Fur-seal and fishery investigations in Alaskan waters and patrol of Bering Sea.
1894. Fur-seal investigations and patrol of Bering Sea.
1895. Fur-seal investigations in Alaskan waters and voyage to Commander Islands.
1896. Fur-seal investigations, Pribilof Islands, Commander Islands, Okhotsk Sea, Kuril Islands, Japan coast, and return voyage via Hawaiian Islands.
1897. Fishery investigations, west coast of the United States, and special salmon fishery investigations in Alaska.
1898. In service of Navy Department during war with Spain.
1899–1900. Voyage of exploration through the tropical Pacific to Japan. Salmon fishery investigations in Alaska.
1901. Salmon fishery investigations in southeast Alaska.

While it is scarcely expected that the present compilation will be free from errors, it is hoped that it will be of substantial service not only in connection with the study of the ever-increasing collections of the *Albatross*, but as a contribution to the general subject of oceanography.

WASHINGTON, *September 27, 1901.*

List of abbreviations used in the dredging and hydrographic records to denote the instruments employed and the characters of the bottom.

Abbreviation.	Meaning.	Abbreviation.	Meaning.	Abbreviation.	Meaning.
bk	black.	lge	large.	slat	slate color.
br	brown.	lt	light.	sml	small.
brk	broken.	m	mud.	sp	specks.
bu	blue.	mang	manganese.	st	stones.
c	clay.	min	mineral.	stf	stiff.
choc	chocolate color.	nod	nodules.	stk	sticky.
co	coral.	oz	ooze.	vol	volcanic.
crs	coarse.	p	pebbles.	wh	white.
dd	dead.	part	particles.	yl	yellow.
dk	dark.	pter	pteropods.	L. B. T.	Large beam trawl.
fne	fine.	pum	pumice.	S. B. T.	Small beam trawl.
for	foraminifera.	r	rock.	Bl. Dr.	Blake dredge (deep-sea dredge).
frag	fragments.	rad	radiolaria.	Sh. Dr.	Ship's dredge (mud bag).
g	gravel.	rd	red.	Tgls	Tangles.
glob	globigerina.	rky	rocky.	*surf*	*surface townet.*
gn	green.	rot	rotten.	4′ Blk	4-foot Blake beam trawl.
gy	gray.	s	sand.	5½′ Blk	5½-foot Blake beam trawl.
hrd	hard.	sft	soft.	8′ Tnr	8-foot Tanner beam trawl.
lav	lava.	sh	shells.		

DREDGING AND TRAWLING RECORDS.

Record of dredging and trawling stations of the Albatross, 1883–1900.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Atlantic Ocean, Cape Hatteras to Cape May.						
	1883.	° ′ ″	° ′ ″	°F.	°F.	*Fms*		
a 2001	Mar. 22	37 46 30	74 00 00	....	.....	519	gn. m	Deep-sea trawl.
2002	Mar. 23	37 20 42	74 17 36	48	.....	641	gn. m	Beam trawl.
2003	Mar. 23	37 16 30	74 20 33	50	.....	641	.....	Do.
2004	Mar. 23	37 19 45	74 26 06	51	.....	102	gn. m., sh	Do.
2005	Mar. 23	37 18 11	74 27 36	50	.....	82	bu. m. and s., brk. sh	Do.
2006	Mar. 23	37 19 11	74 26 06	50	.....	512	bu. m., fne. s	Do.
2007	Apr. 27	35 17 00	75 13 00	56	68	15	fne. s	Do.
2008	Apr. 27	35 09 40	75 04 36	72	74½	92	bu. m., fne. s	Do.
2009	Apr. 28	35 29 35	74 46 45	69	.....	531	.....	Deep-sea trawl.
2010	Apr. 28	35 30 00	74 44 45	61	.....	890	.....	Do.
2011	Apr. 30	36 38 30	74 40 10	48	.....	81	s. and brk. sh	Beam trawl.
2012	Apr. 30	36 41 15	74 39 50	52	.....	68½	.....	Rake dredge.
2013	Apr. 30	36 45 30	74 25 30	48	.....	888	gn. m	Beam trawl.
2014	May 1	36 41 05	74 38 55	47	.....	373	gn. m., fne. s	Do.
2015	May 5	37 31 00	74 53 30	48	.....	19	fne. s. and sh	Do.
2016	May 5	37 31 00	74 52 36	47	45½	19	fne. s. and sh	Do.
2017	May 5	37 30 48	74 51 24	46½	45½	18	fne. s. and sh	Rake dredge.
2018	May 7	37 12 22	74 20 04	54	39	788	bu. m	Deep-sea trawl.
2019	May 7	37 13 52	74 23 52	52½	39	600	bu. m	Do.
2020	May 21	37 37 50	74 15 30	54	.....	143	bu. m., fne. s	Beam trawl.
2021	May 21	37 36 00	74 15 00	54	45	170	bu. m., fne. s	Do.
2022	May 21	37 32 00	74 13 20	52	40	487	bu. m	Deep sea trawl.
2023	May 21	37 48 00	74 01 30	56	.....	377	blk. m., fne. s	Beam trawl.
		Cape May to Nantucket.						
2024	May 25	40 02 10	70 27 00	49	40½	222	dk. gn. m	Beam trawl.
2025	May 25	40 02 00	70 27 00	49	40½	230	gn. m., fne. s	Do.
2026	May 25	40 04 00	70 28 50	49	48	131	gn. m. and s	Do.
2027	May 25	39 58 25	70 37 00	52	43	198	bu. m. and s	Do.
2028	May 25	39 57 50	70 32 00	52	41	209	bu. m	Do.
2029	May 25	39 42 00	70 47 00	53	38½	1,168	gy. m	Dredge tangles.
2030	May 26	39 29 45	71 43 00	49	.....	588	bu. m	Beam trawl.
2031	May 26	39 29 00	72 19 55	50	49½	74	gy. m., blk. and wh. s	Do.
2032	May 26	39 29 00	72 19 40	50	47½	74	gn. m., fne. s., blk. sp	Do.
2033	May 26	39 32 30	72 18 35	49½	41	379	gn. m	Do.
2034	July 17	39 27 10	69 56 20	72	38	1,346	glob. oz	Do.
2035	July 17	39 26 16	70 02 37	71	.....	1,362	glob. oz	Do.
2036	July 18	38 52 40	69 24 40	76	38	1,735	glob. oz	Do.
2037	July 18	38 53 00	69 23 30	76	38	1,731	glob. oz	Do.
2038	July 26	38 30 30	69 08 25	76½	.....	2,033	glob. oz	Deep sea trawl.
2039	July 28	38 19 28	68 20 20	81	.....	2,309	glob. oz	Do.
2040	July 29	38 35 13	68 16 00	76	.....	2,226	glob. oz	Do.
2041	July 30	39 22 50	68 25 00	72	38	1,608	glob. oz	Do.
2042	July 30	39 33 00	68 26 45	71	38½	1,555	glob. oz	Do.
2043	July 30	39 49 00	68 28 30	72	38½	1,467	glob. oz	Do.
2044	July 31	40 00 30	68 37 20	72	39	1,067	oz	Do.
2045	July 31	40 04 20	68 43 50	72	40	373	bu. m., fne. sh	Beam trawl.
2046	July 31	40 02 49	68 49 00	72	40	407	bu. m	Do.
2047	July 31	40 02 30	68 49 40	72	52	389	bu. m	Deep-sea trawl.
2048	July 31	40 02 00	68 56 30	72	39	547	crs. s., m., and g	Do.
2049	Aug. 1	39 43 40	69 20 00	71	39	1,025	bu. m	Do.
2050	Aug. 1	39 42 50	69 21 20	72	44½	1,050	glob. oz	Beam trawl.
2051	Aug. 1	39 41 00	69 20 20	72	39	1,106	bu. m. and glob. oz ...	Do.
2052	Aug. 1	39 40 05	69 21 25	73	45	1,098	glob. oz	Do.
		Nantucket to Cape Sable, N.S.						
2053	Aug. 29	42 02 00	68 27 00	61	.....	105	bu. m	Beam trawl.
2054	Aug. 29	42 03 30	68 26 00	64	.....	105	bu. m	Dredge.
2055	Aug. 30	42 32 00	68 17 00	60	.....	99.5	bu. m., s., and crs. g.	Do.
2056	Aug. 30	42 01 30	68 01 00	57	.....	97	bu. m., fne. s., and crs. g.	Do.
2057	Aug. 30	42 01 00	68 00 30	57	.....	86	crs. s., blk. sp., brk. sh	Beam trawl.
2058	Aug. 30	41 57 30	67 58 00	58	50	35	gy. s	Do.
2059	Aug. 31	42 05 00	66 46 15	55	.....	41	bu. m. and s	Do.
2060	Aug. 31	42 10 00	66 46 15	55	.....	123	gy. s., blk. sp., brk. sh	Do.
2061	Aug. 31	42 10 00	66 47 45	54	40	115	gy. s., blk. sp., bu. m.	Do.
2062	Aug. 31	42 17 00	66 37 15	61	42	150	s. and g	Do.
2063	Aug. 31	42 23 00	66 23 00	57½	40	141	s. and crs. g	Do.
2064	Aug. 31	42 25 40	66 08 35	56	.....	122	crs. s. and g	Do.
2065	Aug. 31	42 27 00	66 00 45	55	44½	80	s., g., and brk. sh	Rake dredge.

a First dredging station occupied by the *Albatross*.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Nantucket to Cape Sable, N. S.						
	1883.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2066	Sept. 1	42 19 40	65 49 30	54	43.5	65	s., st., and g	Rake dredge.
2067	Sept. 1	42 15 25	65 48 40	56	46	122	s. and g	Beam trawl.
2068	Sept. 1	42 03 00	65 48 40	56	42	131	s., fne. g., and c	Do.
2069	Sept. 1	41 54 50	65 48 35	56¼	42	101	s., st., g., p. and c	Grapnel dredge.
2070	Sept. 1	41 55 30	65 47 10	57	42.5	113	p. and c	Bar and tangles.
2071	Sept. 1	41 56 20	65 48 40	57	.....	113	p. and c	Grapnel dredge.
2072	Sept. 2	41 53 00	65 35 00	56	39	858	gy. m	Beam trawl.
2073	Sept. 2	41 54 15	65 39 00	58	40	586.5	gy. s	Do.
2074	Sept. 3	41 43 00	65 21 50	69	40	1,309	m. and st	Do.
2075	Sept. 3	41 40 30	65 35 00	58	39	855	glob. oz	Do.
2076	Sept. 4	41 13 00	66 00 50	69	.....	906	bu. m	Do.
2077	Sept. 4	41 09 40	66 02 20	68	39	1,255	bu. m	Do.
2078	Sept. 4	41 11 30	66 12 20	66	40	490	gy. m. and s	Do.
2079	Sept. 4	41 13 00	66 19 50	67¼	45	75	wh. s	Do.
2080	Sept. 4	41 13 00	66 21 50	67¼	46	55	gy. s	Do.
2081	Sept. 4	41 10 20	66 30 20	56	46	50	wh. s., blk. sp	Do.
2082	Sept. 4	41 09 50	66 31 50	55	46.5	49	crs. yl. s	Do.
2083	Sept. 5	40 26 40	67 05 15	72	40	959	gy. m	Do.
2084	Sept. 5	40 16 50	67 05 15	78¼	40	1,290	bu. m. and s	Do.
2085	Sept. 20	40 05 00	70 34 45	68	50	70	bu. m	Do.
2086	Sept. 20	40 05 05	70 35 00	67	52.5	69	bu. m., gy. s	Do.
2087	Sept. 20	40 06 50	70 34 15	67	50	65	gn. m., wh. s	Do.
2088	Sept. 20	39 59 15	70 36 30	68	48	143	yl. s	Do.
2089	Sept. 20	39 58 50	70 39 40	69	45	168	gy. s	Do.
2090	Sept. 20	39 59 40	70 41 10	68	48.5	140	gy. s., brk. sh	Do.
		Cape Hatteras to Nantucket.						
2091	Sept. 21	40 01 50	70 59 00	69	49	117	gn. m	Beam trawl.
2092	Sept. 21	39 58 35	71 00 30	67¼	45	197	gn. m	Do.
2093	Sept. 21	39 42 50	71 01 20	69	39	1,000	foraminifera, s., m	Do.
2094	Sept. 21	39 44 30	71 04 00	68	38.5	1,022	foraminifera, s., m	Do.
2095	Sept. 30	39 20 00	70 58 40	69¼	.....	1,342	glob. oz	Do.
2096	Sept. 30	39 22 20	70 52 20	69	37.5	1,451	glob. oz	Do.
2097	Oct. 1	37 56 20	70 57 30	72¼	.....	1,917	glob. oz	Do.
2098	Oct. 1	37 40 30	70 37 30	72¼	.....	2,221	glob. oz	Do.
2099	Oct. 2	37 12 20	69 39 00	82	.....	2,940	glob. oz	Do.
2100	Oct. 3	39 22 60	68 34 30	69	37.5	1,628	glob. oz	Do.
2101	Oct. 3	39 18 30	68 24 00	67	37	1,686	glob. oz	Do.
2102	Nov. 5	38 44 00	72 38 00	62¼	30	1,209	glob. oz	Do.
2103	Nov. 5	38 47 20	72 37 00	62	39	1,091	glob. oz	Do.
2104	Nov. 5	38 48 00	72 40 30	63	41.5	991	bu. m	Do.
2105	Nov. 6	37 50 00	73 03 50	63	41	1,395	glob. oz	Do.
2106	Nov. 6	37 41 20	73 03 20	63	42.5	1,497	glob. oz	Do.
2107	Nov. 9	35 19 30	75 15 20	76	.....	16.5	fne. dk. gy. s., small sh.	Do.
2108	Nov. 9	35 16 00	75 02 30	78¼	66	48	bu. m., crs s	Do.
2109	Nov. 9	35 14 20	74 59 10	76	50.5	142	bu. m	Do.
2110	Nov. 9	35 12 10	74 57 15	75¼	40	516	bu. m	Do.
2111	Nov. 9	35 09 50	74 57 40	76	.....	938	gn. m	Do.
2112	Nov. 10	35 20 50	75 18 00	70	73.5	15.5	s., blk. sp	Do.
2113	Nov. 10	35 20 30	75 19 00	70	72.5	15	m., blk. s	Do.
2114	Nov. 10	35 20 00	75 20 00	70	72	14	m., blk. s	Do.
2115	Nov. 11	35 49 30	74 34 45	78	39	843	m., fne. s	Do.
2116	Nov. 11	35 45 23	74 31 25	77	39	888	bu. m., fne. s	Do.
	1884.	*Caribbean Sea.*						
2117	Jan. 27	15 24 40	63 31 30	78	39.75	683	yl. m. fne. s	L. B. T.
2118	Jan. 28	13 32 40	62 54 00	77	.....	690	gy. m. bk. s	Do.
2119	Jan. 29	11 48 30	62 17 30	77	39.25	1,140	gy. m	Do.
2120	Jan. 30	11 07 00	62 14 30	76	.....	73	bu. m	Dr. Tgl.
2121	Feb. 3	10 37 40	61 42 40	77	67	31	dk. slate col. m	L. B. T.
2122	Feb. 3	10 37 00	61 44 22	77	73	34	dk. slate col. m	Do.
2123	Feb. 3	10 42 02	61 48 48	78	64.5	117	bu. m	Do.
2124	Feb. 18	11 34 30	69 02 10	74	59.5	122	fne. sh. gn. m	Sh. Dr.
2125	Feb. 18	11 43 00	69 00 30	74	50.7	208	yl. m. s. bk. sp	S. B. T.
2126	Feb. 19	13 17 45	70 01 00	77	39.3	1,701	yl. m. crs. s. for	Do.
2127	Feb. 25	19 45 00	75 04 00	77	.....	1,639	gn. m	L. B. T.
2128	Feb. 27	19 55 46	75 49 23	78	49.5	400	bu. m. fne. s	Tgl. bar.
2129	Feb. 27	19 56 04	75 48 55	78	.....	274	bu. m. fne. s	Do.
2130	Feb. 27	19 56 25	75 49 49	79	.....	175	gy. m. s. brk. sh	Do.
2131	Feb. 27	19 56 44	75 50 49	79	.....	202	hrd. crs. s	Do.
2132	Feb. 27	19 55 38	75 49 16	79	.....	478	yl. m. brk. sh	Do.
2133	Feb. 27	19 55 55	75 48 03	79	.....	290	wh. s. brk. sh	Do.
2134	Feb. 27	19 56 06	75 47 32	78	.....	254	.....	Do.
2135	Feb. 27	19 55 58	75 47 07	77	.....	250	hrd. co	Do.
2136	Feb. 29	17 43 40	75 38 25	78	.....	52	co. brk. sh	Do.
2137	Feb. 29	17 44 50	75 39 20	78	.....	47	co. brk. sh	Do.
2138	Feb. 29	17 44 05	75 39 00	78	.....	23	co. brk. sh	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Caribbean Sea.						
	1884.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2139	Mar. 11	17 52 00	76 45 30	79	62.3	215	bk. m	Tgl. bar.
2140	Mar. 11	17 36 10	76 46 05	78	39.7	966	s	S. B. T.
2141	Mar. 12	17 25 00	75 59 55	77	.....	5	co. s	Tgl. bar.
2142	Mar. 25	9 30 15	76 20 30	81	.....	42	gn. m. s	S. B. T.
2143	Mar. 23	9 30 45	76 25 30	80	.....	155	gn. m	Do.
2144	Mar. 25	9 49 00	79 31 30	79	.....	896	gn. m	L. B. T.
2145	Apr. 2	9 27 00	79 54 00	79	.....	25	gn. m. brk. sh	Sh. Dr.
2146	Apr. 2	9 32 00	79 54 30	79	.....	34	brk. sh	L. B. T.
2147	Apr. 2	9 32 20	79 54 45	79	78.5	34	co	Tgl. bar.
2148	Apr. 2	9 35 00	79 55 30	79	78.25	130	hrd	Do.
2149	Apr. 4	13 01 30	81 25 00	78	39.7	992	yl. m	Do.
2150	Apr. 9	13 34 45	81 21 10	78	45.75	382	wh. crs. s	Dr. and Tgl. bar.
2151	Apr. 10	15 28 39	80 36 00	78	40.2	653	yl. for. oz	L. B. T.
		Off Havana, Cuba.						
2152	Apr. 30	2¼ miles NW. of Havana Light.		77	49	387	co	Tgl. bar
2153	Apr. 30	23 10 19	82 23 10	77	55.8	283	co	Do.
2154	Apr. 30	23 10 16	82 22 54	77	59.6	310	co	Do.
2155	Apr. 30	23 10 21	82 22 44	77	.....	300	co	Do.
2156	Apr. 30	23 10 35	82 21 55	77	59.8	278	co	Do.
2157	Apr. 30	23 10 04	82 21 07	77	.....	20	.....	Do.
2158	Apr. 30	23 10 25	82 20 36	77	.....	86	.....	Do.
2159	Apr. 30	23 10 39	82 20 08	77	.....	98	co	Do.
2160	Apr. 30	23 10 31	82 20 37	77	.....	167	co	Do.
2161	Apr. 30	23 10 36	82 20 28	78	.....	146	co	Do.
2162	Apr. 30	23 10 30	82 20 25	78	.....	122	co	Do.
2163	Apr. 30	23 10 31	82 20 29	78	.....	133	co	Do.
2164	May 1	23 10 39	82 20 29	77	.....	102	co	Do.
2165	May 1	23 10 39	82 20 28	77	.....	200	co	Do.
2166	May 1	23 10 36	82 20 30	77	71.9	196	co	Do.
2167	May 1	23 10 40	82 20 30	78	.....	201	co	Do.
2168	May 1	23 10 36	82 20 20	78	.....	122	co	Do.
2169	May 1	23 10 28	82 20 27	78	.....	78	co	Do.
		Cape Hatteras to Nantucket.						
2170	July 20	37 57 00	73 53 30	71	.....	155	gy. s	Tgl. bar.
2171	July 20	37 59 30	73 48 40	75	39.5	444	gn. m	Do.
2172	July 20	38 01 15	73 44 00	76	39	568	gn. m	Do.
2173	July 21	37 57 00	72 34 00	70	37	1,600	glob. oz	Do.
2174	July 21	38 15 00	72 03 00	76	.....	1,594	gy. m	Do.
2175	July 22	39 33 00	72 18 30	68	40.5	452	gn. m	Do.
2176	July 22	39 32 30	72 21 30	68	41	302	bk. m	S. B. T.
2177	July 22	39 33 40	72 08 45	68	52	87	gn. m. s	L. B. T.
2178	July 22	39 20 00	72 05 15	68	42.3	220	gn. m. s	Do.
2179	July 23	39 30 10	71 50 00	67	39.5	510	bk. m	Do.
2180	July 23	39 29 50	71 49 30	68	39.5	523	bk. m	Do.
2181	July 23	39 29 00	71 46 00	68	39	603	gy. m. fne. s	Do.
2182	July 23	39 25 30	71 44 00	68	39	861	gn. m	Do.
2183	Aug. 2	39 57 45	70 58 30	68	44.5	195	gn. m. s	Do.
2184	Aug. 2	40 01 15	70 55 30	70	48.9	136	gn. m. s	Do.
2185	Aug. 2	40 00 45	70 54 15	69	51	129	gn. m. s	Do.
2186	Aug. 2	39 52 15	70 55 30	69	39.7	353	gn. m. s	Do.
2187	Aug. 3	39 49 30	71 10 00	68	39.7	420	gn. m. s	Do.
2188	Aug. 3	39 54 30	71 08 00	70	42.7	235	gn. m. s	Do.
2189	Aug. 4	39 49 30	70 26 00	71	39.7	600	gn. m. s	Do.
2190	Aug. 4	39 40 00	70 20 15	73	.....	1,180	glob. oz	Do.
2191	Aug. 4	39 45 30	70 17 00	73	.....	961	gn. m	Lost trawl.
2192	Aug. 5	39 46 30	70 14 45	72	38.6	1,060	gy. oz	L. B. T.
2193	Aug. 5	39 44 30	70 10 30	73	38.4	1,122	gn. m	Do.
2194	Aug. 5	39 43 45	70 07 00	74	38.4	1,140	oz	Do.
2195	Aug. 5	39 44 00	70 03 00	74	38.4	1,058	gn. m	Do.
2196	Aug. 6	39 35 00	69 44 00	74	38	1,230	gn. m	Do.
2197	Aug. 6	39 56 30	69 43 20	74	52.3	84	s. brk. sh	Do.
2198	Aug. 6	39 56 30	69 43 20	74	52.3	84	s. brk. sh	Do.
2199	Aug. 6	39 57 30	69 41 10	74	.....	78	gy. s	Do.
2200	Aug. 6	39 53 30	69 43 20	74	45	148	crs. s. bk. sp	Do.
2201	Aug. 19	39 39 45	71 35 15	66	39.5	538	bu. m	Do.
2202	Aug. 19	39 38 00	71 39 45	67	39.1	515	gn. m	Do.
2203	Aug. 19	39 34 15	71 41 15	74	38.9	705	gn. m. s	Do.
2204	Aug. 19	39 30 30	71 44 30	74	39.1	728	br. m.	Do.
2205	Aug. 20	39 35 00	71 18 45	73	38.1	1,073	gy. oz	Do.
2206	Aug. 20	39 35 00	71 24 30	74	38.4	1,043	gn. m	Do.
2207	Aug. 20	39 35 33	71 31 45	74	38.6	1,061	gn. m	Do.
2208	Aug. 21	39 33 00	71 16 15	74	38.4	1,178	gn. m	Do.
2209	Aug. 21	39 34 45	71 31 30	74	39.5	1,080	gn. m. s	Do.
2210	Aug. 21	39 37 45	71 18 45	74	38.1	991	glob. oz	Do.
2211	Aug. 21	39 35 00	71 18 00	74	38.3	1,064	gy. oz	Do.
2212	Aug. 22	39 59 30	70 30 45	71	40	428	gn. m	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.		Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Lat. N.	Long. W.					
		Cape Hatteras to Nantucket.						
	1884.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2213	Aug. 22	39 58 30	70 30 00	71	39.5	384	gn. m	L. B. T.
2214	Aug. 22	39 57 00	70 32 00	74	39.5	475	gn. m	Do.
2215	Aug. 22	39 49 15	70 31 45	74	.....	578	lost ther	Do.
2216	Aug. 22	39 47 00	70 30 30	71	39.5	983	gn. m	Do.
2217	Aug. 23	39 47 20	69 34 15	73	38.1	924	gy. m	Do.
2218	Aug. 23	39 46 22	69 29 00	74	38.8	948	gy. m	
2219	Aug. 23	39 46 22	69 29 00	74	38.8	948	gy. m	
2220	Aug. 23	39 43 30	69 23 00	74	38.3	1,054	gy. m	
2221	Sept. 6	39 05 30	70 44 30	75	36.9	1,525	gy. oz	
2222	Sept 6	39 03 15	70 50 45	73	36.9	1,537	gy. oz	
2223	Sept. 7	37 48 30	69 43 30	75	36.4	2,516	glob. oz	
2224	Sept. 8	36 16 30	68 21 00	79	36.8	2,574	glob. oz	
2225	Sept. 9	36 05 30	69 51 45	78	36.7	2,512	yl. oz	
2226	Sept. 10	37 00 00	71 54 00	80	36.8	2,045	glob. oz	
2227	Sept. 10	36 55 23	71 55 00	82	36.8	2,179	glob. oz	Lost trawl.
2228	Sept. 11	37 25 00	73 06 00	77	36.8	1,582	br. m	L. B. T.
2229	Sept. 11	37 38 40	73 16 30	75	37.7	1,423	glob. oz	Do.
2230	Sept. 12	38 27 00	73 02 00	75	36.8	1,168	gy. oz	Do.
2231	Sept. 12	38 29 00	73 09 00	75	36.8	965	gy. oz	Do.
2232	Sept. 12	38 37 30	73 11 00	74	42.8	243	gn. m	Do.
2233	Sept. 12	38 36 30	73 06 00	73	39.2	630	gn. m	Do.
2234	Sept. 13	39 09 00	72 03 15	69	38.6	810	gn. m	Do.
2235	Sept. 13	39 12 00	72 03 30	72	38.8	707	gn. m	Do.
2236	Sept. 13	39 11 00	72 08 30	72	39.5	636	gn. m	Do.
2237	Sept. 13	39 12 17	72 09 30	72	39.5	520	gn. m	Do.
2238	Sept. 13	39 06 00	72 10 00	72	38.7	904	gy. m	Do.
2239	Sept. 26	40 38 00	70 29 45	62	.....	32	gn. m	Do.
2240	Sept. 26	40 27 30	70 29 00	61	.....	44	gn. m	Do.
2241	Sept. 26	40 21 00	70 29 15	63	51.4	50	gn. m	Do.
2242	Sept. 26	40 15 30	70 27 00	63	51.4	58	gn. m	Do.
2243	Sept. 26	40 10 15	70 26 00	64	52.4	63	gn. m	Do.
2244	Sept. 26	40 05 15	70 23 00	71	52.9	67	gn. m. s	Do.
2245	Sept. 26	40 01 15	70 22 00	61	50.9	98	gn. m. bk. s	Do.
2246	Sept. 26	39 56 45	70 20 30	71	48.8	122	gn. m	Do.
2247	Sept. 27	40 03 00	69 57 00	70	51.9	78	gn. m. s	Do.
2248	Sept. 27	40 07 00	69 57 00	70	52.4	67	gn. m. bk. s	Do.
2249	Sept. 27	40 11 00	69 52 00	70	51.4	53	gn. m. fne. s	Do.
2250	Sept. 27	40 17 15	69 51 45	68	51.4	47	gn. m. fne. s	Do.
2251	Sept. 27	40 22 17	69 51 30	65	50.9	43	gn. m. fne. s	Do.
2252	Sept. 27	40 28 00	69 51 00	63	50.3	38	gn. m. fne. s	Do.
2253	Sept. 27	40 34 30	69 50 45	61	52.9	32	gy. s. bk. sp	Do.
2254	Sept. 27	40 40 30	69 50 30	61	54.4	25	gy. s. bk. sp	Do.
2255	Sept. 27	40 46 30	69 50 15	60	55.9	18	fne. s. bk. sp	Do.
2256	Sept. 28	40 38 30	69 29 00	61	52.9	30	yl. s	Do.
2257	Sept. 28	40 32 30	69 29 00	61	51.9	33	yl. s. bk. sp	Do.
2258	Sept. 28	40 26 00	69 29 00	61	51.2	36	gy. s. bk. sp	Do.
2259	Sept. 28	40 19 30	69 29 10	61	50.2	41	gy. s. bk. sp	Do.
2260	Sept. 28	40 13 15	69 29 15	65	50.2	46	gy. s	Do.
2261	Sept. 28	40 04 00	69 29 30	66	53.9	58	gy. s. bk. sp	Do.
2262	Sept. 28	39 54 45	69 29 45	67	41.6	250	gn. m. s	Do.
2263	Oct. 18	37 08 00	74 33 00	68	.....	430	gn. m	Do.
2264	Oct. 18	37 07 50	74 34 20	66	46.8	167	gy. s	Do.
2265	Oct. 18	37 07 40	74 35 40	67	57.9	70	gn. m. g	Do.
2266	Oct. 19	35 07 00	75 08 30	78	62.8	111	fne. s. bk. sp	S. B. T.
2267	Oct. 19	35 08 50	75 07 20	79	72.8	68	gy. m	Tgl. bar.
2268	Oct. 19	35 10 40	75 06 10	79	71.3	68	gy. m	Do.
2269	Oct. 19	35 12 30	75 05 00	75	77	48	crs. gy. bk. s	Do.
2270	Oct. 19	35 14 15	75 07 00	75	76.3	32	fne. gy. s. bk. sp	D. S. dredge.
2271	Oct. 19	35 16 00	75 09 00	75	.....	26	crs. gy. s. bk. sp	S. B. T.
2272	Oct. 19	35 20 10	75 14 00	75	.....	15	gy. s bk. sp	Do.
2273	Oct. 19	35 20 30	75 17 30	72	72.3	17	gy. s. brk. sh	Do.
2274	Oct. 19	35 20 35	75 18 05	71	.....	16	gy. s. brk. sh	Dr. S. dredge.
2275	Oct. 19	35 20 40	75 18 40	71	.....	16	gy. s. brk. sh	Dr. & M. B.
2276	Oct. 19	35 20 45	75 19 15	71	.....	16	gy. s. brk. sh	Do.
2277	Oct. 19	35 20 50	75 19 50	71	.....	16	gy. s. brk. sh	Do.
2278	Oct. 19	35 20 55	75 20 20	71	.....	16	gy. s. brk. sh	L. B. T.
2279	Oct. 19	35 20 55	75 20 55	71	.....	16	gy. s. brk. sh	Do.
2280	Oct. 19	35 21 00	75 21 30	70	.....	16	gy. s. brk. sh	Do.
2281	Oct. 19	35 21 05	75 22 05	70	.....	16	gy. s. brk. sh	Do.
2282	Oct. 19	35 21 10	75 22 40	70	.....	14	bk. s	Do.
2283	Oct. 19	35 21 15	75 23 15	70	.....	14	gy. s	Do.
2284	Oct. 19	35 21 20	75 23 50	70	.....	13	crs. gy. s	Do.
2285	Oct. 19	35 21 25	75 24 25	70	.....	13	crs. gy. s	Do.
2286	Oct. 19	35 21 30	75 25 00	70	.....	11	crs. gy. s	Do.
2287	Oct. 20	35 22 30	75 26 00	69	.....	7	crs. gy. s	Do.
2288	Oct. 20	35 22 40	75 25 30	69	.....	7	crs. s. brk. sh	Do.
2289	Oct. 20	35 22 50	75 25 00	69	.....	7	crs. s. bk. sp	Do.
2290	Oct. 20	35 23 00	75 24 30	69	.....	9½	s. brk. sh	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Cape Hatteras to Nantucket.						
	1884.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2291	Oct. 20	35 25 30	75 20 30	69	.....	15	gy. s. brk. sh.....	L. B. T.
2292	Oct. 20	35 27 20	75 16 30	70	.....	17	gy. s. brk. sh.....	Do.
2293	Oct. 20	35 29 10	75 12 30	71	.....	18	crs. s. bk. sp.....	Do.
2294	Oct. 20	35 31 00	75 08 30	71	.....	19	crs. gy. s.....	Do.
2295	Oct. 20	35 32 41	75 04 30	73	.....	22	crs. gy. s.....	Do.
2296	Oct. 20	35 35 20	74 58 45	71	.....	27	crs. gy. s.....	Do.
2297	Oct. 20	35 38 00	74 53 00	73	.....	49	bk. m. brk. sh.....	Do.
2298	Oct. 20	35 39 00	74 52 00	73	.....	80	bk. m. brk. sh.....	Do.
2299	Oct. 20	35 40 00	74 51 30	73	.....	296	bk. m.....	Do.
2300	Oct. 20	35 41 30	74 48 30	71	.....	671	bk. m.....	Do.
2301	Oct. 21	35 11 30	75 05 00	77	75	59	crs. s. bk. sp.....	Tgl. bar.
2302	Oct. 21	35 14 00	75 03 00	77	71.4	49	s. co.....	Do.
2303	Oct. 21	35 17 00	75 01 00	77	.....	41	fne. gy. and bk. s..	S. B. T.
2304	Oct. 21	35 19 00	74 58 00	77	.....	37	fne. gy. and bk. s..	Do.
2305	Oct. 21	35 23 00	74 51 30	79	66.2	58	fne. gy. and bk. s..	Do.
2306	Oct. 21	35 21 30	74 52 00	79	41.7	322	gy. m.....	L. B. T.
2307	Oct. 21	35 42 00	74 54 30	70	57.3	43	gy. and bk. s.....	Do.
2308	Oct. 21	35 43 00	74 53 30	71	.....	45	gy. and bk. s.....	Do.
2309	Oct. 21	35 43 30	74 52 00	71	.....	56	gy. s. brk. sh.....	Do.
2310	Oct. 21	35 44 00	74 51 00	71	.....	132	bk. m. fne. s.....	Do.
		Charleston to Savannah.						
	1885.							
2311	Jan. 5	32 55 00	77 54 00	72	59.1	79	crs. s. bk. sp.....	L. B. T.
2312	Jan. 5	32 54 00	77 53 30	73	57.8	88	crs. s. bk. sp.....	Do.
2313	Jan. 5	32 53 00	77 53 00	73	57.2	99	crs. s. bk. sp. brk. sh	Do.
2314	Jan. 5	32 43 00	77 51 00	69	47.4	159	crs. s. bk. sp. brk. sh	Do.
		Havana, Cuba, to Yucatan.						
2315	Jan. 15	24 26 00	81 48 15	75	.....	37	co.....	L. B. T.
2316	Jan. 15	24 25 30	81 47 45	75	74	50	.....	Do.
2317	Jan. 15	24 25 45	81 46 45	75	75	45	co.....	Do.
2318	Jan. 15	24 25 45	81 46 00	75	75	45	co.....	Do.
2319	Jan. 17	23 10 37	82 20 06	76	.....	143	gy. co.....	Tgls.
2320	Jan. 17	23 10 39	82 18 48	76	.....	130	fne. co.....	Do.
2321	Jan. 17	23 10 54	82 18 00	77	.....	230	fne. gy. s.....	Do.
2322	Jan. 17	23 10 54	82 17 45	77	.....	115	co.....	Do.
2323	Jan. 17	23 10 51	82 19 03	78	.....	163	wh. br. co.....	Do.
2 24	Jan. 17	23 10 25	82 20 24	78	79.1	33	co.....	Do.
2325	Jan. 17	23 10 48	82 19 54	76	.....	170	lt. br. co.....	Do.
2326	Jan. 17	23 11 45	82 18 54	78	62	104	br. co.....	Do.
2327	Jan. 17	23 11 45	82 17 54	76	.....	182	fne. br s.....	Do.
2328	Jan. 17	23 11 03	82 19 15	75	58	203	fne. gy. co.....	Do.
2329	Jan. 17	23 11 03	82 18 45	75	.....	118	wh. co.....	Do.
2330	Jan. 17	23 10 48	82 19 15	75	.....	121	fne. gy. co.....	Do.
2331	Jan. 17	23 10 31	82 19 55	75	.....	114	co.....	Do.
2332	Jan. 19	23 10 38	82 20 06	75	.....	156	wh. gy. co.....	Do.
2333	Jan. 19	23 10 36	82 19 12	75	.....	169	fne. wh. co.....	Do.
2334	Jan. 19	23 10 42	82 18 24	75	.....	67	wh. co.....	Do.
2335	Jan. 19	23 10 39	82 20 21	77	.....	204	.....	Do.
2336	Jan. 19	23 10 48	82 18 52	77	.....	157	co.....	Do.
2337	Jan. 19	23 10 39	82 20 21	78	.....	199	co.....	Do.
2338	Jan. 19	23 10 40	82 20 15	78	.....	189	co.....	Do.
2339	Jan. 19	23 10 40	82 20 15	78	.....	101	co.....	Do.
2340	Jan. 19	23 10 47	82 20 06	78	.....	234	co.....	Do.
2341	Jan. 19	23 11 00	82 19 06	78	.....	143	co.....	Do.
2342	Jan. 19	23 10 39	82 20 21	78	.....	201	co.....	Do.
2343	Jan. 19	23 11 35	82 19 25	78	.....	279	fne. co.....	Do.
2344	Jan. 19	23 10 39	82 20 21	78	.....	199	br. co.....	Do.
2345	Jan. 20	23 10 40	82 20 15	78	.....	184	fne. gy. wh. co.....	Do.
2346	Jan. 20	23 10 39	82 20 21	78	.....	200	co.....	Do.
2347	Jan. 20	23 10 39	82 20 21	78	.....	216	co.....	Do.
2348	Jan. 20	23 10 39	82 20 21	78	.....	211	co.....	Do.
2349	Jan. 20	23 10 40	82 20 15	78	.....	182	co.....	Do.
2350	Jan. 20	23 10 39	82 20 21	78	.....	213	co.....	S. B. T.
2351	Jan. 21	22 41 00	84 16 30	77	.....	426	.....	L. B. T.
2352	Jan. 21	22 35 00	84 23 00	77	45	463	wh. co.....	Do.
2353	Jan. 22	20 59 00	86 23 00	79	62.8	167	co.....	Tgls.
2354	Jan. 22	20 59 30	86 23 45	78	.....	130	co.....	S. B. T.
2355	Jan. 22	20 56 48	86 27 00	78	.....	399	yl. oz.....	Do.
2356	Jan. 29	20 18 50	87 03 00	78	.....	137	fne. wh. co.....	Tgls.
2357	Jan. 29	20 19 00	87 03 10	78	.....	178	wh. co.....	Do.
2358	Jan. 29	20 19 00	87 03 30	78	.....	222	fne. wh. co.....	S. B. T.
2359	Jan. 29	20 19 10	87 03 30	78	50.8	231	wh. co.....	Do.
2360	Jan. 30	22 08 30	86 49 00	78	.....	26	wh. co.....	Tgls.
2361	Jan. 30	22 08 15	86 51 15	78	.....	25	co. s.....	S. B. T.
2362	Jan. 30	22 08 30	86 53 30	78	.....	25	co. s.....	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Havana, Cuba, to Yucatan.						
	1885.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2363	Jan. 30	22 07 30	87 06 00	77	.....	21	wh r.co	S. B. T.
2364	Jan. 30	22 08 40	87 06 00	77	.....	22	co.s	Do.
2365	Jan. 30	22 18 00	87 04 00	77	.....	24	wh.r.co	Do.
2366	Jan. 30	22 23 00	87 02 00	76	.....	27	fne.wh.co	Do.
2367	Jan. 30	22 38 00	87 00 00	76	.....	124	wh.co	Do.
		Gulf of Mexico.						
2368	Feb. 7	29 15 00	85 32 00	64	.....	28	crs.gy.s.brk.sh	Tgls.
2369	Feb. 7	29 16 30	85 32 00	64	.....	26	crs.gy.s.brk.sh	L. B. T.
2370	Feb. 7	29 18 15	85 32 00	64	.....	25	crs.gy.s.brk.sh	Do.
2371	Feb. 7	29 17 00	85 30 45	66	.....	26	gy.s.brk.sh	Do.
2372	Feb. 7	29 15 30	85 29 30	64	.....	27	g	Do.
2373	Feb. 7	29 14 00	85 29 15	64	.....	25	co	Do.
2374	Feb. 7	29 11 30	85 29 00	65	.....	26	s.g.brk.sh	Do.
2375	Feb. 7	29 10 00	85 31 00	65	.....	30	s.bk.sp.brk.sh	Do.
2376	Feb. 11	29 03 15	88 16 00	62	46.5	324	gy.m	Do.
2377	Feb. 11	29 07 30	88 08 00	63	67	210	gy.m	Do.
2378	Feb. 11	29 14 30	88 09 30	63	.....	68	gy.m	Do.
2379	Mar. 2	28 00 15	87 42 00	66	.....	1,467	yl.oz	Do.
2380	Mar. 2	28 02 30	87 43 45	69	40.1	1,430	br.m	Do.
2381	Mar. 2	28 05 00	87 56 15	69	.....	1,390	lt.br.m	Do.
2382	Mar. 3	28 19 45	88 01 30	62	39.6	1,255	gy.m	Do.
2383	Mar. 3	28 32 00	88 08 00	69	39.8	1,181	br.gn.m	Do.
2384	Mar. 3	28 45 00	88 15 30	67	39.6	940	br.gy.m	Do.
2385	Mar. 3	28 51 00	88 18 00	67	40.1	730	gy.m	Do.
2386	Mar. 4	29 15 00	88 06 00	67	61.8	60	bu.m	Do.
2387	Mar. 4	29 21 00	88 04 00	61	.....	32	s.g.brk.sh	Do.
2388	Mar. 4	29 24 30	88 01 00	61	.....	35	yl.s.bk.sp	Do.
2389	Mar. 4	29 28 00	87 56 00	62	.....	27	gy.s.brk.sh	Do.
2390	Mar. 4	29 27 30	87 48 30	62	.....	30	crs.s.bk.sp.sh	Do.
2391	Mar. 4	29 32 00	87 45 00	59	.....	25	gy.s.bk.sp	Do.
2392	Mar. 13	28 47 30	87 27 00	62	40.7	724	br.gy.m	Do.
2393	Mar. 13	28 43 00	87 14 30	64	41.1	525	lt.gy.m	Do.
2394	Mar. 13	28 38 30	87 02 00	66	41.8	420	gn.m	Do.
2395	Mar. 13	28 36 15	86 50 00	66	44.1	347	gy.m	Do.
2396	Mar. 13	28 34 00	86 48 00	66	.....	335	gy.m	Do.
2397	Mar. 14	28 42 00	86 36 00	65	46.1	280	gy.m	Do.
2398	Mar. 14	28 45 00	86 26 00	67	48.6	227	gy.m	Do.
2399	Mar. 14	28 44 00	86 18 00	68	51.6	196	gy.m	Do.
2400	Mar. 14	28 41 00	86 07 00	67	.....	169	gy.m	Do.
2401	Mar. 14	28 38 30	85 52 30	69	.....	142	gn.m.brk.sh	Do.
2402	Mar. 14	28 36 00	85 33 30	63	.....	111	gy.m	Do.
2403	Mar. 15	28 42 30	85 29 00	65	.....	88	gy.m	Do.
2404	Mar. 15	28 44 00	85 16 00	66	.....	60	gy.s	Do.
2405	Mar. 15	28 45 00	85 02 00	68	.....	30	gy.s.brk.co	Do.
2406	Mar. 15	28 46 00	84 49 00	64	.....	26	crs.s.co	Do.
2407	Mar. 15	28 47 30	84 37 00	63	.....	24	co.brk.sh	Do.
2408	Mar. 16	28 28 00	84 25 00	64	.....	21	co	Do.
2409	Mar. 18	27 04 00	83 21 15	66	.....	26	crs.gy.s.brk.sh	Do.
2410	Mar. 18	26 47 30	83 25 15	66	.....	28	fne wh.s.bk.sp.brk.sh.	Rake dredge.
2411	Mar. 18	26 33 30	83 15 30	67	.....	27	fne.wh.s.bk.sp	L. B. T.
2412	Mar. 19	26 18 30	83 08 45	66	.....	27	fne.gy.s.bk.sp.brk.sh.	Do.
2413	Mar. 19	26 00 00	82 57 30	66	.....	24	fne.s.bk.sp.brk.sh	Do.
2414	Mar. 19	25 04 30	82 59 15	69	.....	26	fne.wh.s.brk.sh	Do.
		Savannah to Cape Charles.						
2415	Apr. 1	30 44 00	79 26 00	70	45.6	440	co.crs.s.sh.for	L. B. T.
2416	Apr. 1	31 26 00	79 07 00	74	53.8	276	co.brk.sh	Do.
2417	Apr. 2	33 18 30	77 07 00	67	65.8	95	fne.gy.s	Do.
2418	Apr. 2	33 20 00	77 05 00	67	65.8	90	gy.s	Do.
2419	Apr. 2	32 34 00	76 40 30	72	60.3	107	fne.gy.s.bk.sp	Do.
2420	Apr. 5	37 03 20	74 31 40	48	47.7	104	bk.s.m.g	Do.
2421	June 3	37 07 00	74 34 30	61	.....	64	fne.gy.s.p	Do.
2422	June 3	37 08 30	74 33 30	63	52.5	85	crs. gy. s. bk. sp. brk.sh.	Do.
2423	June 3	37 10 15	74 32 00	67	.....	143	gn.m.fne.s	Do.
2424	June 4	36 41 37	74 42 15	67	52.5	85	bk.m	Do.
2425	June 4	36 20 24	74 46 30	69	51.5	119	dk.gy.m.fne.s	Do.
2426	June 4	36 01 30	74 47 30	71	52.0	93	crs.gy.bk.s.brk.sh	Do.
		Off Newfoundland.						
2427	June 23	42 46 00	51 00 00	47	38.7	523	hrd	L. B. T.
2428	June 23	42 48 00	50 55 30	48	38.3	826	gn.m	Do.
2429	June 23	42 55 30	50 51 00	45	38.7	471	gy.m	Do.
2430	June 23	42 58 30	50 50 00	46	.....	179	gn.s.p	Do.
2431	June 23	43 00 00	50 47 30	46	33.5	129	yl.s.bk.sp	Do.
2432	June 23	43 04 00	50 45 00	47	.....	64	fne.gy.s	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Off Newfoundland.						
	1885.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2433	June 23	43 05 00	50 43 00	48	33	57	gn. s	L. B. T.
2434	June 23	43 08 00	50 40 00	48	34	51	gn. m	Do.
2435	June 23	43 12 00	50 38 45	48	34	47	bk. m	Do.
2436	June 24	43 36 00	50 06 30	49	34	36	wh. s. bk. sp. brk. sh.	Do.
2437	June 24	43 36 00	50 05 00	49	35.8	37	crs. brk. sh. brk. st	Do.
2438	June 24	43 36 00	50 03 30	48	36.8	37	gn. s. bk. sp. brk. sh	Do.
2439	June 24	43 37 00	49 56 30	48	37.8	36	wh. s. bk. sp	Do.
2440	June 24	43 38 00	49 49 30	48	38.3	33	fne. wh. s. bk. sp	Do.
2441	June 25	45 27 00	49 42 00	43	33	34	wh. s. brk. sh	Do.
2442	June 25	45 33 00	49 43 00	44	33.2	36	wh. s. brk. sh	Do.
2443	June 25	45 44 00	49 45 00	46	34.9	35	wh. s. brk. sh	Do.
2444	June 25	45 59 00	49 45 30	45	34.4	39	wh. s. brk. sh	Do.
2445	June 25	46 09 30	49 48 30	44	33.5	39	brk. sh	Do.
2446	June 25	46 20 00	49 52 00	43	35.3	40	brk. sh	Do.
2447	June 25	46 26 00	49 42 00	43	34.8	39	brk. sh	Do.
2448	June 25	46 28 00	49 39 30	43	33.9	40	s. g	Do.
2449	June 25	46 37 00	49 50 30	42	33	39	brk. sh	Do.
2450	June 25	46 45 00	50 02 30	42	31	44	p. brk. sh	Do.
2451	June 26	46 58 00	50 34 00	40	29.7	67	s. sh	S. B. T.
2452	June 26	47 04 00	50 48 00	40	29.7	89	fne. gn. s	L. B. T.
2453	June 26	47 10 00	51 02 00	41	29.7	82	gn. m. fne. s	Do.
2454	June 26	47 16 00	51 16 00	42	29.7	74	fne. gy. s	Do.
2455	June 26	47 21 00	51 38 30	43	30	81	br. s	Do.
2456	July 2	47 29 00	52 18 00	46	.....	86	g	Bl. Dr.
2457	July 2	47 13 00	52 24 00	47	29.5	86	gy. s	Do.
2458	July 2	46 48 30	52 34 00	48	29.5	89	s. gn. m	Do.
2459	July 2	46 23 00	52 45 00	49	29.5	88	crs. gy. s	Do.
2460	July 3	45 50 00	54 06 00	47	30	67	gy. s. sh	Do.
2461	July 3	45 47 00	54 13 30	48	30	59	fne. s. bk. sp	Sh. Dr.
2462	July 3	45 45 30	54 20 30	48	30	41	wh. s. bk. sp	Bl. Dr.
2463	July 3	45 44 00	54 27 00	50	30	45	brk. sh	Do.
2464	July 3	45 40 00	54 41 00	47	32	42	wh. bk. s. brk. sh	Sh. Dr.
2465	July 3	45 35 00	55 01 00	48	30	67	bk. gy. s	Do.
2466	July 3	45 29 00	55 24 00	53	30	67	co	Do.
2467	July 3	45 23 00	55 41 00	52	35.8	38	fne. wh. s. bk. sp	Bl. Dr.
2468	July 3	45 11 30	55 51 30	52	33	42	fne. bk. s	Sh. Dr.
2469	July 4	44 58 37	56 20 45	54	40.5	201	gn. m	L. B. T.
		Off Nova Scotia.						
2470	July 4	44 47 00	56 33 45	54	40.2	224	gy. m	L. B. T.
2471	July 4	44 34 00	56 41 45	53	40.4	218	gy. m. s	Do.
2472	July 4	44 27 30	57 10 45	53	40	137	crs. s. g	Tgls. with grapnels.
2473	July 4	44 27 15	57 10 00	53	40	219	crs. s. brk. sh	Do.
2474	July 4	44 28 30	57 10 45	53	40	133	brd	Do.
2475	July 4	44 28 30	57 10 00	53	.....	222	yl. s. p	Do.
2476	July 4	44 28 50	57 10 30	53	.....	200	yl. s. p	Do.
2477	July 4	44 29 30	57 11 15	51	.....	114	crs. wh. s. p	L. B. T.
2478	July 5	44 05 30	57 16 30	52	.....	191	fne. yl. s	Tgls.
2479	July 5	44 05 45	57 16 45	52	.....	120	wh. s. p	Do.
2480	July 5	44 06 00	57 16 30	52	.....	189	wh. s. p	Sh. Dr.
2481	July 5	44 07 30	57 16 45	52	.....	116	g	Do.
2482	July 5	44 08 00	57 16 15	52	.....	265	br. m	Do.
2483	July 5	44 16 00	57 12 45	53	.....	175	crs. g	Do.
2484	July 5	44 20 00	57 11 15	54	.....	204	fne. wh. s	Do.
2485	July 5	44 24 00	57 09 50	54	.....	205	fne. wh. s	Do.
2486	July 5	44 28 00	57 11 15	54	39.7	190	crs. s. g	Do.
2487	July 5	44 28 30	57 14 45	54	.....	89	gy. s. g	Do.
2488	July 5	44 35 00	57 13 30	53	.....	150	yl. s	Do.
2489	July 5	44 43 00	57 22 45	53	.....	33	wh. s	Do.
2490	July 6	45 27 30	58 27 45	52	.....	50	g. p	Do.
2491	July 6	45 24 30	58 35 15	53	.....	59	wh. s	Do.
2492	July 6	45 22 00	58 43 45	53	33.3	75	wh. s	Do.
2493	July 6	45 19 00	58 51 15	53	32.3	45	wh. s. brk. sh	Do.
2494	July 6	45 14 30	59 06 45	54	32 5	50	s. g	Tgls.
2495	July 6	45 10 00	59 23 45	54	32.5	44	hrd	Do.
2496	July 6	45 07 30	59 27 45	56	32.2	44	crs. yl. s. p	Do.
2497	July 6	45 04 00	59 36 45	55	33	57	yl. s. brk. sh. hrd	Sh. Dr.
2498	July 6	44 54 00	59 46 45	57	.....	65	fne. br. s	L. B. T.
2499	July 6	44 46 30	59 55 45	57	35.8	130	bk. m	Do.
2500	July 7	44 28 00	60 15 15	58	.....	30	s. g	Do.
2501	July 7	44 27 00	60 20 15	58	38.7	26	s. g	Do.
2502	July 7	44 19 00	60 39 15	57	34.8	54	yl. s	Do.
2503	July 7	44 22 30	61 00 15	60	35	47	p	Do.
2504	July 7	44 23 00	61 22 45	62	40.6	82	bk. m. g	Sh. Dr.
2505	July 7	44 23 30	61 44 15	63	42.3	93	dk. br. m	L. B. T.
2506	July 8	44 28 00	62 10 00	61	43.1	127	dk. br. m	Do.
2507	July 8	44 27 30	62 33 30	61	41.6	80	hrd	Sh. Dr.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Off Nova Scotia.						
	1885.	° ′ ″	° ′ ″	° F.	° F.	Fms.		
2508	July 8	44 28 30	62 56 00	61	39.7	72	br m	L. B. T.
2509	July 8	44 30 00	63 18 00	61	34.8	43	crs. s	Sh. Dr.
2510	July 11	44 16 00	63 23 00	53	39.2	68	bk. m. brk. sh	Dredge.
2511	July 11	44 05 30	63 31 30	57	41.6	84	br. m	Sh. Dr.
2512	July 11	43 48 00	63 46 30	58	42.6	103	br. m	Do.
2513	July 11	43 34 00	63 56 30	58	43.6	134	gy. oz	S. B. T.
2514	July 11	43 28 30	63 57 30	59	43.1	126	bk. m	Do.
2515	July 12	43 18 30	63 51 30	58	36.3	57	s. g	Sh. Dr.
2516	July 12	43 15 00	63 58 00	58	38.3	52	rky	Do.
2517	July 12	43 10 00	64 18 00	60	38.3	55	yl. s. bk. sp	Do.
2518	July 12	43 05 00	64 40 30	59	38.7	60	st	Do.
2519	July 12	42 51 15	64 49 00	60	39.2	53	hrd	Do.
2520	July 12	42 41 00	64 55 30	60	40.6	62	rky	Do.
2521	July 12	42 30 30	65 02 00	62	42.1	65	s. g	Do.
2522	July 12	42 20 00	65 07 30	61	46.7	104	s. g	S. B. T.
		Cape Sable to Cape May.						
2523	July 13	41 48 30	65 44 30	60	41.6	111	s. g. st	Sh. Dr.
2524	July 13	41 48 45	65 47 00	60	42.6	85	s. g. st	Do.
2525	July 13	41 49 00	65 49 30	60	43.6	72	s. g. brk. sh	Do.
2526	July 13	41 40 45	65 46 00	66	.....	121	p	Do.
2527	July 13	41 59 00	65 35 30	61	.....	117	s. g	(*a*)
2528	July 13	41 47 00	65 37 30	60	38.7	677	br. s	L. B. T.
2529	July 14	41 03 30	66 14 00	65	38.7	662	gy. m	Do.
2530	July 14	40 53 30	66 24 00	67	38.4	956	gy. oz	Do.
2531	July 14	40 42 00	66 33 00	67	38.4	852	gy. m	Do.
2532	July 14	40 34 30	66 48 00	67	38.7	705	gy. m	Do.
2533	July 15	40 16 30	67 26 15	68	38.7	828	br. oz	Do.
2534	July 15	40 01 00	67 29 15	70	37.8	1,234	gy. oz	Do.
2535	July 15	40 03 30	67 27 15	70	37.8	1,149	gy. oz	Do.
2536	Aug. 7	39 56 15	70 47 30	74	.....	157	gn. m. fne. s	Do.
2537	Aug. 7	39 56 45	70 50 30	74	46.2	156	gn. m. fne. s	Do.
2538	Aug. 7	39 57 30	70 51 15	74	46.2	150	gn. m. fne. s	Do.
2539	Aug. 7	39 59 45	70 53 00	74	47.7	133	gn. s	Do.
2540	Aug. 7	39 58 20	70 52 00	74	46.7	144	gn. s	Do.
2541	Aug. 7	39 57 45	70 50 30	73	47.7	134	gn. s. brk. sh	Do.
2542	Aug. 7	40 00 15	70 42 20	76	47.2	129	s. brk. sh	Do.
2543	Aug. 7	39 58 15	70 42 30	76	45.2	166	gn. s. bk. sp	Do.
2544	Aug. 8	40 01 45	70 24 00	74	47.7	131	gn. s. bk. sp	Do.
2545	Aug. 8	40 01 00	70 23 45	74	46.7	142	gn. s. bk. sp	Do.
2546	Aug. 8	39 53 30	70 17 30	72	39.6	538	gn. m	Do.
2547	Aug. 8	39 54 30	70 20 00	76	39.6	300	gn. m	Do.
2548	Aug. 8	39 56 00	70 14 30	76	43.4	200	gn. s. bk. sp	Do.
2549	Aug. 8	39 51 30	70 17 00	76	39.5	571	gn. m	Do.
2550	Aug. 9	39 44 30	70 30 45	76	38.5	1,081	br. m	Do.
2551	Aug. 9	39 46 00	70 36 30	77	38.7	778	gy. oz	
2552	Aug. 9	39 47 07	70 35 00	77	39.6	721	gy. oz	Do.
2553	Aug. 9	39 48 00	70 36 00	77	39.2	551	gn. m	Do.
2554	Aug. 9	39 48 30	70 40 30	77	39.6	445	gn. m	Do.
2555	Aug. 10	39 53 00	71 32 00	75	47.7	136	gn. m. s	Do.
2556	Aug. 10	39 52 15	71 32 00	75	.....	180	gn. m. fne. s	S. B. T.
2557	Aug. 10	39 53 10	71 31 00	75	46.7	154	gn. m	Do.
2558	Aug. 10	39 47 15	71 50 30	76	50.3	123	gn. s	Do.
2559	Aug. 10	39 48 00	71 48 30	76	.....	120	br. m. s	Do.
2560	Aug. 10	39 48 10	71 48 40	76	50.7	114	br. m. s	L. B. T.
2561	Aug. 10	39 38 00	71 42 00	77	39.2	500	gn. m	Do.
2562	Aug. 11	39 15 30	71 25 00	76	37.3	1,434	gy. oz	Do.
2563	Aug. 11	39 18 30	71 23 30	77	37.4	1,422	gy. oz	Do.
2564	Aug. 11	39 22 00	71 23 30	78	37.3	1,390	gy. oz	Do.
2565	Aug. 28	38 19 20	60 02 30	77	36.2	2,069	gy. and br. oz	Do.
2566	Aug. 29	37 23 00	68 08 00	80	36.4	2,620	gy. oz	Do.
2567	Aug. 30	37 45 00	66 56 00	78	36.4	2,721	gy. oz	(*b*)
2568	Aug. 31	39 15 00	68 08 00	75	36.9	1,781	gy. oz	Do.
2569	Aug. 31	39 26 00	68 03 30	75	37	1,782	gy. oz	Do.
2570	Sept. 1	39 54 00	67 05 30	72	36.8	1,813	glob. oz	Do.
2571	Sept. 1	40 09 30	67 09 00	72	37.8	1,356	gy. glob. oz	Do.
2572	Sept. 2	40 29 00	66 04 00	72	37.8	1,769	gy. oz	Do.
2573	Sept. 2	40 34 18	66 09 00	71	37.3	1,742	gy. m. s	S. B. T.
2574	Sept. 3	41 02 30	65 08 15	71	36.7	1,791	yl. glob. oz	(*c*)
2575	Sept. 3	41 07 00	65 26 30	71	37.1	1,710	gy. oz	Do.
2576	Sept. 4	41 15 30	68 15 00	61	.....	18	crs. wh. s. yl. sp	Do.
2577	Sept. 4	41 17 00	68 21 00	61	.....	32	yl. s. p. hrd	Do.
2578	Sept. 4	41 20 30	68 34 30	60	54.4	37	fne. wh. s. bk. sp	Do.
2579	Sept. 4	41 23 00	68 47 00	61	42.2	70	fne. dk. gy. s	Do.
2580	Sept. 4	41 25 30	69 01 00	62	42.4	83	yl. s. bk. sp	Do.

a Dories lowered with trawl grapnels to drag for coral. Several sprays obtained.
b Lost trawl. *c* Dredge-rope parted, losing large beam-trawl and 321 fathoms of wire rope.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Cape Sable to Cape May.						
	1885.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2581	Sept. 18	39 43 00	71 34 00	70	.....	394	gn. m	L. B. T.
2582	Sept. 18	39 50 00	71 43 00	70	47.2	137	gn. m	Do.
2583	Sept. 18	39 50 45	71 43 00	70	.....	131	gn. m. s	Do.
2584	Sept. 19	39 05 30	72 23 20	72	39.5	541	gy. m	Do.
2585	Sept. 19	39 08 30	72 17 00	73	39	542	dk. gy. m	(a)
2586	Sept. 20	39 02 40	72 40 00	71	40.2	328	dk. gy. m	S. B. T.
2587	Sept. 20	39 02 00	72 38 00	71	39.7	404	dk. gy. m	Do.
2588	Sept. 20	39 02 00	72 36 00	71	39.5	479	gn. m	Do.
2589	Sept. 21	38 55 00	72 50 30	70	44.2	231	gn. m. s	Do.
2590	Sept. 21	38 53 30	72 52 00	71	47.6	190	gn. m. s	Do.
2591	Sept. 21	38 53 30	72 52 00	71	.....	188	gn. m. s	Do.
		Cape Hatteras to Charleston, S. C.						
2592	Oct. 17	35 02 20	75 12 00	79	.....	120	fne. gy. s	L. B. T.
2593	Oct. 17	35 01 19	75 12 00	79	.....	143	gy. s. bk. sp	Do.
2594	Oct. 17	35 01 00	75 12 00	78	.....	160	crs. gy. s. brk. sh	Do.
2595	Oct. 17	35 08 00	75 05 30	78	.....	63	gy. s. brk. sh	Do.
2596	Oct. 17	35 08 30	75 10 00	78	.....	49	gy. s	Do.
2597	Oct 18	34 57 00	75 43 30	76	.....	15	crs. gy. s	Do.
2598	Oct. 18	34 51 00	75 40 15	77	.....	22	wh. s. brk. sh	Do.
2599	Oct. 18	34 45 20	75 38 10	77	.....	25	wh. s. brk. sh	Do.
2600	Oct. 18	34 39 30	75 35 30	78	.....	87	fne. gy. s. bk. sp. brk. sh.	Do.
2601	Oct. 18	34 39 15	75 33 30	78	.....	107	gy. s. p	Do.
2602	Oct. 18	34 38 30	75 33 30	78	.....	124	s. r	Do.
2603	Oct. 18	34 38 30	75 33 30	77	.....	124	s. r	Do.
2604	Oct. 18	34 37 30	75 39 45	78	.....	84	yl. s. brk. sh	Do.
2605	Oct. 18	34 35 30	75 45 30	78	.....	32	wh. s. bk. sp	Do.
2606	Oct. 18	34 35 15	75 52 00	78	.....	25	wh. s. bk. sp	Do.
2607	Oct. 19	34 38 00	76 12 00	76	.....	18	fne. gy. s	Do.
2608	Oct. 19	34 32 00	76 12 00	76	.....	22	crs. gy. s. bk. sp	Do.
2609	Oct. 19	34 26 00	76 12 00	78	.....	22	fne. gy. s	Do.
2610	Oct. 19	34 20 00	76 12 00	75	.....	22	wh. s. bk. sp. brk. sh.	Do.
2611	Oct. 19	34 15 00	76 11 30	75	.....	31	bk. s. brk. sh	Do.
2612	Oct. 19	34 11 00	76 10 30	78	.....	52	crs. wh. s. brk. sh	Do.
2613	Oct. 19	34 09 00	76 02 00	78	.....	168	gy. s. bk. sp	Do.
2614	Oct. 19	34 09 00	76 02 00	78	.....	168	gy. s. bk. sp	Do.
2615	Oct. 20	33 45 00	77 25 00	75	.....	18	gy. s	Dredge.
2616	Oct. 20	33 42 45	77 31 00	75	.....	17	s. p	Do.
2617	Oct. 20	33 37 30	77 36 30	75	.....	14	crs. yl. s. brk. sh	Do.
2618	Oct. 20	33 37 15	77 35 30	74	.....	17	crs. yl. s. brk. sh	S. B. T.
2619	Oct. 20	33 38 00	77 36 00	74	.....	15	crs. yl. s. brk. sp. rot. co.	Dredge.
2620	Oct. 20	33 37 45	77 36 30	75	.....	15	gy. s. rot. co	S. B. T.
2621	Oct. 20	33 34 00	77 42 00	75	.....	9	gy. s. brk. co	Do.
2622	Oct. 20	33 38 00	77 36 00	74	.....	15	gy. s. brk. co	Do.
2623	Oct. 20	33 38 00	77 36 00	74	.....	15	gy. s. brk. co	Do.
2624	Oct. 21	32 36 00	77 29 15	78	.....	258	gy. s. bk. sp	L. B. T.
2625	Oct. 21	32 35 00	77 30 00	76	.....	247	gy. s. bk. sp	Do.
2626	Oct. 21	32 27 30	77 20 30	76	.....	353	fne. gy. s	Do.
2627	Oct. 21	32 21 30	77 07 00	77	.....	437	yl. m	Do.
2628	Oct. 21	32 24 00	76 55 30	77	.....	528	yl. m	Do.
		Bahamas, Florida, and Cuba.						
	1886.							
2629	Mar. 8	23 48 40	75 10 40	73	38.4	1,169	co. s	L. B. T.
2630	Mar. 12	24 39 45	76 11 30	72	61.8	244	co. s	Tgls.
2631	Mar. 12	24 39 30	76 11 00	72	59.8	280	co. s	Do.
2632	Mar. 13	24 30 43	76 23 45	73	39.4	791	co. s. gy. oz	L. B. T.
2633	Apr. 7	23 11 00	82 19 30	76	60.8	208	co. s	Tgls.
2634	Apr. 7	23 10 45	82 18 45	76	.....	162	br. s. brk. sh	Do.
2635	Apr. 7	23 10 55	82 18 55	73	62.8	208	dead co. sh	Do.
2636	Apr. 7	23 10 45	82 18 45	73	62.6	191	dead co. sh	Do.
2637	Apr 7	23 10 45	82 19 00	75	65.8	143	dead co. sh	Do.
2638	Apr. 7	23 17 45	82 18 00	76	39.6	1,025	yl. s	L. B. T.
2639	Apr. 9	25 04 50	80 15 10	73	.....	56	co. s	Bl. Dr.
2640	Apr. 9	25 05 00	80 15 00	73	.....	58	co. s	L. B. T.
2641	Apr. 9	25 11 30	80 10 00	74	69.2	60	co. s	Do.
2642	Apr. 9	25 20 30	79 58 00	74	42.6	217	gy. s	Do.
2643	Apr. 9	25 25 00	79 55 15	74	43.1	211	gy. s	Do.
2644	Apr. 9	25 40 00	80 00 00	73	43.4	193	gy. s	Bl. Dr.
2645	Apr. 9	25 46 30	80 02 00	75	43.4	157	gn. s	Do.

a Lost trawl.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Bahamas, Florida, and Cuba.						
	1886.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2646	Apr. 9	25 47 00	80 05 00	75	.....	85	gy. s. for	Bl. Dr.
2647	Apr. 9	25 48 00	80 04 00	75	.....	85	gy. s. for	Do.
2648	Apr. 9	25 53 00	80 03 30	73	.....	84	gn. m	Do.
2649	Apr. 12	23 34 00	76 33 00	74	74.2	36	co. s.	Tgls.
2650	Apr. 12	23 34 30	76 34 00	74	57.8	369	co. s. wh. oz	Do.
2651	Apr. 13	24 02 00	77 12 45	74	73.4	97	wh. oz	Do.
2652	Apr. 13	24 12 30	77 13 00	74	67.1	140	wh. m	Bl. Dr.
2653	Apr. 14	24 52 30	77 39 00	74	39.1	1,000	lt. br. oz	L. B. T.
2654	May 2	27 57 30	77 27 30	73	39.3	660	yl. oz. bk. sp	Do.
2655	May 2	27 22 00	78 07 30	76	47.5	338	gy. s.	Do.
		Bahamas to Cape Fear, N. C.						
2656	May 3	27 58 30	78 24 00	71	41.2	572	for	L. B. T.
2657	May 3	28 08 00	78 28 00	73	44.7	540	for	Do.
2658	May 3	28 21 00	78 33 00	73	44.7	514	for. brk. sh	Do.
2659	May 3	28 32 00	78 42 00	74	45.2	509	br. for	Do.
2660	May 3	28 40 00	78 46 00	74	45.7	504	yl. for	Do.
2661	May 4	29 16 30	79 36 30	75	45.5	438	gy. s bk. sp	Do.
2662	May 4	29 24 30	79 43 00	75	43.7	434	gy. s. brk. sh	Do.
2663	May 4	29 39 00	79 49 00	77	42.7	421	br. s	Do.
2664	May 4	29 41 00	79 55 00	75	42.7	373	co. s	Do.
2665	May 4	29 47 00	80 05 45	76	45.2	263	fne. gy. s	Do.
2666	May 5	30 47 30	79 49 00	74	48.3	270	gy. s	Do.
2667	May 5	30 53 00	79 42 30	75	48.7	273	gy. s. bk. sp	Do.
2668	May 5	30 58 30	79 38 30	76	46.3	294	gy. s. dd. co	Do.
2669	May 5	31 09 00	79 33 30	77	43.7	352	gy. s. dd. co	Do.
2670	May 5	31 20 00	79 22 00	74	44.5	280	gy. s. dd. co	Do.
2671	May 5	31 20 00	79 22 00	77	.....	280	gy. s. dd. co	Tgls.
2672	May 5	31 31 00	79 05 00	77	54.3	277	crs. br. s	Do.
2673	May 6	32 26 00	77 43 30	77	51.6	240	co. gy. s. bk. sp	L. B. T.
2674	May 6	32 32 00	77 17 00	76	46	316	gy. s. bk. sp. sh	Do.
2675	May 6	32 32 30	77 15 00	75	45.8	327	gy. s. bk. sp. sh	Do.
2676	May 6	32 39 00	77 01 00	77	45.8	407	gn. oz. gy. s	Do.
2677	May 6	32 39 00	76 50 30	78	39.3	478	gn. m	Do.
2678	May 6	32 40 00	76 40 30	77	38.7	731	lt. gy. oz	Do.
2679	May 6	32 40 00	76 40 30	75	38.6	782	lt. gy. oz	Do.
		Long Island to Nantucket.						
2680	July 16	39 50 00	70 26 00	....	.....	555	No specimen	L. B. T.
2681	July 16	39 43 00	70 29 00	....	.....	990	gn. m	Do.
2682	July 16	39 38 00	70 22 00	....	.....	1,004	gn. m. s	Do.
2683	July 17	39 33 00	70 50 00	....	.....	887	br. oz	Do.
2684	July 17	39 35 00	70 54 00	....	.....	1,105	br. c. bk. sp	Do.
2685	July 17	39 35 00	71 02 30	....	.....	1,137	gn. m. wh. sp	Do.
2686	July 18	39 52 00	71 20 45	....	.....	226	gn. m	Do.
2687	July 18	39 46 00	71 19 00	....	.....	326	gn. m	Do.
2688	July 18	39 42 00	71 12 00	....	.....	644	gn. m	Do.
2689	July 18	39 42 00	71 15 30	....	.....	525	gn. m	Do.
2690	July 18	39 39 00	71 11 00	....	.....	643	gn. m	Do.
2691	July 18	39 37 00	71 08 00	....	.....	835	lt. gn. m	Do.
		Off Newfoundland.						
2692	Aug. 11	46 50 00	44 35 00	....	.....	73	gy. s. sml. bk. st	L. B. T.
2693	Aug. 11	46 53 00	44 39 30	....	.....	78	rd. and gn. s. bk. and gy. p.	Do.
2694	Aug. 11	46 52 30	44 54 30	....	.....	86	gy. s. bk. sp	Do.
2695	Aug. 11	46 51 30	45 06 30	....	.....	105	gy. s. bk. sp. p	Do.
2696	Aug. 11	46 53 30	45 05 30	....	.....	98	gy. s. bk. sp	Do.
2697	Aug. 12	47 40 00	47 35 30	....	.....	206	gn. m. bk. sp	Do.
2698	Aug. 22	45 07 00	55 09 00	....	.....	90	gy. s. bk. sp. p	Do.
2699	Aug. 22	45 04 00	55 23 00	....	.....	72	co	Do.
2700	Aug. 22	44 56 30	55 48 00	....	.....	59	gy. s. bk. sp	Do.
2701	Aug. 22	44 56 00	55 49 30	....	.....	75	gy. s. bk. sp	Do.
2702	Aug. 22	44 50 00	56 19 30	....	.....	215	gn. m	Do.
		Cape Breton to Nantucket.						
2703	Aug. 23	44 01 00	59 02 30	....	.....	140	gy. s. bk. sp	L. B. T.
2704	Aug. 23	43 32 00	59 22 00	....	.....	110	gy. s. bk. sp	Do.
2705	Aug. 24	42 47 00	61 04 00	....	.....	1,255	lt. br. oz	Do.
2706	Aug. 27	41 28 30	65 35 30	....	.....	1,188	gy. oz. for	Do.
2707	Aug. 27	41 24 00	65 48 00	....	.....	1,099	br. oz. for	Do.
2708	Aug. 28	40 07 00	67 49 00	....	.....	980	br. oz	Do.
2709	Aug. 28	40 07 00	67 54 00	....	.....	886	br. m	Do.
2710	Aug. 28	40 06 00	68 01 30	....	.....	984	gn. m	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.		Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Lat. N.	Long. W.					
		Nantucket to Cape Charles.						
	1886.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2711	Sept. 16	38 59 00	70 07 00	....	.....	1,544	glob. oz	L. B. T.
2712	Sept. 17	38 20 00	70 05 30	....	.....	1,867	br. oz	Do.
2713	Sept. 17	38 20 00	70 08 30	....	.....	1,859	br. oz	Do.
2714	Sept. 17	38 22 00	70 17 30	....	.....	1,825	br. oz	Do.
2715	Sept. 18	38 29 30	70 54 30	....	.....	1,753	br. oz	Do.
2716	Sept. 18	38 29 30	70 57 00	....	.....	1,631	br. oz. for	Do.
2717	Sept. 18	38 24 00	71 13 00	....	.....	1,615	br. oz	Do.
2718	Sept. 19	38 24 00	71 52 00	....	.....	1,569	br. oz	Do.
2719	Sept. 19	38 29 00	71 58 00	....	.....	1,536	gy. oz	Do.
2720	Sept. 19	38 36 30	72 12 00	....	.....	1,509	gy. oz	Do.
2721	Sept. 20	38 56 00	72 11 30	....	.....	813	gy. oz	Do.
2722	Sept. 20	39 13 00	72 01 00	....	.....	594	gn. m	Do.
2723	Oct. 23	36 47 00	73 09 30	....	.....	1,085	gy. oz. for	Do.
2724	Oct. 23	36 47 00	73 25 00	....	.....	1,641	gy. oz. for	Do.
2725	Oct. 24	36 34 00	73 48 00	....	.....	1,374	gy. oz. for	Do.
2726	Oct. 24	36 34 00	73 54 30	....	.....	1,253	gy. oz	Do.
2727	Oct. 24	36 35 00	74 03 30	....	.....	1,230	gy. oz	Do.
2728	Oct. 25	36 30 00	74 33 00	....	.....	859	gy. oz	Do.
2729	Oct. 25	36 36 00	74 32 00	....	.....	679	dk. gn. m	Do.
2730	Oct. 25	36 42 00	74 30 00	....	.....	727	gn. m. for	Do.
2731	Oct. 25	36 45 00	74 28 00	....	.....	781	gy. oz	Do.
2732	Oct. 26	37 27 00	73 33 00	....	.....	1,162	dk. gn. m	Do.
2733	Oct. 26	37 26 00	73 43 00	....	.....	944	gn. m	Do.
2734	Oct. 26	37 23 00	73 53 00	....	.....	841	sft. gn. m	Do.
2735	Oct. 26	37 23 00	74 02 00	....	.....	811	sft. gn. m	Do.
	1887.							
2736	Apr. 8	Hampton Roads ..		46	46	11	s	S. B. T.
2737	Apr. 8	.....do		46	47	12	s	Do.
		Cape Charles to Long Island.						
2738	Sept. 16	36 52 00	74 23 00	70	38	958	gn. m	L. B. T.
2739	Sept. 17	37 34 30	73 58 00	69	38.2	811	gy. m	Do.
2740	Sept. 17	37 40 00	73 50 00	70	38	1,011	br oz	Do.
2741	Sept. 17	37 44 00	73 57 00	70	38	852	gn. m	Do.
2742	Sept. 17	37 46 30	73 56 30	69	38	865	gn. m	Do.
2743	Sept. 18	38 31 00	72 53 00	67	37.8	1,155	gn. oz	Do.
2744	Sept. 18	38 35 00	73 05 15	69	39	554	bu. m	Do.
2745	Sept. 18	38 42 00	73 05 30	68	41.8	224	gn. m	Do.
2746	Sept. 18	38 46 00	73 05 45	68	51.2	102	gr. s	Do.
2747	Sept. 19	39 27 00	71 15 00	67	37.5	1,276	bu. m	Do.
2748	Sept. 19	39 31 00	71 14 30	68	37.8	1,103	gy. m. for	Do.
2749	Sept. 19	39 42 00	71 17 00	67	38.8	705	gn. oz	Do.
		Lesser Antilles.						
2750	Nov. 27	18 30 00	63 31 00	80	44.5	496	fne. gy. s	2 S. D.
2751	Nov. 28	16 54 00	63 12 00	81	40	687	bu. glob. oz	L. B. T.
2752	Dec. 4	13 34 00	61 04 00	82	48	281	bk. s	Do.
2753	Dec. 4	13 34 00	61 03 00	83	48	281	bk. s	T.
2754	Dec. 5	11 40 00	58 33 00	84	38	880	glob. oz	L. B. T.
		East coast South America.						
2755	Dec. 7	8 04 00 Lat. S.	52 47 00	81	40	720	bu. m	L. B. T.
2756	Dec. 14	3 22 00	37 49 00	79	40.5	417	gy. spk. sp	S. B. T.
2757	Dec. 16	6 59 00	34 47 00	79	79	20	brk. sh	S. D.
2758	Dec. 16	6 59 30	34 47 00	79	79	20	brk. sh	Do.
2759	Dec. 16	7 00 00	34 47 00	79	79	20	brk. sh	S. B. T.
2760	Dec. 18	12 07 00	37 17 00	80	39.5	1,010	br. co	L. B. T.
2761	Dec. 26	15 36 00	38 32 54	79	30	818	pter. oz	Do.
2762	Dec. 30	23 08 00	41 34 00	70	57.1	59	bu. m	S. D.
2763	Dec. 30	24 17 00	42 48 30	75	37.9	671	br. glob. oz	L. B. T.
	1888.							
2764	Jan. 12	36 42 00	50 23 00	68	.....	11.5	s. brk. sh	L. B. T.
2765	Jan. 12	36 43 00	56 23 00	69	.....	10.5	s. brk. sh	Do.
2766	Jan. 12	36 47 00	56 23 00	68	.....	10.5	s. brk. sh	Do.
2767	Jan. 13	40 03 00	58 56 00	64	.....	52	fne. dk. s	Do.
2768	Jan. 14	42 24 00	61 38 30	61	.....	43	dk. s. bk. sp	Do.
2769	Jan. 15	45 22 00	64 20 00	58	56.6	51.5	gn. m. fne. s	Do.
2770	Jan. 16	48 37 00	65 46 00	52	.....	58	gy. s. bk. sp	Do.
2771	Jan. 17	51 34 00	68 00 00	50	49.4	50.5	gy. s. bk. sp	Do.
2772	Jan. 17	52 16 00	68 13 00	52	.....	31.5	fne. gy. s	Do.
2773	Jan. 17	52 23 00	68 11 00	51	.....	10	fne. gy. s	S. B. T.
		Straits of Magellan.						
2774	Jan. 18	52 23 00	68 31 30	49	.....	17	s. g	S. B. T.
2775	Jan. 18	52 22 30	69 22 00	51	.....	29.5	s. st	Do.
2776	Jan. 18	52 41 00	69 55 30	51	.....	21	s. g	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.		Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Lat. S.	Long. W.					
		Straits of Magellan.						
	1888,	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2777	Jan. 19	52 38 00	70 10 30	51	.....	19.75	g.....	S. B. T.
2778	Jan. 23	53 01 00	70 42 15	49	47.9	61	gy. s. bk. sp.....	L. B. T.
2779	Jan. 23	53 06 00	70 40 30	49	46.9	77.5	gn. oz.....	Do.
		Off Chile, South America.						
2780	Feb. 2	53 01 00	73 42 30	51	46.9	369	gn. m.....	L. B. T.
2781	Feb. 4	51 52 00	73 41 00	51	49.9	348	bu. m.....	Do.
2782	Feb. 6	51 12 00	74 13 30	49	47.9	258	bu. m.....	S. B. T.
2783	Feb. 6	51 02 30	74 08 30	49	47.9	122	bu. m.....	Do.
2784	Feb. 8	48 41 00	74 24 00	55	51.9	194	bu. m.....	L. B. T.
2785	Feb. 8	48 09 00	74 36 00	57	46.9	449	bu. m.....	Do.
2786	Feb. 9	46 46 00	75 16 30	57	54.9	57	gn. m.....	Do.
2787	Feb. 9	46 47 30	75 15 00	57	53.9	61	gn. m.....	Do.
2788	Feb. 11	45 35 00	75 55 00	58	36.9	1,050	gn. m.....	Do.
2789	Feb. 12	42 36 00	75 28 00	60	35.9	1,342	bu. m.....	Do.
2790	Feb. 13	39 21 00	74 42 00	62	35.9	1,287	gn. m.....	Do.
2791	Feb. 14	38 08 00	75 53 00	61	37.9	677	yl. m.....	Do.
		Ecuador to Panama.						
2792	Mar. 2	00 37 00	81 00 00	77	42.9	401	gn. m.....	L. B. T.
		Lat. N.						
2793	Mar. 3	01 03 00	80 15 00	78	38.4	741	gn. m.....	Do.
2794	Mar. 5	07 37 00	78 46 30	78	59.6	62	gy. s. bk. sp. brk. sh	S. B. T.
2795	Mar. 5	07 57 00	78 55 00	78	64.1	33	gy. s. bk. sp. brk. sh	L. B. T.
2796	Mar. 5	08 05 00	78 51 00	78	.....	33	gy. s. brk. sh.....	Oyster.
2797	Mar. 5	08 06 30	78 51 00	78	.....	33	gy. s. brk. sh.....	L. B. T.
2798	Mar. 5	08 10 30	78 50 30	78	.....	18	gy. s. brk. sh.....	Do.
2799	Mar. 6	08 44 00	79 09 00	75	.....	29.5	gn. m.....	Do.
2800	Mar. 30	08 51 00	79 31 30	77	.....	7	gn. m.....	Do.
2801	Mar. 30	08 47 00	79 29 30	78	.....	14	gn. m.....	Do.
2802	Mar. 30	08 38 00	79 31 30	78	.....	16	gn. m.....	Do.
2803	Mar. 30	08 27 00	79 35 00	78	.....	26	gn. m.....	Do.
2804	Mar. 30	08 16 30	79 37 45	81	.....	47	gn. m.....	Do.
2805	Mar. 30	07 56 00	79 41 30	78	.....	51.5	gn. m.....	Do.
		Galapagos Islands.						
2806	Apr. 3	00 30 00	88 37 30	80	36.4	1,379	br. glob. oz.....	L. B. T.
		Lat. S.	Long. W.					
2807	Apr. 4	00 24 00	89 06 00	79	38.5	812	glob. oz. co. m.....	Do.
2808	Apr. 4	00 36 30	89 19 00	79	39.9	634	co. s.....	Do.
2809	Apr. 4	00 50 00	89 36 00	79	74.1	45	gy. s.....	S. B. T.
2810	Apr. 7	01 22 00	89 39 30	81	.....	6.5	co. s.....	Tangles.
2811	Apr. 7	01 21 30	89 39 30	81	.....	19	co. s.....	S. B. T.
2812	Apr. 7	01 21 30	89 39 45	81	.....	20	co. s.....	Tangles.
2813	Apr. 7	01 21 00	89 40 15	81	.....	40	co. s.....	S. Dredge.
2814	Apr. 9	01 17 30.	90 30 00	79	.....	20	hrd.....	Do.
2815	Apr. 9	01 17 30	90 30 15	79	.....	33.5	gy. s. bk. sp.....	Tangles.
2816	Apr. 9	01 17 00	90 31 30	79	.....	78.5	gy. s. fne. g.....	Do.
2817	Apr. 15	00 46 00	89 42 00	80	46.9	271	wh. s.....	S. B. T.
2818	Apr 15	00 29 00	89 54 30	83	43.9	392	wh. and bk s.....	L. B. T.
2819	Apr. 15	00 08 00	90 06 00	83	39.9	671	wh. s.....	Do.
		Off Manzanillo, Mexico.						
		Lat. N.	Long. W.					
2820	Apr. 26	18 43 00	104 04 00	85	45.9	294	br. m.....	L. B. T.
2821	Apr. 28	18 52 00	10 10 30	84	53.9	117	br. m.....	Do.
		Gulf of California.						
2822	Apr. 30	24 16 00	110 22 00	73	.....	21	gy. s. brk. sh.....	S. B. T.
2823	Apr. 30	24 18 00	110 22 00	73	.....	26.5	brk. sh.....	L. B. T.
2824	Apr. 30	24 22 30	110 19 30	73	.....	8	brk. sh.....	Tangles.
2825	Apr. 30	24 22 15	110 19 15	73	.....	7	brk. co.....	Ship dredge.
2826	Apr. 30	24 12 00	109 55 00	74	.....	9.5	sh.....	Oyster dredge.
2827	Apr. 30	24 11 45	109 55 00	74	.....	10	sh.....	Do.
2828	Apr. 30	24 11 30	109 55 00	74	.....	10	sh.....	Do.
		Off Lower California.						
2829	May 1	22 52 00	109 55 00	75	74.1	31	rky.....	Tangles.
2830	May 1	23 33 00	110 37 00	67	74.1	66	fne. s.....	L. B. T.
2831	May 2	24 32 00	111 50 00	67	.....	12	fne. gy s.....	Do.
2832	May 2	24 38 00	112 17 30	60	56.4	51	gn. m.....	Do.
2833	May 2	24 38 00	112 17 30	60	.....	51	gn. m.....	Tangles.
2834	May 3	26 14 00	113 13 00	61	53.9	48	yl. m.....	L. B. T.
2835	May 4	26 42 30	113 34 15	56	.....	5.5	gn. m.....	Ship dredge.
2836	May 4	26 42 30	113 34 15	57	.....	6	gn. m.....	Oyster dredge.
2837	May 5	28 10 00	115 09 45	62	.....	23	fne. s.....	Ship dredge.
2838	May 5	28 12 00	115 09 00	62	.....	44	gn. m.....	L. B. T.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.		Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Lat. N.	Long. W.					
		Santa Barbara Islands, California.						
	1888.	° ′ ″	° ′ ″	°F.	° F.	Fms.		
2839	May 8	33 08 00	118 40 00	61	41.4	414	gy. s	L. B. T.
2840	May 9	34 11 00	120 15 00	54	43.9	27.6	gn. m	Do.
		Unalaska to Cook Inlet.						
2841	July 23	54 18 00	165 55 00	46	41	56	p	S. B. T.
2842	July 23	54 15 00	166 03 00	46	41	72	p	Do.
2843	July 28	53 56 00	165 56 00	50	43.5	45	brk. sh. and p	Do.
2844	July 28	53 56 00	165 40 00	48	42	54	gy. s	L. B. T.
2845	July 29	54 05 00	164 09 00	51	42	42	crs. bk. s	Do.
2846	July 30	54 08 00	162 44 00	50	42	44	g	Do.
2847	July 31	55 01 00	160 12 00	51	42	48	fne. gy. s	Do.
2848	July 31	55 10 00	160 18 00	49	41	110	gn. m	Do.
2849	Aug. 2	55 16 00	160 28 00	51	43	69	gn. m	Do.
2850	Aug. 4	54 52 00	159 46 00	51	48.2	21	brk. sh	Do.
2851	Aug. 4	54 55 00	159 52 00	51	44.8	35	gy. s. brk. sh	Do.
2852	Aug. 4	55 15 00	159 37 00	48	41.8	58	bk. s	Do.
2853	Aug. 9	56 00 00	154 20 00	55	41	159	gy. s	Do.
2854	Aug. 10	56 55 00	153 04 00	55	42.8	60	bk. s	Do.
2855	Aug. 10	57 00 00	153 18 00	56	44	69	gn. m	Do.
2856	Aug. 22	58 07 00	154 36 00	54	44	68	gy. sh. bk. sp	Do.
2857	Aug. 22	58 05 00	150 46 00	57	44.6	51	brk. sh. gy. s	Do.
2858	Aug. 24	58 17 00	148 36 00	59	39.8	230	bu. m. g	Do.
		Sitka to Columbia River.						
2859	Aug. 29	55 20 00	136 20 00	60	34.9	1,569	gy. oz	L. B. T.
2860	Aug. 31	51 23 00	130 34 00	58	36 5	876	gn. m	Do.
2861	Aug. 31	51 14 00	129 50 00	60	42.6	204	No specimen in cup.	Do.
2862	Sept. 1	50 49 00	127 36 30	58	44.7	238	gy. s. and p	Do.
2863	Sept. 5	48 58 00	123 10 00	62	48.5	67	fne. s. brk. sp	Do.
2864	Sept. 6	48 22 00	122 51 00	52	47.7	48	m. brk. sh. s	Do.
2865	Sept. 6	48 12 00	122 49 00	52	51.7	40	p	Do.
2866	Sept. 20	48 09 00	125 03 00	59	43.2	171	gy. s	Do.
2867	Sept. 20	48 07 00	124 55 00	58	.....	37	fne. gy. s	Do.
2868	Sept. 21	47 52 00	124 44 00	58	46.9	31	gy. s	Do.
2869	Sept. 21	47 38 00	124 39 00	60	48.4	32	bk. s	Do.
2870	Sept. 23	46 44 00	124 32 00	58	46.5	58	rky	Do.
2871	Sept. 23	46 55 00	125 11 00	62	38.4	559	br. oz	Do.
2872	Sept. 24	48 17 00	124 52 00	59	45.5	38	gy. s	Do.
2873	Sept. 24	48 30 00	124 57 00	54	47.8	40	r	Do.
2874	Sept. 24	48 30 00	124 57 00	52	50.3	27	r. and sh	Tangles.
2875	Sept. 24	48 30 00	124 57 00	52	47.8	40	r. and sh	Do.
2876	Sept. 25	48 33 00	124 53 00	49	45.5	59	bk. s. and m	L. B. T.
2877	Sept. 25	48 33 00	124 53 00	49	45.5	59	bk. s. and m	Tangles.
2878	Sept. 25	48 37 00	125 32 00	57	45.5	66	p	S. D.
2879	Sept. 26	48 53 00	125 53 00	54	50.3	34	r	Do.
2880	Sept. 26	48 53 00	125 53 00	54	50.3	34	r	S. D.
2881	Sept. 26	49 00 00	125 48 00	57	52.3	24	gy. s	Do.
		Off Oregon.						
2882	Oct. 13	46 09 00	124 22 30	60	45.8	68	gy. s	L. B. T.
2883	Oct. 18	45 56 00	124 01 30	60	50.1	29	fne. gy. s	S. D.
2884	Oct. 18	45 55 00	124 02 00	60	50.2	20	fne. gy. s	Do.
2885	Oct. 18	45 56 00	124 02 00	60	49	30	fne. gy. s	Do.
2886	Oct. 19	43 59 00	124 56 30	57	48.1	50	rky	Do.
2887	Oct. 19	43 58 00	124 57 00	59	47.1	42	c. and p	L. B. T.
2888	Oct. 19	43 58 00	124 57 30	59	47.6	41	c. and p	Do.
2889	Oct. 19	43 59 00	124 56 00	57	47.7	46	c. sh	Do.
2890	Oct. 19	43 46 00	124 57 00	59	42.2	277	gy. s	Do.
		Off Southern California.						
	1889.							
2891	Jan. 5	34 25 00	120 42 00	57	45.1	233	m	L. B. T.
2892	Jan. 5	34 15 00	120 36 00	57	44.1	284	yl. m	Do.
2893	Jan. 5	34 12 30	120 32 30	59	48.6	145	fne. gy. s. m	Do.
2894	Jan. 5	34 07 00	120 33 30	60	55.6	53	brk. sh. s	S. D.
2895	Jan. 5	34 07 00	120 33 30	60	.....	53	brk. sh. s	Tangles.
2896	Jan. 6	33 55 30	120 28 00	59	42.8	376	yl. m	L. B. T.
2897	Jan. 6	33 59 30	120 29 30	61	47.1	197	rky	Tangles.
2898	Jan. 6	33 00 30	120 29 00	61	.....	158	.....	L. B. T.
2899	Jan. 6	34 00 00	120 23 00	59	.....	44	gy. s. brk. sh	Do.
2900	Jan. 7	34 01 30	120 01 30	58	.....	13	s	S. D.
2901	Jan. 7	34 05 00	120 02 00	58	55.1	48	gy. s. m	
2902	Jan. 7	34 06 00	120 02 00	59	45.0	53	fne. gy. s. m	S. B. T.
2903	Jan. 7	34 11 30	120 03 00	59	43.5	322	g. m	L. B. T.
2904	Jan. 7	34 18 30	120 04 30	59	43.7	314	g. m	Do.
2905	Jan. 8	34 23 00	120 20 00	59	.....	95	rky	S. B. T.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.		Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Lat. N.	Long. W.					
		Off Southern California.						
	1889.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
2906	Jan. 8	34 23 30	120 19 30	58	55.5	98	s.m	Tangles.
2907	Jan. 8	34 24 30	120 20 00	58	.....	44	fne.gy.s	L.B.T.
2908	Jan. 8	34 25 25	120 20 00	58	.....	31	gy.s.brk.sh	Do.
2909	Jan. 8	34 22 00	120 08 30	59	45.2	205	gn.m	S.B.T.
2910	Jan. 8	34 20 00	119 54 00	61	45.2	229	gn.m	Do.
2911	Jan. 16	32 27 30	119 05 00	59	.....	60	r.s	S.D.
2912	Jan. 16	32 25 15	119 04 30	59	.....	10	rky	Tangles.
2913	Jan. 16	32 25 30	119 03 30	60	59	26	brk.sh	S.D.
2914	Jan. 16	32 25 00	119 03 15	60	59	26	brk.sh	Tangles.
2915	Jan. 16	32 23 30	119 02 15	60	53.1	55	gy.s	Do.
2916	Jan. 16	32 22 30	119 02 00	60	49.1	93	rky	L.B.T.
2917	Jan. 16	32 22 30	119 03 30	59	49.1	90	fne.g.s.brk.sh	S.D.
2918	Jan. 16	32 22 30	119 03 30	59	52.4	67	fne.gy.s	Do.
2919	Jan. 17	32 17 00	119 17 00	59	38	984	gy.m	L.B.T.
2920	Jan. 17	32 27 00	119 15 00	60	50.1	87	yl.s.brk.sh	S.D. and tangles.
2921	Jan. 17	32 27 00	119 14 15	60	51.5	145	fne.gy.s	S.D.
2922	Jan. 17	32 27 15	119 05 15	59	57.1	47	fne.gy.s	Do.
2923	Jan. 19	32 40 30	117 31 30	59	39	822	gn.m	L.B.T.
2924	Jan. 19	32 34 30	117 25 30	59	40.5	455	br.m	Do.
2925	Jan. 19	32 32 30	117 24 00	59	42.9	339	m	Do.
2926	Jan. 19	32 34 30	117 18 45	62	54.4	69	fne.gy.s	Do.
2927	Jan. 23	32 43 00	117 51 00	58	43.3	313	gn.m	Do.
2928	Jan. 23	32 47 30	118 10 00	59	41	417	bk.s.g	Do.
2929	Jan. 26	32 27 30	117 26 30	58	.....	623	gn.m	S.B.T.
2930	Jan. 26	32 25 00	117 18 45	59	52.9	60	m	Do.
2931	Jan. 26	32 25 30	117 16 45	59	55.9	34	gy.s.sh	Do.
2932	Jan. 26	32 26 15	117 16 15	59	58	20	gy.s.brk.sh	Do.
2933	Jan. 26	32 28 45	117 16 15	59	57.3	36	fne.gy.s	S.D.
2934	Jan. 26	32 33 30	117 16 00	59	58.2	35	gy.s	L.B.T.
2935	Feb. 4	32 44 30	117 23 00	59	49.2	124	fne.gy.s	Do.
2936	Feb. 4	32 49 00	117 27 30	61	49	359	m	Do.
2937	Feb. 4	33 04 30	117 42 00	62	46.5	464	gn.m	Do.
2938	Feb. 5	33 35 15	118 08 30	58	58	47	fne.gy.s.st	Do.
2939	Feb. 5	33 36 00	118 09 30	59	.....	27	fne.gy.s.st	Do.
2940	Feb. 5	33 36 00	118 11 00	59	.....	26	fne.gy.s.brk.sh	Do.
2941	Feb. 5	33 37 15	118 12 00	59	.....	26	sh.st	Do.
2942	Feb. 5	33 38 45	118 13 45	59	.....	20	gy.s.brk.sh	Do.
2943	Feb. 6	34 00 30	119 28 30	59	56	31	rky	S.D.
2944	Feb. 6	34 00 00	119 28 30	59	.....	30	rky	S.B.T.
2945	Feb. 6	34 00 00	119 20 30	59	.....	30	p	Do.
2946	Feb. 6	33 58 00	119 30 45	59	56.5	150	crs.gy.s	L.B.T.
2947	Feb. 7	33 55 30	119 40 30	59	.....	289	gy.s.g.brk.sh	Do.
2948	Feb. 7	33 55 30	119 41 30	59	.....	206	gy.s.g.brk.sh	Do.
2949	Feb. 7	33 57 00	119 53 30	58	.....	155	fne.gy.s	Do.
2950	Feb. 8	34 00 30	119 59 00	57	55.4	21	gy.s.brk.sh	Do.
2951	Feb. 8	33 55 30	119 55 00	56	.....	48	fne.gy.s	Do.
2952	Feb. 8	33 50 00	119 57 00	57	.....	57	brk.sh.r	Do.
2953	Feb. 8	33 47 00	119 58 15	57	.....	82	gy.s.brk.sh	S.D.
2954	Feb. 8	33 42 30	119 59 30	57	.....	65	g.sh.r	Do.
2955	Feb. 8	33 46 00	120 03 15	59	48.2	121	fne.gy.s.brk.sh	S.B.T.
2956	Feb. 8	33 57 30	120 18 30	58	53.1	52	fne.gy.s.r	Do.
2957	Feb. 9	34 04 00	120 19 30	58	54.9	26	gy.s.rky	S.D.
2958	Feb. 9	34 04 00	120 19 30	58	54.9	26	gy.s	Tangles.
2959	Feb. 9	34 06 45	120 18 00	59	51.9	55	gn.m.gy.s.brk.sh	L.B.T.
2960	Feb. 9	34 10 45	120 16 45	59	48	267	gn.m	Do.
2961	Feb. 11	34 22 45	119 40 30	58	.....	21	gn.m	Do.
2962	Feb. 11	34 23 30	119 39 30	59	.....	105	s.st.co	Do.
2963	Feb. 11	34 23 10	119 39 40	59	.....	20	s.st.co	Tangles.
2964	Feb. 11	34 22 45	119 40 00	59	.....	21.5	s.st	Do.
2965	Feb. 11	34 21 20	119 38 30	60	58	27	fne.gy.s.r	Do.
2966	Feb. 11	34 20 40	119 38 50	60	58.5	30	crs.m	Do.
2967	Feb. 11	34 21 15	119 39 10	60	58	30	crs.m	Do.
2968	Feb. 11	34 21 40	119 38 20	61	59	31	m	Do.
2969	Feb. 11	34 20 40	119 37 45	61	58	26	gy.s.p.st	Do.
2970	Feb. 11	34 20 20	119 37 30	61	59.1	29	fne.gy.s.m	L.B.T.
2971	Feb. 11	34 20 30	119 37 50	60	58.5	29	fne.gy.s.m	Do.
2972	Feb. 11	34 18 30	119 41 00	60	53.5	61	gn.m	Do.
2973	Feb. 11	34 19 30	119 44 15	60	54	68	gn.m	Do.
2974	Feb. 11	34 19 30	119 44 45	60	53.2	73	gn.m	Tangles.
2975	Feb. 12	34 01 30	119 29 00	60	57	36	g.brk.sh	L.B.T.
2976	Feb. 12	34 00 00	119 28 30	60	58	31	crs.g.s.brk.sh	S.B.T.
2977	Feb. 12	33 59 30	119 25 30	60	56.5	45	fne.gy.s.p	Do.
2978	Feb. 12	33 59 45	119 22 15	60	56.5	46	gy.s	Do.
2979	Feb. 12	33 56 30	119 22 30	60	.....	388	gn.m	L.B.T.
2980	Feb. 12	33 49 45	119 24 30	62	38.9	603	gn.m	Do.
2981	Feb. 13	33 18 00	119 24 00	58	.....	45	crs.gy.s.brk.sh	Do.
2982	Feb. 13	33 24 45	119 07 00	58	46.7	178	s.m.g	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Off Lower California.						
	1889.	° ′ ″	° ″	° F.	° F.	Fms.		
2983	Feb. 28	28 58 30	118 15 45	61	55.8	58	gy. s. brk. sh	S. B. T.
2984	Feb. 28	28 57 15	118 15 45	63	49.8	113	gy. s. brk. sh	Do.
2985	Feb. 28	28 57 00	118 16 30	65		36	brk. sh. r	Do.
2986	Feb. 28	28 57 00	118 14 30	64	38.5	684	fne. gy. s. brk. sh	L. B. T.
2987	Feb 28	28 54 15	118 18 00	63	46.3	171	gy. s. bk. sp. g	S. B. T.
2988	Mar. 2	24 58 30	115 52 30	65	63.9	34	coralline	Tangles.
2989	Mar. 2	24 58 15	115 53 00	64.5	64.3	36	coralline	S. D.
2990	Mar. 2	24 58 05	115 53 10	65	63.6	48	coralline	S. B. T.
		Revillagigedo Islands.						
2991	Mar. 6	18 18 30	114 40 00	72		341		L. B. T.
2992	Mar. 6	18 17 30	114 43 15	72	41.8	460	bk. s. r	Do.
2993	Mar. 6	18 17 15	114 44 30	72	43.5	304	gy. s. brk. sh	Do.
2994	Mar. 6	18 18 30	114 44 30	72	66.6	54	brk. co	S. D.
2995	Mar. 6	18 19 00	116 44 15	72	68.4	31	gy. s. brk. co	Do.
		Gulf of California.						
2996	Mar. 16	24 30 15	110 29 00	72	56	112	gn. m	L. B. T.
2997	Mar. 16	24 39 30	110 34 00	73	49.5	221	gn. m	Do.
2998	Mar. 16	24 51 00	110 39 00	72	64	40	s. brk. sh	Do.
2999	Mar. 16	24 54 30	110 39 00	72	63.6	39	crs. s	Do.
3000	Mar. 16	24 54 45	110 39 30	72	61.5	43	crs. s	Oyster dredge.
3001	Mar. 16	24 55 15	110 39 00	72	64.5	33	fne. gy. s. brk. sh	Do.
3002	Mar. 17	25 02 15	110 43 30	70		17	s. sh	Do.
3003	Mar. 17	25 02 25	110 43 30	70		9	s. sh	Do.
3004	Mar. 17	25 02 35	110 43 30	70		7.5	s. sh	L. B. T.
3005	Mar. 17	25 02 45	110 43 30	71		21	s. sh. coralline	Do.
3006	Mar. 17	25 02 30	110 43 30	75		8	shs	Do.
3007	Mar. 17	25 27 30	110 50 30	69	44.6	362	gn. m	Do.
3008	Mar. 18	25 59 45	111 03 30	67	46	306	m	Do.
3009	Mar. 20	27 09 00	111 42 00	66	37.7	857	gn. m	Do.
3010	Mar. 20	27 23 45	111 25 00	71	37.6	1,005	gn. m	Do.
3011	Mar. 23	28 07 00	111 39 45	69	57.9	71	fne. gy. s. brk. sh	Do.
3012	Mar. 23	28 16 00	111 54 00	69	63	22	fne. gy. s	Do.
3013	Mar. 23	28 23 45	111 58 00	66	65	14	gy. s. brk. sh	Do.
3014	Mar. 23	28 28 00	112 04 30	66	62.9	29	gy. s	Do.
3015	Mar. 24	29 19 00	112 50 00	63	54.9	145	br. m	Do.
3016	Mar. 24	29 40 00	112 57 00	65	59	76	gn. m	Do.
3017	Mar. 24	29 54 30	113 01 00	66.5	61.8	58	gn. m	Do.
3018	Mar. 24	30 16 00	113 05 00	66	63.3	36	gy. s. brk. sh	Do.
3019	Mar. 24	30 28 00	113 06 30	66	66	14	bk. s. brk. sh	Do.
3020	Mar. 24	30 37 30	113 07 00	65		7	gy. s. bk. sp	Do.
3021	Mar. 24	30 47 00	113 13 00	65		14	gy. s. brk. sh	Do.
3022	Mar. 24	30 58 30	113 17 15	66.1	66.1	11	gy. s. bk. sp	Do.
3023	Mar. 25	31 17 30	113 57 15	67		10	g. sh	Do.
3024	Mar. 25	31 21 00	113 49 00	67	67	11	s. brk. sh. g	Do.
3025	Mar. 25	31 21 15	113 59 00	67	66.1	9.5	fne. gy. s	Do.
3026	Mar. 25	31 22 00	114 07 45	66	65.2	17	g. brk. sh	Do.
3027	Mar. 26	31 31 45	114 19 00	68		10	gy. s	Do.
3028	Mar. 26	31 32 30	114 20 00	68		9.75	s	Do.
3029	Mar. 26	31 33 00	114 20 30	68		10.5	fne. gy. s. brk. sh	Do.
3030	Mar. 27	31 07 00	114 29 00	65	64	20	m	Do.
3031	Mar. 27	31 06 45	114 28 15	65	63.8	33	bn. m	Do.
3032	Mar. 27	31 05 30	114 29 00	65		12	gy. s	Do.
3033	Mar. 27	30 50 45	114 29 45	65.7	63.5	18	gy. m	Do.
3034	Mar. 27	30 36 30	114 27 45	69.5	63.5	24	gy. m	Do.
3035	Mar. 27	30 21 00	114 25 15	70	62	30	gy. m	Do.
3036	Mar. 29	29 47 15	114 24 00	67		5	m. s. brk. sh	Do.
3037	Mar. 31	27 45 00	110 45 00	69	65.2	20	gn. m	Do.
		Off Lower California.						
3038	Apr. 8	24 24 30	111 53 00	67	65.5	31	gy. s. brk. sh	L. B. T.
3039	Apr. 8	24 27 00	111 59 00	67	68.5	47	fne. yl. s	Do.
3040	Apr. 9	24 35 00	112 04 30	68		21	s. sh	Oyster dredge.
3041	Apr. 9	24 35 30	112 05 00	68	64.5	27	fne. gy. s	L. B. T.
3042	Apr. 9	24 38 00	112 05 30	67	65	17	fne. gy. s	Do.
3043	Apr. 10	26 07 00	113 32 00	64	55	74	fne. gy. s	Do.
3044	Apr. 10	26 16 15	113 42 15	64	56	58	gy. s. brk. sh	Do.
3045	Apr. 10	26 24 00	113 49 00	65	48	184	m	Do.
		Off Oregon and Washington.						
3046	June 7	46 48 30	124 28 00	56	46.1	48	fne. gy. s	L. B. T.
3047	June 7	46 47 00	124 30 15	57	45.9	50	fne. gy. s	Do.
3048	June 7	46 45 30	124 33 00	58	41.1	52	rky	Do.
3049	June 7	46 31 00	124 22 00	57	46.7	48	fne. blk. s	Do.
3050	June 8	44 01 15	124 57 00	54	50.1	46	co. brk. sh	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.		Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Lat. N.	Long. W.					
		Off Oregon and Washington.						
	1880.	° ′ ″	° ′ ″	°F.	° F.	Fms.		
3051	June 8	43 59 15	124 58 30	55	.....	59	co. brk. sh. rky	Tangles.
3052	June 8	44 00 00	124 57 00	55	49	48	co. brk. sh. rky	Do.
3053	June 8	44 04 30	124 50 00	56	47.3	64	co. brk. sh. rky	Do.
3054	June 8	44 13 00	124 44 30	56	48	53	r	Do.
3055	June 9	44 41 30	124 09 15	57	47.4	28	fne. gy. s	L. B. T.
3056	June 9	44 41 30	124 09 15	57	47.4	28	fne. gy. s	Do.
3057	June 9	44 43 31	124 15 45	52	45.7	43	crs. gy. s	Do.
3058	June 9	44 48 00	124 10 00	53	45.8	38	crs. gy. s. sh	Do.
3059	June 9	44 56 00	124 12 30	53	45.1	77	m	Do.
3060	June 13	45 56 15	124 01 30	53	.....	28	br. m	Do.
3061	June 13	45 55 30	124 01 00	53	48.4	23	fne. blk. s	Do.
3062	June 13	46 55 45	124 05 00	54	45.2	44	fne. blk. s	Do.
3063	June 13	46 55 15	124 04 30	54	45.8	42	fne. gy. s	Do.
3064	June 13	46 03 15	124 09 00	58	45.6	46	fne. gy. s. g	Do.
3065	June 13	46 14 30	124 13 00	57	.....	27	fne. bk. s	Do.
3066	June 13	46 26 30	124 26 00	57	45.6	55	s. m	Do.
3067	June 18	47 36 00	122 23 15	56	.....	82	gn. m	Do.
3068	June 18	47 35 30	122 27 00	58	.....	135	gn. m	Do.
3069	June 28	47 25 30	125 42 00	56	37.6	760	gn. m	Do.
3070	June 28	47 29 30	125 43 00	57	37.9	636	gn. m	Do.
3071	June 28	47 29 00	125 33 30	55	38	685	gn. m	Do.
3072	June 28	47 28 30	125 24 00	55	38.2	584	gn. m	S. B. T.
3073	June 28	47 28 00	125 15 00	55	49.2	477	gn. m	Do.
3074	June 29	47 22 00	125 48 30	54	36.6	877	gn. m	L. B. T.
3075	June 29	47 22 00	125 41 00	57	36.6	859	gn. m	Do.
3076	June 29	47 46 00	125 10 00	59	43.4	178	gn. m	Do.
		Southeast Alaska.						
3077	July 23	55 46 00	132 24 00	60	42.4	322	gn. m. g	L. B. T.
		Off Oregon.						
3078	Sept. 1	43 59 15	124 46 00	60	45.7	68	g. m	S. B. T.
3079	Sept. 1	43 59 15	124 44 40	59	46.7	55	rky	Tangles.
3080	Sept. 1	43 58 00	124 35 00	60	45.6	93	gn. m	L. B. T.
3081	Sept. 1	43 59 00	124 20 00	58	45.8	61	gn. m. s	Do.
3082	Sept. 2	43 52 00	124 15 00	57	46.2	43	fne. gy. s	Do.
3083	Sept. 2	43 59 00	124 14 30	56	47.8	32	fne. gy. s. bk. sp	Do.
3084	Sept. 2	44 12 30	124 10 00	58	46.9	46	fne. gy. s. bk. sp	Do.
3085	Sept. 2	44 29 30	124 17 00	56	45.7	42	fne. gy. s	L. B. T.
3086	Sept. 3	44 36 00	124 18 30	54	46.2	46	fne. gy. s. bk. sp	Do.
3087	Sept. 3	44 28 00	124 26 00	56	45.9	46	c. and p	Tangles.
3088	Sept. 3	44 28 00	124 25 30	56	46.3	46	c. p.	S. B. T.
3089	Sept. 7	45 40 30	123 58 45	56	.....	20	fne. gy. s	L. B. T.
3090	Sept. 7	45 43 00	124 12 00	57	45.8	62	fne. gy. s	Do.
3091	Sept. 8	45 32 00	124 19 30	56	.....	87	gn. m	Do.
3092	Sept. 8	45 31 15	124 05 00	56	45.9	46	bk. s	Do.
3093	Sept. 8	45 20 30	124 06 30	50	44.9	57	fne. gy. s	Do.
3094	Sept. 12	43 01 00	124 30 30	48	46.7	35	crs. s. sh	S. Dr.
3095	Sept. 12	42 44 45	124 38 10	48	47.0	42	r. st. brk. sh	Tangles.
3096	Sept. 12	42 45 00	124 36 15	48	46.7	33	st. brk. sh	Do.
		Off Central California.						
	1890.							
3097	Mar. 5	37 59 08	122 25 45	51	.....	12	bu. m	L. B. T.
3098	Mar. 5	37 58 25	122 26 30	51	.....	13	bu. m	Do.
3099	Mar. 10	37 44 50	122 43 00	51	50.8	20	fne. gy. s	Do.
3100	Mar. 10	37 43 20	122 43 00	51	50.4	29	cra. g	Do.
3101	Mar. 10	37 42 00	122 53 20	51	50.8	33	yl. s	Do.
3102	Mar. 10	37 40 40	122 59 00	51	51.8	27	c. brk. sh	Do.
3103	Mar. 10	37 38 00	123 02 30	49	57.9	67	fne. dk. s	Do.
3104	Mar. 11	37 23 00	123 08 00	49	40.8	391	c	Do.
3105	Mar. 11	37 21 00	123 00 00	51	44.2	217	fne. gy. s	Do.
3106	Mar. 11	37 21 00	122 51 00	51	.....	77	fne. gy. s	Do.
3107	Mar. 11	37 20 00	122 44 00	52	.....	51	fne. gy. s	Do.
3108	Mar. 11	37 19 00	122 36 00	53	50.8	43	r. brk. sh	Do.
3109	Mar. 11	37 18 30	122 35 00	53	50.8	40	rky	Tangles.
3110	Mar. 11	37 19 00	122 32 00	53	51.0	39	rky	Do.
3111	Mar. 11	37 13 30	122 26 00	53	52.8	20	gy. s	Do.
3112	Mar. 12	37 08 00	122 47 00	52	41.8	206	fne. gy. s	L. B. T.
3113	Mar. 12	37 06 40	122 37 30	52	48.8	70	fne. gy. s	Do.
3114	Mar. 12	37 06 00	122 32 00	52	.....	62	m	Do.
3115	Mar. 12	37 05 00	122 24 00	52	.....	43	fne. bk. s	Do.
3116	Mar. 12	37 05 30	122 19 00	54	.....	16	rky	S. Dr.
3117	Mar. 12	37 01 20	122 18 20	52	50.7	43	bk. s. m	L. B. T.
3118	Mar. 12	36 57 10	122 18 00	55	50.9	54	rky. co	S. Dr.
3119	Mar. 12	36 56 30	122 17 40	55	50.9	54	rky. co	Tangles.
3120	Mar. 12	36 55 40	122 16 10	54	49.7	54	gn. m. s. r	Do.
3121	Mar. 12	36 57 20	122 15 00	53	49.8	48	gn. m. s	Do.
3122	Mar. 12	36 59 00	122 15 00	52	52.3	38	gy. s. m	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Off Central California.						
	1800.	° ′ ″	° ′ ″	°F.	° F.	*Fms.*		
3123	Mar. 12	36 57 00	122 10 00	54	52.8	37	fne. gy. s. m	Tangles.
3124	Mar. 13	36 55 10	122 04 00	51	52.3	21	rky	L. B. T.
3125	Mar. 13	36 52 00	122 11 00	52	48.4	65	fne. gy. s. sh	L. B. T. and mud bag.
3126	Mar. 13	36 49 20	122 12 30	53	52.8	456	gn. m	L. B. T.
3127	Mar. 13	36 45 00	122 10 20	53	40.5	418	gn. m. s	L. B. T. and mud bag.
3128	Mar. 13	36 41 50	122 07 30	53	38.9	627	bu. m	Do.
3129	Mar. 13	36 39 40	122 01 00	57	43.7	204	s. and m	Do.
3130	Mar. 14	36 36 40	121 53 00	58	.....	9	s	S. B. T.
3131	Mar. 14	36 41 30	121 54 10	58	50.8	48	br. m. r	Do.
3132	Mar. 14	36 44 00	121 51 00	55	52.1	33	br. m	Do.
3133	Mar. 14	36 47 50	121 49 00	55	52.3	37	br. m	Do.
3134	Mar. 14	36 51 40	121 51 20	54	54.5	13	fne. s. m	L. B. T
3135	Mar. 14	36 54 10	121 55 00	54	54.7	15	fne. gy. s	Do.
3136	Mar. 15	36 57 00	122 01 00	52	.....	7	gy. s	S. B. T.
3137	Mar. 15	36 56 00	122 01 20	52	.....	11	s. p	Do.
3138	Mar. 15	36 55 30	122 02 00	52	55.4	19	fne. s. m. st	S. Dr.
3139	Mar. 15	36 54 10	122 03 00	52	52.9	27	gn. m	Do.
3140	Mar. 15	36 54 30	122 05 00	52	52.3	30	m	Do.
3141	Mar. 15	36 56 00	122 06 00	52	53	24	fne. gy. s. m	Do.
3142	Mar. 15	36 56 20	122 03 20	52	.....	13	fne. s. rky	Do.
3143	Mar. 15	36 56 10	122 02 40	53	.....	9	rky	Do.
3144	Mar. 15	36 55 40	122 03 10	54	.....	20	s. g. r. m	Do.
3145	Mar. 15	36 51 05	122 05 30	54	49.5	56	fne. gy. s	L. B. T.
3146	Mar. 15	36 53 30	122 12 00	54	49.5	62	gn. m. r	S. B. T.
3147	Mar. 15	37 00 00	122 20 00	55	49.2	56	br. m	Do.
3148	Mar. 15	37 08 00	122 28 10	54	51.3	47	br. m	Do.
3149	Mar. 15	37 13 50	122 32 30	54	51.1	45	gn. m	Do.
3150	Mar. 21	37 47 00	122 44 10	55	52.3	21	fne. gy. s	L. B. T.
3151	Mar. 21	37 49 00	122 55 30	55	51.6	37	crs. s. rd. sp	Do.
3152	Mar. 21	37 53 30	122 56 30	55	50.6	36	fne. gy. s	Do.
3153	Mar. 21	37 57 10	122 56 20	52	51.3	32	gn. m	Do.
3154	Mar. 21	37 59 20	122 55 30	52	51.8	20	bk. s. m	Do.
3155	Mar. 22	37 57 30	122 59 00	52	.....	35	gn. m	Do.
3156	Mar. 22	37 53 30	123 04 00	52	45.3	50	s	Do.
3157	Mar. 22	37 49 30	123 06 00	53	50.6	47	fne. gy. s	T. B. T.
3158	Mar. 22	37 47 30	123 10 40	53	51.4	29	rky	Tangles.
3159	Mar. 22	37 47 20	123 10 00	53	.....	27	rky	Do.
3160	Mar. 22	37 48 35	123 12 40	52	51.8	39	rky	Do.
3161	Mar. 22	37 49 30	123 23 40	52	44.5	191	fne. gy. s	L. B. T. and mud bag.
3162	Mar. 22	37 54 10	123 30 00	53	39	552	gn. m	L. B. T.
3163	Mar. 22	37 56 40	123 25 30	52	48.5	69	fne. gy. s	Do.
3164	Mar. 23	37 59 40	123 14 25	50	48.5	61	rky	S. Dr.
3165	Mar. 23	37 59 45	123 08 35	50	49	50	gn. m	Do.
3166	Mar. 23	37 57 30	123 04 30	52	50.3	47	gn. m	S. B. T.
3167	Mar. 23	37 57 30	122 59 30	52	49.5	33	gn. m	Do.
3168	Mar. 24	38 01 25	123 26 55	52	.....	34	rky. co	Tangles.
3169	Mar. 28	38 16 30	123 30 00	52	44	202	m	L. B. T.
3170	Mar. 28	38 17 00	123 29 00	52	.....	187	m	Do.
3171	Mar. 28	38 20 30	123 20 00	52	48	76	rky. s	Do.
3172	Mar. 28	38 23 35	123 14 00	52	48	62	bk. s	Do.
3173	Mar. 28	38 19 25	123 14 30	52	48.2	62	m	S. B. T. and mud bag.
3174	Mar. 28	38 15 30	123 14 15	53	49.5	65	gn. m	L. B. T.
3175	Mar. 29	38 07 35	123 13 30	49	.....	57	br. m	Do.
3176	Mar. 29	38 01 30	123 06 00	49	.....	37	gy. s	Do.
3177	Mar. 29	37 59 30	123 03 05	50	.....	25	crs. s. g	S. B. T.
3178	Mar. 29	37 57 00	122 57 25	50	49	32	s	L. B. T.
3179	Mar. 29	37 53 30	122 52 00	53	50	30	fne. gy. s	Do.
3180	Mar. 29	37 50 00	122 47 00	53	50.7	24	fne. gy. s	L. B. T. and mud bag.
3181	Mar. 29	37 50 10	122 41 30	53	51	16	fne. gy. s	L. B. T.
3182	Mar. 29	37 49 50	122 37 10	54	52.2	11	fne. gy. s	Do.
3183	Apr. 3	36 31 00	121 59 00	52	44.5	102	gy. s. r	S. B. T.
3184	Apr. 3	36 26 40	122 00 05	51	46.4	77	s. g	Do.
3185	Apr. 3	36 27 10	121 57 00	51	48.4	41	crs. s	Do.
3186	Apr. 3	36 18 50	122 06 00	52	41.3	328	bk. s. m	L. B. T.
3187	Apr. 3	36 14 00	121 58 40	54	41.1	208	yl. s. m	Do.
3188	Apr. 3	36 08 15	121 49 40	54	45	316	gn. m	Do.
3189	Apr. 4	35 45 30	121 29 00	54	43.2	218	m	Do.
3190	Apr. 4	35 40 30	121 22 40	54	49	53	fne. gy. s	Do.
3191	Apr. 4	35 35 15	121 23 00	53	44	211	br. m	Do.
3192	Apr. 4	35 33 40	121 15 00	52	47.2	101	bk. s. m	Do.
3193	Apr. 5	35 25 50	121 09 10	51	44.4	160	gn. m	Do.
3194	Apr. 5	35 23 30	121 02 30	53	45.9	92	gy. s	Do.
3195	Apr. 5	35 14 00	121 07 00	54	43.2	252	gn. m	Do.
3196	Apr. 5	35 02 55	120 59 40	54	44.1	200	gn. m	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.		Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Lat. N.	Long. W.					
		Off Central California.						
	1890.	° ′ ″	° ′ ″	° F.	° F.	Fms.		
3197	Apr. 5	35 01 30	120 50 30	53	48.4	77	gn. m	L. B. T.
3198	Apr. 6	34 10 25	120 38 30	53	42.1	278	gn. m	L. B. T. and mud bag.
3199	Apr. 6	34 16 45	120 25 30	52	43.9	233	gn. m	L. B. T.
3200	Apr. 6	34 15 00	120 14 30	52	43.1	265	gn. m	Do.
3201	Apr. 6	34 14 45	119 54 00	55	42.9	280	gn. m	Do.
3202	Apr. 11	36 46 10	121 58 45	52	41.1	382	gn. m	Do.
3203	Apr. 11	36 48 00	121 53 50	54	44.7	138	br. m	Do.
3204	Apr. 12	36 54 45	122 20 15	55	44.1	202	bk. s	Do.
3205	Apr. 12	36 55 10	122 23 50	51	43.7	240	bk. s. r	Do.
3206	Apr. 12	36 57 30	122 27 30	51	.....	169	.....	Do.
3207	Apr. 12	37 00 30	122 35 30	50	45.8	108	fne. gy. s	Do.
3208	Apr. 12	37 01 10	122 39 45	50	44.3	203	fne. gy. s	Do.
3209	Apr. 12	37 05 15	122 42 05	50	45.4	141	gn. m	Do.
		South of Alaska Peninsula.						
3210	May 21	54 00 00	162 40 30	43	38.5	483	s. gn. m	L. B. T.
3211	May 21	54 02 00	162 52 00	44	38.7	313	gn. m	Do.
3212	May 21	54 05 30	162 54 00	43	38	49	gy. s. bk. sp	Do.
3213	May 21	54 10 00	162 57 30	40	.....	41	bk. s	Do.
3214	May 21	54 13 00	163 06 00	40	.....	38	gy. s. g	Do.
3215	May 21	54 14 40	163 24 00	43	38.5	43	g	Do.
3216	May 21	54 20 30	163 37 00	43	.....	61	bk. s. m	Do.
3217	May 22	54 14 50	164 06 00	42	.....	42	bk. g	Do.
3218	May 22	54 15 40	164 21 00	42	37.7	41	bk. s	Do.
3219	May 22	54 14 00	164 35 00	42	38	59	bk. s. g	Do.
		Bering Sea.						
3220	May 22	54 15 00	165 06 00	42	.....	34	g. brk. sh	L. B. T.
3221	May 22	54 15 20	165 23 30	42	39.1	66	bk. s. sh	Do.
3222	May 22	54 20 00	165 30 00	40	39.7	50	bk. s. p. sh	Do.
3223	May 22	54 26 15	165 32 00	42	39	56	bk. p	Do.
3224	May 22	54 42 50	165 37 00	43	38.7	121	bk. s. g	Do.
3225	May 22	54 48 30	165 49 00	41	38.6	85	bk. s	Do.
3226	May 23	55 01 00	167 25 00	42	38.5	128	m. s. sh	S. B. T.
3227	May 23	54 36 30	166 54 00	42	38.6	225	gn. m	L. B. T.
3228	May 31	58 39 20	157 17 30	49	.....	8	gy. s. p	S. B. T.
3229	May 31	58 40 00	157 15 00	50	.....	8	gy. s. p	Do.
3230	May 31	58 31 30	157 13 30	50	.....	3.25	gy. s. p	Do.
3231	June 2	58 35 00	157 28 50	47	.....	12	s	L. B. T.
3232	June 2	58 31 30	157 34 15	47	.....	10.5	p. st	Do.
3233	June 2	58 23 45	157 42 45	45	44.5	7.25	s. p	Do.
3234	June 2	58 27 00	157 52 00	47	.....	5	gy. s	Do.
3235	June 7	58 16 30	158 13 00	44	.....	11	bk. s	Do.
3236	June 7	58 11 00	158 05 30	42	39	14.75	g. s. sh	Do.
3237	June 7	58 08 00	158 19 00	41	.....	19	gy. s. g. sh	Do.
3238	June 7	58 03 40	158 37 30	39	.....	18	fne. gy. s	Do.
3239	June 8	58 22 20	159 23 15	44	.....	11.5	fne. gy. s	Do.
3240	June 8	58 30 00	159 35 50	43	.....	14.5	fne. bk. s	Do.
3241	June 8	58 38 30	159 33 30	47	38	14	bk. m	Do.
3242	June 8	58 44 30	160 08 45	45	.....	11	bk. m	Do.
3243	June 8	58 45 10	160 28 00	48	.....	4.5	fne. gy. s	Do.
3244	June 9	58 37 20	161 05 00	43	.....	4.5	fne. gy. s	Do.
3245	June 9	58 31 20	161 13 00	44	.....	11.5	s. and p	Do.
3246	June 9	58 26 30	161 36 00	40	38	17.5	g	Do.
3247	June 13	58 40 45	162 08 30	43	40.6	17	p. st	Do.
3248	June 13	58 34 15	162 22 00	41	43	21	fne. gy. s. g	Do.
3249	June 13	58 27 30	162 36 00	39	37	13.5	fne. gy. s. bk. sp	Do.
3250	June 13	58 11 30	163 02 45	40	46.2	17.5	gy. s	Do.
3251	June 14	57 35 50	164 06 00	39	37.5	25.5	fne. gy. s	Do.
3252	June 14	57 22 20	164 24 40	40	44.8	29.5	bk. m	Do.
3253	June 14	57 05 50	164 27 15	42	35	36	m. s	Do.
3254	June 14	56 50 00	164 27 50	43	36.2	46	gn. m. s	Do.
3255	June 14	56 33 30	164 31 40	44	37	48	gn. m. s	L. B. T. and surface tow net.
3256	June 14	56 18 00	164 34 10	45	35	49	gn. m. bk. sh	L. B. T.
3257	June 24	54 49 00	165 32 00	45	39	81	gy. s. g	Do.
3258	June 24	54 48 00	165 13 30	44	39	70	bk. s. g	Do.
3259	June 24	54 40 50	165 05 30	44	40.6	41	bk. s. g	Do.
3260	June 24	54 36 15	164 52 00	44	42	13	fne. bk. s	Do.
3261	June 24	54 42 15	164 49 15	45	41.2	27	bk. g. p	Do.
3262	June 24	54 49 30	165 02 00	45	40.7	43	bk. s. r	Do.
3263	June 24	55 04 00	165 04 00	45	39.5	61	bk. m	Do.
3264	June 24	54 57 00	164 48 00	45	40.5	40	crs. s. g	Do.
3265	June 25	55 16 30	163 52 45	45	39.8	38	bk. s	Do.
3266	June 25	55 08 30	163 30 30	45	42	24	bk. s	Do.
3267	June 25	55 23 30	163 29 00	46	41	32	bk. s	Do.
3268	June 25	55 29 00	163 13 00	47	41.2	26	bk. s. g	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Bering Sea.						
	1800.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
3269	June 25	55 10 00	163 04 30	44	42.3	16	fne. gy. s. bk. sh	L. B. T.
3270	June 26	55 26 30	162 52 00	47	43.5	16	bk. s	Do.
3271	June 26	55 29 15	162 58 00	47	41.9	25	bk. s	Do.
3272	June 27	55 31 40	163 07 00	45	42	31	bk. and rd. s	Do.
3273	June 27	55 44 30	162 56 00	45	38.5	39	gy. s. m	Do.
3274	June 27	55 34 30	162 31 45	45		19	bk. s. sh	Do.
3275	June 27	55 44 20	162 17 30	45	42.8	22	fne. bk. s	Do.
3276	June 28	55 51 15	162 03 00	43	42	18	g. s. r	S. B. T.
3277	June 28	55 58 45	161 46 30	46	43.2	18	g. s. r	Tangles.
3278	June 28	56 12 30	162 13 00	44	38.8	47	fne. gy. s	L. B. T.
3279	June 28	56 25 40	162 59 15	55	37	41	fne. gy. s	Do.
3280	June 28	56 27 00	162 08 00	55	41	36	fne. gy. s	Do.
3281	June 28	56 14 00	161 41 15	55		36	gy. s. bk. sp	Do.
3282	June 29	56 30 45	161 50 15	55	38.2	53	fne. s. gn. m	Do.
3283	June 29	56 28 00	161 16 30	44	40.3	39	fne. gy. s	Do.
3284	June 29	56 16 30	160 53 00	47	43	25	fne. g	Do.
3285	July 17	56 45 45	160 42 45	44	41	35	gy. s. bk. sp	Do.
3286	July 17	56 39 30	160 29 00	45	41.5	37	fne. gy. s. sh. g	Do.
3287	July 17	56 33 00	160 14 00	46	42	30	crs. bk. s	Do.
3288	July 17	56 26 30	160 00 00	46	45.5	15	bk. g	Do.
3289	July 18	56 44 30	159 16 00	45		16	bk. s	Do.
3290	July 18	56 50 30	159 01 00	47		16	gy. s. g	Do.
3291	July 18	56 58 30	159 11 00	45	41.2	26	bk. s. g	Do.
3292	July 18	57 14 00	159 35 00	45		32	bk. s. g	Do.
3293	July 18	57 30 00	159 33 00	44	40	30	fne. gy. s	Do.
3294	July 18	57 16 45	159 03 30	45	41	30	bk. g	Do.
3295	July 19	57 14 30	158 26 30	50		11.5	fne. gy. s	Do.
3296	July 19	57 26 30	158 46 00	47	43	24	gy. s. bk. sp	Do.
3297	July 19	57 38 00	159 07 30	47	41.5	26	gy. s	Do.
3298	July 19	57 38 30	158 22 30	48	43.8	20	fne. gy. s	Do.
3299	July 20	57 59 00	158 44 00	54	44	20	fne. gy. s. yl. sp	Do.
3300	July 20	58 12 30	159 55 00	51	42.2	15	p	Do.
3301	July 20	58 12 45	160 37 30	52		17	fne. gy. s	Do.
3302	July 21	57 45 45	160 12 15	51	40.2	30	fne. gy. s	Do.
3303	July 21	57 27 00	160 23 30	50	39.5	33	bk. s	Do.
3304	July 21	58 02 30	161 13 45	49		28	fne. gy. s	C. R. D.
3305	July 22	57 51 30	161 40 00	56	41.8	23	fne. gy. s	Do.
3306	July 22	57 24 30	161 17 00	52	38.9	33	fne. gy. s	Do.
3307	Aug. 3	53 55 00	170 50 00	50	35.4	1,033	gn. oz	D. S. T.
3308	Aug. 4	56 12 00	172 07 00	50	35	1,625	gn. oz	Do.
3309	Aug. 4	56 56 00	172 55 00	50	37.9	71	gn. m	L. B. T.
3310	Aug. 15	53 56 51	166 28 53	54	41.5	58	fne. dk. s. m	S. B. T.
3311	Aug. 15	53 59 36	166 29 43	52	41	85	gn. m	Do.
3312	Aug. 15	53 59 11	166 25 09	55	43	45	fne. s. m	Do.
3313	Aug. 15	54 01 51	166 27 38	55	42.7	68	fne. bk. s	Do.
3314	Aug. 15	54 02 24	166 32 47	55	42.5	74	bk. s	Do.
3315	Aug. 15	54 02 40	166 42 00	55	38.5	277	gn. m. s	Do.
3316	Aug. 16	54 01 00	166 48 45	56	38.2	309	bk. s. g	Do.
3317	Aug. 16	53 57 40	166 59 00	54	39.5	165	crs. s. g. r	Do.
3318	Aug. 16	53 47 40	167 14 00	52	42	61	bk. s. g. sh	Do.
3319	Aug. 18	53 40 30	167 30 00	52	40.8	59	bk. s	L. B. T.
3320	Aug. 18	53 40 00	167 20 45	52	40.8	59	bk. s. co	Tangles.
3321	Aug. 18	53 33 30	167 15 40	50	41.5	54	dk. m	L. B. T.
3322	Aug. 18	53 28 45	167 23 50	50	42.4	35	bk. s	Do.
3323	Aug. 19	53 26 00	167 31 10	46	42	51	fne. bk. s	Do.
3324	Aug. 20	53 33 50	167 46 50	47		109	crs. bk. s. g. r	Do.
3325	Aug. 20	53 37 10	167 50 10	49	38	284	gn. m	Do,
3326	Aug. 20	53 40 25	167 41 40	49	37.5	576	m	Do.
3327	Aug. 20	53 43 40	167 29 30	49	38.2	322	bk. s	S. B. T.
3328	Aug. 21	53 41 45	167 19 25	48	37	578	m	L. B. T.
3329	Aug. 21	53 56 50	167 08 15	51	37.7	399	fne. bk. s	Do.
3330	Aug. 21	54 00 45	166 53 50	51	37.8	351	bk. s. m	Do.
3331	Aug. 21	54 01 40	166 48 50	52		350	m	Do.
3332	Aug. 21	54 02 50	166 45 00	52		400	rky. s	Do.
3333	Aug. 22	53 53 35	166 30 15	48	43.0	19	gn. m	S. B. T.
3334	Aug. 22	53 50 20	166 20 15	48	42.6	50	m. s	Do.
3335	Aug. 22	53 58 05	166 33 25	47	40.8	93	m	Do.
3336	Aug. 22	53 56 55	166 33 35	50	41.6	55	fne. bk. s	Do.
		Unalaska to Kadiak.						
3337	Aug. 27	53 55 30	163 26 00	51	39.3	280	gn. mr	L. B. T.
3338	Aug. 28	54 19 00	159 40 00	51	37.3	625	gn. m. s	Do.
3339	Aug. 28	54 46 00	157 43 30	52	37.4	138	m. g	Do.
3340	Aug. 29	55 26 00	155 26 00	52	36.8	695	m	Do.
3341	Aug. 29	56 01 30	153 52 00	54	41.1	67	fne. gy. s	Do.
		Off British Columbia.						
3342	Sept. 8	52 39 30	132 38 00	57	35.3	1,588	gy. oz. crs. s	L. B. T.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.		Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Lat. N.	Long. W.					
		Off Washington.						
	1890.	° ′ ″	° ′ ″	° *F.*	° *F.*	*Fms.*		
3343	Sept. 21	47 40 40	125 20 00	54	38.2	516	gn. m	L. B. T.
3344	Sept. 21	47 20 00	125 07 30	52	36.8	831	gn. m	Do.
3345	Sept. 22	45 39 00	124 53 00	57	37.3	759	gn. m	Do.
3346	Sept. 22	45 30 00	124 52 00	54	37.3	786	gn. m	Do.
3347	Sept. 22	45 09 35	124 45 00	54	40.9	345	m	Do.
		Off Northern California.						
3348	Sept. 25	39 02 40	124 06 15	54	47.6	455	fne. gy. s	L. B. T.
3349	Sept. 25	38 57 45	124 03 05	54	44.1	239	bk. s	Do.
3350	Sept. 25	38 58 10	123 57 05	54	48.4	75	fne. s. m	Do.
3351	Sept. 25	38 59 40	123 50 50	54	50	51	m	S. B. T.
3352	Sept. 25	39 01 10	123 44 00	54	51.5	26	fne. br. s	Do.
		Off Panama.						
	1891.							
3353	Feb. 23	7 06 15	80 34 00	73	39	695	gn. m	L. B. T.
3354	Feb. 23	7 09 45	80 50 00	78	46	322	gn. m	Do.
3355	Feb. 23	7 12 20	80 55 00	81	54.1	182	bk. g. sh	Do.
3356	Feb. 23	7 09 30	81 08 30	83	40.1	546	sft. bl. m	Do.
3357	Feb. 24	6 35 00	81 44 00	83	38.5	782	gn. s	Do.
3358	Feb. 24	6 30 00	81 44 00	83	40.2	555	gn. s	Do.
3359	Feb. 24	6 22 20	81 52 00	83	42	465	rky	Tangles.
3360	Feb. 24	6 17 00	82 05 00	83	36.4	1,672	fne. b. & gn. s	L. B. T.
3361	Feb. 25	6 10 00	83 06 00	82	36.6	1,471	gn. oz	Do.
3362	Feb. 26	5 56 00	85 10 30	84	36.8	1,175	gn. m. s. r	L. B. T.
3363	Feb. 26	5 43 00	85 50 00	83	37.5	978	wh. glob. oz	Do.
3364	Feb. 27	5 30 00	86 08 30	81	38	902	yl. glob. oz	Do.
3365	Feb. 27	5 31 00	86 31 00	85	37	1,010	yl. glob. oz	Agassiz, B. T.
3366	Feb. 27	5 30 00	86 45 00	84	37	1,067	yl. glob. oz	L. B. T.
3367	Feb. 28	5 31 30	86 52 30	82	57	100	rky	S. B. T.
3368	Feb. 28	5 32 45	86 54 30	82	58.4	60	rky	Do.
3369	Feb. 28	5 32 45	86 55 20	82	62.2	52	rky	L. B. T. *a*
3370	Feb. 28	5 36 40	86 56 50	84	54.8	134	r. sh	Tangles.
3371	Mar. 1	5 26 20	86 55 00	82	39	770	glob. oz	Agassiz, B. T.
3372	Mar. 1	4 49 00	86 11 20	84	38.8	761	gy. glob. oz	Do.
3373	Mar. 2	4 02 00	84 58 00	82	36.6	1,977	bn. m. bk. sp	Do.
3374	Mar. 3	2 35 00	83 53 00	80	36.4	1,823	gn. oz	L. B. T.
3375	Mar. 4	2 34 00	82 29 00	77	36.6	1,201	gy. glob. oz	L. B. T., mud bag.
3376	Mar. 4	3 09 00	82 08 00	78	36.3	1,132	gy. glob. oz	Do.
3377	Mar. 5	3 56 00	81 40 15	77	38	764	m	Do.
3378	Mar. 5	3 58 20	81 36 00	78	55.9	112	brk. sh	S. B. T.
3379	Mar. 5	3 59 40	81 35 00	78	.....	52	r	Tangles.
3380	Mar. 5	4 03 00	81 31 00	79	37.2	899	r	L. B. T.
3381	Mar. 6	4 56 00	80 52 30	77	35.8	1,772	gn. m	Do.
3382	Mar. 7	6 21 00	80 41 00	75	35.8	1,793	gn. m	Do. *b*
3383	Mar. 8	7 21 00	79 02 00	74	36	1,832	gn. glob. oz	Do.
3384	Mar. 8	7 31 30	79 14 00	74	42	458	gn. s	Do.
3385	Mar. 8	7 32 36	79 16 00	72	45.9	286	gn. m	Do.
3386	Mar. 8	7 33 12	79 17 15	73	48	242	fne. gy. s	Do.
3387	Mar. 8	7 40 00	79 17 50	74	56.2	127	fne. gy. s	Do.
3388	Mar. 9	7 06 00	79 48 00	73	36.2	1,168	gn. glob. oz	Do.
3389	Mar. 9	7 16 45	79 56 30	74	48.8	210	gn. m	Do.
3390	Mar. 9	7 26 10	79 53 50	74	62.6	56	fne. gy. s. g	Do.
3391	Mar. 9	7 33 40	79 43 20	73	55.8	153	gn. m	Do.
3392	Mar. 10	7 05 30	79 40 00	73	36.4	1,270	brd	Do.
3393	Mar. 10	7 15 00	79 36 00	74	36.8	1,020	gn. m	Do.
3394	Mar. 10	7 21 00	79 35 00	73	41.8	511	dk. gn. m	Do.
3395	Mar. 11	7 30 36	78 39 00	70	38.5	730	rky	Do.
3396	Mar. 11	7 32 00	78 36 30	70	47.4	259	brd. gy. m. s	Do.
3397	Mar. 11	7 33 00	78 34 20	71	57.3	85	sft. gn. m. brk. sh	Do.
3398	Mar. 23	1 07 00	80 21 00	84	36	1,573	gn. oz	Blake B. T.
3399	Mar. 24	1 07 00	81 04 00	80	36	1,740	gn. oz	L. B. T.
		Off Galapagos Islands.						
		Lat. S.						
3400	Mar. 27	0 36 00	86 46 00	81	36.1	1,322	lt. gy. glob. oz	L. B. T.
3401	Mar. 28	0 59 00	88 58 30	82	43.8	395	glob. oz	Do.
3402	Mar. 28	0 57 30	89 03 30	82	42.3	421	r. glob. oz	S. B. T.
3403	Mar. 28	0 58 30	89 17 00	82	43.3	384	fne. gy. s. bk. sp	Do.
3404	Mar. 28	1 03 00	89 28 00	83	43.2	395	r	Do.
3405	Mar. 28	0 57 00	89 38 00	83	59.9	53	p. co. sh	Tangles.
3406	Apr. 3	0 16 00	90 21 30	81	41.3	551	r	S. B. T.
3407	Apr. 3	0 04 00	90 24 30	81	37.2	885	glob. oz	L. B. T.
		Lat. N.						
3408	Apr. 3	0 12 30	90 32 30	83	39.5	684	glob. oz	L. B. T.
3409	Apr. 3	0 18 40	90 34 00	82	42.3	327	bk. s	S. B. T.
3410	Apr. 3	0 19 00	90 34 00	82	44	331	bk. s	Do.

a Bottom also known as Nullipore.

b Three trials submarine tow net.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.		Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Lat. N.	Long. W.					
		Off Galapagos Islands.						
	1891.	° ′ ″	° ′ ″	° F.	° F.	Fms.		
3411	Apr. 4	0 54 00	91 09 00	82	36.2	1,189	yl. glob. oz	L. B. T.
3412	Apr. 4	1 23 00	91 43 00	82	38	918	r	Do.
3413	Apr. 5	2 34 00	92 06 00	82	36	1,360	glob. oz. dk. sp	Do.
		Off Mexico.						
3414	Apr. 8	10 14 00	96 28 00	82	35.8	2,232	gn. m	L. B. T. *a*
3415	Apr. 10	14 46 00	98 40 00	83	36	1,879	bn. m. glob. oz	Do.
3416	Apr. 11	16 32 30	99 42 40	81	40.5	419	bn. m	Do.
3417	Apr. 11	16 32 00	99 48 00	82	40.6	493	gn. m	S. B. T.
3418	Apr. 11	16 33 00	99 52 30	82	39	980	bn. s. bk. sp	Do.
3419	Apr. 11	16 34 30	100 03 00	81	39	672	gn. m. bk. sp	Do.
3420	Apr. 12	16 46 00	100 08-20	82	39.6	664	dk. gn. m	Do.
3421	Apr. 12	16 47 20	100 00 10	82	42.9	388	dk. gn. m	Do.
3422	Apr. 12	16 47 30	99 59 30	83	53.3	141	gn. m	Do.
3423	Apr. 12	16 47 30	99 59 20	83	55.8	94	gn. m	Do.
3424	Apr. 18	21 15 00	106 23 00	76	38	676	gy. s. bk. sp	Do.
3425	Apr. 18	21 19 00	106 24 00	76	39	680	gn. m. s	Do.
3426	Apr. 18	21 21 00	106 25 00	76	51.2	146	rky	Do.
3427	Apr. 18	21 22 15	106 25 00	76	51.2	80	rky	Tangles.
3428	Apr. 18	21 36 30	106 25 00	76	48.1	238	dk. gy. s	S. B. T.
3429	Apr. 19	22 30 30	107 01 00	73	37.5	919	gn. oz. rky	Do.
3430	Apr. 19	23 16 00	107 31 00	73	37.9	852	bk. s	Do.
		Gulf of California.						
3431	Apr. 20	23 59 00	108 40 00	70	37	995	lt. bn. m	S. B. T.
3432	Apr. 20	24 22 30	109 03 20	70	37.8	1,421	bn. m. bk. sp	L. B. T.
3433	Apr. 21	25 26 15	109 48 00	69	36.5	1,218	bn. m. bk. sp	S. B. T.
3434	Apr. 21	25 29 30	109 48 00	70	36.4	1,588	bn. m. bk. sp	Do.
3435	Apr. 22	26 48 00	110 45 20	70	37.3	859	bn. m. bk. sp	Do.
3436	Apr. 22	27 03 40	110 53 40	72	37.2	905	bn. m. bk. sp	Do.
3437	Apr. 23	27 39 40	111 00 30	70	40	628	bn. m. bk. sp	Submarine tow net.
		Bering Sea.						
3438	Aug. 3	57 06 30	170 22 30	45	.....	20	fne. gy. s. sh	S. B. T.
3439	Aug. 3	57 06 00	170 35 00	44	44	41	fne. bk. s	Do.
3440	Aug. 3	57 05 00	170 41 00	46	.....	48	bk. m. sh	Do.
3441	Aug. 3	57 04 20	170 52 30	48	39	51	bk. m. sh	Do.
3442	Aug. 3	57 10 00	170 47 15	50	40	47	bl. m. sh	Do.
		Off Washington.						
3443	Aug. 27	48 13 30	123 11 20	57	46	97	gn. m. p	L. B. T.
3444	Aug. 27	48 16 30	123 29 40	56	45	80	gn. m. p	Do.
3445	Aug. 27	48 16 00	123 45 05	65	44	100	rky	Do.
3446	Aug. 27	48 18 50	123 58 20	53	44.5	100	bn. m	Do.
3447	Aug. 28	48 30 15	124 36 20	54	44	116	gy. s	Do.
3448	Aug. 28	48 31 40	124 39 00	55	44	98	gy. s	Do.
3449	Aug. 28	48 29 40	124 40 10	55	.....	135	gy. s. g	Do.
3450	Aug. 28	48 26 50	124 39 35	53	44	151	g	Do.
3451	Aug. 28	48 25 10	124 37 50	53	45	106	g. st	Do.
3452	Aug. 29	48 24 40	124 29 10	53	44.5	125	rky. bk. g	Do.
3453	Aug. 29	48 20 00	124 13 40	57	44.4	120	gy. s. bk. sp	Do.
3454	Sept. 1	48 27 50	124 42 40	54	44.2	152	gy. s. rky	Do.
3455	Sept. 1	48 28 40	124 43 50	54	44.3	152	gy. s. rky	Do.
3456	Sept. 1	48 31 15	124 43 15	55	44.2	138	gy. s	Do.
3457	Sept. 1	48 28 20	124 52 05	54	44.2	142	gy. s	Do.
3458	Sept. 2	48 21 50	124 24 00	51	.....	115	dk. s. st	Do.
3459	Sept. 2	48 24 20	124 24 40	53	44.5	123	gy. s. p	Do.
3460	Sept. 2	48 25 05	124 10 00	53	46.8	53	gy. s	Do.
3461	Sept. 2	48 17 20	124 07 25	54	44.4	114	gy. s. g. rks	Do.
3462	Sept. 3	48 15 00	123 35 50	53	44.8	92	dk. s. rky	Do.
3463	Sept. 4	48 09 30	123 23 30	52	47.8	45	gy. s	Do.
3464	Sept. 4	48 14 00	123 20 40	55	47.8	40	gy. s. p	Do.
3465	Sept. 4	48 21 00	123 14 00	55	49.9	48	rky	Do.
3466	Sept. 4	48 18 30	123 22 00	53	48.5	56	gy. s. sh. rky	Do.
		Hawaiian Islands.						
3467	Dec. 3	21 13 00	157 43 37	76	.....	310	fne. wh. s. bk. sp	S. B. T.
3468	Dec. 3	21 15 36	157 41 10	76	.....	17	s. co	Tangles.
3469	Dec. 3	21 14 51	157 43 30	76	.....	14	s. co	Do.
3470	Dec. 4	21 08 30	157 49 00	76	43.3	343	wh. s	L. B. T.
3471	Dec. 4	21 10 30	157 48 30	76	.....	337	fne. wh. s	Do.
3472	Dec. 4	21 12 00	157 49 00	78	.....	295	fne. wh. s	Do.
3473	Dec. 6	21 15 00	157 30 00	76	43.8	318	fne. gy. s	Do.
3474	Dec. 6	21 12 00	157 38 30	77	.....	375	fne. wh. s	Do.
3475	Dec. 6	21 08 00	157 43 00	76	.....	351	fne. wh. s	Do.
3476	Dec. 6	21 09 00	157 53 00	76	.....	298	fne. wh. s	Do.

a Three trials submarine tow net.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.		Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Lat. N.	Long. W.					
		Off San Francisco, Cal.						
	1893.	° ′ ″	° ′ ″	°F.	°F.	Fms.		
3477	Apr. 26	36 50 00	121 59 45	51	46.5	80	rky	L. B. T.
3478	Apr. 26	36 44 45	120 57 00	53	.....	68	gy. s. m	L. B. T., surf.
3479	Apr. 27	37 28 00	123 00 00	50	.....	276	gn. m. fne. s	L. B. T.
		Bering Sea.						
3480	July 8	52 06 00	171 45 00	47	.....	283	bk. s. co. rky	Do.
3481	July 8	52 15 00	171 40 00	48	.....	248	bk. s. g	L. B. T., swabs.
3482	July 12	57 18 00	170 42 00	42	38.9	42	gn. m. fne. s	S. B. T., swabs.
3483	July 12	57 18 00	171 18 00	42	36.8	56	gn. m	Do.
3484	July 12	57 18 00	171 54 00	44	37.4	60	bu. m	L. B. T., mud bag.
3485	July 12	57 18 00	172 34 00	44	37.1	62	gn. m	L. B. T.
3486	July 13	57 19 00	173 53 00	43	38	150	gn. m. fne. s	L. B. T., mud bag.
3487	July 13	57 10 00	173 45 00	43	37.6	81	gn. m. fne. s	Do.
3488	July 13	57 05 00	173 47 00	45	37.3	106	gn. m. gy. s	Do.
3489	July 13	57 00 00	173 14 00	46	38.5	184	gn. m. gy. s	Do.
3490	July 13	56 47 00	173 14 00	46	38	78	gn. m. fne. s	Do.
3491	July 14	56 32 00	172 28 00	44	.....	103	gn. m. fne. gy. s	Do.
3492	July 14	56 32 00	171 50 00	45	37.8	70	gn. m. fne. s	Do.
3493	July 14	56 33 00	171 20 00	46	38.5	67	gn. m. fne. s	Do.
3494	July 14	56 34 00	170 34 00	46	38.5	65	gn. m. fne. s	L. B. T.
3495	July 14	56 37 00	170 01 00	45	38.5	56	gn. m. fne. s	Do.
3496	July 17	56 32 00	169 45 00	42	39.9	41	gy. s. st. gn. m	L. B. T., mud bag
3497	July 17	56 18 00	169 38 00	42	38.7	86	gy. s. bk. sp	Do.
3498	July 17	56 13 00	169 36 00	45	38.6	142	fne. gy. s. g	Do.
3499	July 17	56 12 00	169 35 00	46	38.5	102	fne. gy. s. g	L. B. T.
3500	July 17	56 02 00	169 30 00	46	38.6	121	fne. gy. s. g	L. B. T., surf.
3501	July 17	55 51 00	169 18 00	47	36.9	688	gn. m	Do.
3502	July 17	55 38 00	169 00 00	46	.....	368	gn. m. dk. s	Do.
3503	July 28	57 06 15	170 11 00	43	37.9	17	gn. m. fn. s	S. B. T.
3504	July 28	56 57 00	169 27 00	45	37.8	34	fne. gy. s. bk. sp	L. B. T.
3505	July 28	57 09 00	168 17 00	44	38.1	44	fne. gy. s	Do.
3506	July 29	57 33 00	165 55 00	42	32	36	gy. s. m	Do.
3507	July 29	57 43 00	164 42 00	43	37.5	31	fne. gy. s	L. B. T., surf.
3508	July 29	58 33 00	164 49 00	41	42	23	fne. gy. s. sh	Do.
3509	July 31	57 00 00	169 43 00	43	40.8	35	fne. gy. s. sh	R. D.
3510	Aug. 1	57 12 30	169 51 00	43	40.1	27	sh. bk. s	L. B. T.
3511	Aug. 1	57 32 00	169 38 00	44	37.2	39	fne. s. dk. m	Do.
3512	Aug. 1	57 49 30	169 27 00	45	36.6	38	fne. s. gn. m	R. D.
3513	Aug. 1	58 27.00	169 01 00	43	.....	35	fne. s. gn. m	L. B. T., mud bag.
3514	Aug. 2	59 22 00	168 21 00	40	40.8	21	fne. gy. s	L. B. T.
3515	Aug. 2	59 59 00	167 53 00	42	41.8	13	fne. gy. s	L. B. T., mud bag.
3516	Aug. 2	60 28 00	168 08 00	44	43.2	17	fne. gy. s	L. B. T.
3517	Aug. 2	60 27 00	169 04 00	41	40.3	24	fne. gy. s	L. B. T., surf.
3518	Aug. 3	60 22 00	171 42 00	42	33.9	36	gn. m	Do.
3519	Aug. 3	60 06 00	171 25 00	42	31.1	37	bk. m. fne. s	Do.
3520	Aug. 3	59 28 00	170 57 00	43	32.2	38	gn. m. fne. s	L. B. T., mud bag, surf
3521	Aug. 3	59 09 00	170 48 00	43	31.9	40	gn. m. fne. s	L. B. T., surf. tow net.
3522	Aug. 4	57 58 00	170 09 00	44	35.7	41	crs. gy. s. g	L. B. T., mud bag, surf.
3523	Aug. 4	57 39 00	170 02 00	45	38	39	gn. m. fne. s	L. B. T., surf.
3524	Aug. 4	57 24 00	169 56 00	45	40.3	36	gy. s. p	Do.
3525	Aug. 4	57 21 00	170 05 00	45	41.6	29	bk. s. sh	R. D.
3526	Aug. 5	57 31 00	170 57 00	44	38.9	49	dk. m. fne. s	Do.
3527	Aug. 5	57 48 00	171 21 00	44	38	52	gn. m	L. B. T., surf.
3528	Aug. 5	58 19 30	172 02 00	45	35.9	55	dk. gn. m. fne. s	L. B. T.
3529	Aug. 5	58 36 00	172 24 00	45	36.1	56	gn. m	Do.
3530	Aug. 6	59 39 00	173 53 00	44	34.9	59	dk. gn. m. fne. s	L. B. T., surf.
3531	Aug. 6	59 55 00	174 17 00	46	35.1	59	gn. m	Do.
3532	Aug. 6	59 12 00	175 39 00	44	34.8	77	dk. gn. m. fne. s	Do.
3533	Aug. 7	57 34 00	173 33 00	46	39.2	70	gy. s. bk. sp	L. B. T.
3534	Aug. 8	57 03 00	171 19 00	45	38.1	59	gn. m	Do.
3535	Aug. 8	57 02 00	170 46 00	45	39	52	gn. m. fne. s	Do.
3536	Aug. 8	57 05 00	170 35 00	45	42.4	40	gn. m. fne. s	Do.
3537	Aug. 9	54 45 00	169 06 00	43	38	49	fne. gy. s	L. B. T., surf.
3538	Aug. 9	56 41 00	168 29 00	46	38	59	gn. m. s	Do.
3539	Aug. 9	56 34 00	167 19 00	45	38.9	57	gn. m s	L. B. T., mud bag, surf.
3540	Aug. 9	56 27 00	166 08 00	45	36	51	gn. m. fne. s	L. B. T., surf.
3541	Aug. 10	56 14 00	164 08 00	46	36.1	49	bk. m. fne. s	L. B. T., mud bag, surf.
3542	Aug. 10	56 10 00	163 26 00	47	39.2	49	dk. m. fne. s	L. B. T., surf.
3543	Aug. 18	56 41 00	169 39 00	44	42.7	43	bk. s. sh	Do.
3544	Aug. 18	56 50 00	169 59 00	44	41.1	41	fne. gy. s. sh	Do.
3545	Aug. 21	56 15 00	171 33 00	48	36	1,020	gn. m. fne. s. c	Agassiz dredge, surf.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Bering Sea.						
	1893.	° ′ ″	° ′ ″	° F.	° F.	Fms.		
3546	Aug. 31	54 12 00	165 42 00	47	45.6	36	g. bk. s	L. B. T., mud bag.
3547	Aug. 31	54 16 00	165 45 00	47	45	51	fne. bk. s	L. B. T., surf.
3548	Sept. 1	54 44 00	165 42 00	47	39.5	91	bk. s	Do.
3549	Sept. 1	55 00 00	166 10 00	49	40.1	78	fne. bk. s	Do.
3550	Sept. 1	55 24 00	167 02 00	48	39	76	br. m	Do.
3551	Sept. 1	55 36 00	167 28 00	47	39.1	74	gn. m	Do.
3552	Sept. 2	56 28 00	169 28 00	47	39.8	54	bk. s. rky	L. B. T.
3553	Sept. 2	56 28 00	169 46 00	48	39.5	51	fne. gy. s. m	L. B. T., surf.
3554	Sept. 2	56 34 00	170 19 00	47	39.5	62	gn. m	Do.
3555	Sept. 2	56 45 00	170 18 00	46	40.2	57	gn. m	Do.
3556	Sept. 2	56 57 30	170 33 00	46	41	49	gn. m. fne. s	Do.
3557	Sept. 2	57 04 00	170 24 00	45	45	26	s. bk. sp	L. B. T.
3558	Sept. 3	56 58 00	170 09 00	45	42.9	25	s. dk. sp. rky	Do.
3559	Sept. 3	56 56 00	169 52 00	46	42.5	39	gy. s. brk. sh	L. B. T., mud bag, surf.
3560	Sept. 3	56 40 00	169 20 00	45	40.7	43	fne. gy. s. bk. sp	L. B. T.
3561	Sept. 3	56 31 00	169 17 00	45	40.7	48	gy. s. bk. sp	Do.
	1894.	*San Diego Bay.*						
3562	Mar. 19	San Diego Bay, Cal. *a*		58	.....	7	s. bk. sh	Boat dredge.
3563	Mar. 19	.....do		56	.....	6.5	fne. s. bk. sh	Do.
3564	Mar. 19	.....do		58	.....	5	fne. s. m. bk. sh	Do.
3565	Mar. 19	.....do		58	.....	4.5	fne. s. m. bk. sh	Do.
3566	Mar. 19	.....do		58	.....	3	fne. s. bk. sh	Do.
3567	Mar. 21	.....do		57	.....	3	fne. s. bk. sh	Do.
3568	Mar. 21	.....do		57	.....	4	hrd. bk. sh	Do.
3569	Mar. 21	.....do		57	.....	6	fne. s. bk. sh	Do.
3570	Mar. 21	.....do		57	.....	2	fne. s. oyster sh	Do.
3571	Mar. 21	.....do		57	.....	2	hrd	Do.
3572	Mar. 21	.....do		56	.....	2	m. fne. s	Do.
3573	Mar. 21	.....do		56	.....	1.5	m. s	Boat beam trawl.
3574	Mar. 21	.....do		57	.....	5.75	fne. s	Do.
3575	Mar. 21	.....do		57	.....	6.75	fne. s	Do.
3576	Mar. 21	.....do		58	.....	5	fne. s. bk. sh	Do.
3577	Mar. 21	.....do		57	.....	6	fne. s. bk. sh	Do.
3578	Mar. 21	.....do		56	.....	6	fne. s. bk. sh	Do.
3579	Mar. 22	.....do		53	.....	9	hrd	Do.
3580	Mar. 22	.....do		53	.....	7	hrd	Do.
3581	Mar 22	.....do		53	.....	12	fne. s. r	Do.
3582	Mar. 22	.....do		54	.....	6.75	fne. s. r	Do.
3583	Mar. 22	.....do		53	.....	4	fne. s. r	Do.
3584	Mar. 22	.....do		54	.....	8	fne. s. r	Do.
3585	Mar. 24	.....do		57	.....	4	fne. gy. s.	Do.
3586	Mar. 24	.....do		57	.....	4	fne. gy. s.	Do.
3587	Mar. 24	.....do		57	.....	3	fne. gy. s.	Do.
3588	Mar. 24	.....do		57	.....	2.5	r. oyster sh	Do.
3589	Mar. 24	.....do		57	.....	3	r. oyster sh	Do.
3590	Mar. 24	.....do		57	.....	3.5	r. bk. sh	Do.
3591	Mar. 24	.....do		57	.....	4.5	r. bk. sh	Do.
		Off Washington.						
3592	Apr. 30	48 10 00	122 45 30	46	.....	27	r. s	S. B. T.
3593	Apr. 30	48 11 30	122 48 00	46	46	37	rky	Ship's dredge.
3594	Apr. 30	48 12 00	122 50 00	46	46	36	s. p	Tangles.
3595	Apr. 30	48 13 00	122 59 30	46	45	49	rky. g. s	Do.
3596	Apr. 30	48 14 30	122 58 00	46	44	81	bu. m	L. B. T.
3597	Apr. 30	48 15 00	123 00 00	46	45	67	crs. bk. s	Do.
		Bering Sea.						
			Long. E.					
3598	June 8	52 01 00	177 34 00	40	.....	34	bk. g	L. B. T.
3599	June 9	52 05 00	177 40 00	42	.....	55	rky. fne. s. sh	Do.
			Long. W.					
3600	June 26 1895.	55 06 00	163 28 00	41	40	9	fne. dk. vol. s	L. B. T., surf.
3601	Aug. 5	55 06 00	169 08 00	46	35.8	1,044	gn. m. fne. s	L. T. B., surface and intermediate nets.
3602	Aug. 10	56 32 00	172 40 00	44	37.1	81	gn. m. s	L. B. T., surface net.
3603	Aug. 11	55 23 00	170 31 00	45	35.1	1,771	bn. oz	L. B. T., surface and intermediate nets.
3604	Aug. 12	54 54 00	168 59 00	45	35.2	1,401	gn. oz	Do.
3605	Aug. 13	55 17 00	167 34 00	44	37.1	91	gn. m. s	Do.

a All bearings are magnetic. Chart used, C. S. No. 5106.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Bering Sea.						
	1895.	° ′ ″	° ′ ″	° F.	° F.	Fms.		
3606	Aug. 13	55 27 00	167 47 00	45	38.1	87	gn. m. fne. s	L. B. T., surface and intermediate nets.
3607	Aug. 18	54 11 30	167 25 00	45	35.9	987	gn. m. bk. lav. s	Do.
3608	Aug. 20	55 19 00	168 11 00	45	37.8	276	gy. s	Do.
3609	Aug. 21	55 35 00	168 20 00	46	37.9	74	gn. m. s	Do.
3610	Aug. 22	55 58 00	167 16 00	47	36.8	75	gn. m	Do.
3611	Aug. 22	56 45 00	167 25 00	48	34.6	50	gn. m. s	Do.
3612	Sept. 30	Bellingham, Wash.		52	.....	11	gn. m	S. B. T.
	1896.							
3613	Mar. 31	San Diego Bay, Cal.		63	.....	5	m. sh	Boat beam trawl.
3614	Mar. 31	.....do.....		63	.....	4.5	m. sh	Do.
3615	Mar. 31	.....do.....		63	.....	5	m. sh	Do.
3616	Mar. 31	.....do.....		63	.....	5	m. sh	Do.
3617	Mar. 31	.....do.....		63	.....	5.5	m. sh	Do.
3618	Mar. 31	.....do.....		63	.....	4.5	m. sh	Do.
3619	Mar. 31	.....do.....		63	.....	4	m. sh	Do.
3620	Mar. 31	.....do.....		63	.....	6	m. sh	Do.
3621	Apr. 1	.....do.....		61	.....	6.5	m. s	Do.
3622	Apr. 1	.....do.....		61	.....	7	m. s	Do.
3623	Apr. 1	.....do.....		63	.....	6.25	s	Do.
3624	Apr. 1	.....do.....		63	.....	5	m. s	Do.
3625	Apr. 1	.....do.....		63	.....	6	m. s	Do.
3626	Apr. 1	.....do.....		63	.....	7	m. s	Do.
		West of Cortez and Tanner banks						
3627	Apr. 13	32 44 00	119 32 00	55	39.2	776	gn. m. s	S. B. T.
						Feet.		
3628	June 1	Lower Bay of San Francisco.		57	.....	18	sft. gn. m	Oyster dredge.
3629	June 1	.....do.....		57	.....	19.5	sft. gn. m	Do.
3630	June 1	.....do.....		58	.....	15	sft. gn. m	Do.
3631	June 1	.....do.....		58	.....	25	gn. m	Do.
3632	June 1	.....do.....		60	.....	18	gn. m	Do.
3633	June 1	.....do.....		62	.....	18	gn. m	Do.
		Bering Sea.						
3634	July 7	54 51 00	167 27 00	43	36.3	664	w. vol. s	L. B. T. surf.
3635	July 10	Zapadnie Bay.	St. George Island.	43	.....	24	bk. s. sky	L. B. T.
3636	July 18	57 05 40	170 25 00	38	42.2	18	rky	Do.
3637	July 18	57 06 30	170 28 00	38	39.0	32	crs. g	Do.
3638	July 18	57 07 30	170 28 15	38	38.7	33	g	Do.
3639	July 18	57 05 45	170 30 00	38	38.8	27	fne. gy. s	Do.
3640	July 18	57 06 00	170 32 00	38	39.0	26	fne. gy. s	Do.
		Avatcha Bay, Kamchatka.						
			Long. E.					
3641	Aug. 19	52 58 00	158 36 00	45	47.7	16	bk. m	L. B. T.
3642	Aug. 19	52 57 45	158 36 30	47	.....	16	bk. m	Do.
		Southeast coast of Kamchatka.						
3643	Aug. 20	51 16 00	158 03 00	49	31.7	100	bk. s. p	L. B. T.
3644	Aug. 20	51 09 00	157 48 00	51	33.1	96	bk. s	Do.
3645	Aug. 31	To westward of Robben Island, Okhotsk Sea 2 to 10 miles distant. Having no chart, nearer location can not be given.		47	.....	10	s	Do.
3646	Aug. 31			47	.....	18	fne. gy. s	Do.
3647	Aug. 31			47	.....	20	fne. gy. s	Do.
3648	Aug. 31			47	.....	20	fne. gy. s	Do.
3649	Aug. 31			50	.....	25	fne. dk. s	Do.
3650	Aug. 31			50	.....	28	bn. m. s	Do.
3651	Aug. 31			47	.....	20	fne. gy. s	Do.
		Off Shana, Iturup Island.						
3652	Sept. 6	45 15 30	147 53 00	56	.....	14	yl. c	L. B. T.
3653	Sept. 6	45 14 00	147 52 30	57	56.5	18	dk. gy. s	Do.
		Off Japan.						
3654	Sept. 19	Hakodate Bay		67	.....	10.5	gn. m. s	L. B. T.
3655	Sept. 19	.....do.....		67	.....	12	gn. m. s	Do.
3656	Sept. 19	.....do.....		67	.....	11.5	gn. m. s	Do.
3657	Sept. 19	.....do.....		67	.....	13.5	fne. gy. s	Do.
3658	Sept. 19	.....do.....		67	.....	22	fne. gy. s	Do.
3659	Sept. 19	.....do.....		65	.....	15.5	fne. gy. s	Do.
3660	Sept. 19	.....do.....		65	.....	14.5	fne. gy. s	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. E.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
		Off Japan.						
	1896.	° ′ ″	° ′ ″	° F.	° F.	Fms.		
3661	Oct. 13	Off Uki Shima, Gulf of Tokyo.		72	48.0	109	m. p	L. B. T.
		Lat. N.	Long. W.					
		Santa Catalina Island, California.						
	1897.							
3662	Apr. 8	1¼″ off Avalon, Dakins Cove.		58	51.7	47	fne. gy. s	L. B. T.
3663	Apr. 8	Near preceding station.		58	52.5	47	fne. gy. s	Do.
3664	Apr. 8	2′ off Avalon, Dakins Cove.		58	49.7	80	fne. gy. s	Do.
3665	Apr. 9	33 17 00	118 24 00	61	.....	59	fne. gy. s	Do.
		Monterey Bay and vicinity.						
3666	Apr. 13	36 45 00	121 53 00	55	.....	68	m. s. bldr	L. B. T.
3667	Apr. 13	36 45 00	121 52 00	55	47.7	90	m. s. bldr	Do.
3668	Apr. 13	36 40 00	121 53 00	56	48.7	39	s. mica	Do.
3669	Apr. 16	36 47 00	122 11 00	57	42.7	278	gn. m. fne. s	Do.
3670	Apr. 17	36 43 00	122 12 00	54	37.8	581	gn. m. s	Do.
3671	Apr. 21	37 00 00	122 20 00	50	.....	56	gn. m. s	Do.
3672	Apr. 24	37 37 00	123 02 00	49	49.0	68	s. co. r	Do.
		Flattery Bank.						
3673	May 14	48 21 45	124 50 30	47	45.0	77	gn. m. s	L. B. T.

a Nos. 3674 to 3680 missing from the record.

Record of dredging and trawling stations of the Albatross (Tropical Pacific).

Numbers. Serial.	Numbers. A. A.	Date.	Position. Lat. N.	Position. Long. W.	Surface temp.	Bottom temp.	Depth.	Kind of bottom.	Instrument used, etc.
			San Francisco to Marquesas.						
		1899.	° ′ ″	° ′ ″	° F.	° F.	Fms.		
3681	2	Aug. 27	28 23 00	126 57 00	66	34.6	2,368	lt. br. vol. oz	8′ Tnr.
3682	10	Sept. 2	16 38 00	136 14 00	79	.....	3,088	no spec	5½′ Blk.
3683	13	Sept. 5	9 57 00	137 47 00	82	.....	2,690	rad. oz	Do.
3684	17	Sept. 10	0 50 00 Lat. S.	137 54 00	80	.....	2,403	gy. yl. glob. oz	Do.
3685	25	Sept. 14	Off Marquesas Islands.		80	38.0	830	vol. s. glob	8′ Tnr.
3686	31	Sept. 19	12 20 00	144 15 00	79	35.0	2,700	red. c	5½′ Blk.
3687	74	Oct. 5	Off Pt. Venus, Tahiti Island, S. 82°, E. 4.8 m.		79	.....	725	tul. vol. s. yl. m	8′ Tnr.
			Paumotu Islands.						
3688	133	Oct. 28	N. W. Pt. Marokau, East 2 m.		78	34.5	742	pter. oz. mang	8′ Tnr.
3689	134	Oct. 28	N. W. Pt. Marokau, N 40°, E 4 m.		79	37.6	807	co. s. mang	Tangles.
3690	139	Oct. 29	N. W. Face Hao Atoll, East 2 m.		79	37.6	812	co. s	5½′ Blk.
3691	173	Nov. 4	18 55 00	146 32 00	78	34.8	2,440	vol. m. glob. co. part.	Do.
			Tonga to Ellice Isds.						
3692	183	Nov. 24	19 04 00	167 41 00	80	33.9	2,472	rd. c. rad. oz	Do.
3693	185	Nov. 27	21 18 00	173 31 00	77	.....	4,173	no spec	4′ Blk.
3694	194	Dec. 21	12 43 00 Lat. N.	Long. E. 179 50 00	85	35.6	1,445	glob. oz	8′ Tnr.
			Off Honshu Island, Japan.						
		1900.							
3695	.....	May 4	Tsuragi Saki Light, S. 80°, W. 4.3 m.		64	.....	259; 110	gn. m. fne. s	8′ Tnr.
3696	.....	May 5	Manazuru Zaki, N. 70°, W. 4.7 m.		65	39.0	501; 749	gn. m. vol. a. s	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.	Surface temp.	Depth.	Kind of bottom.	Instrument used, etc.
	1900.	*Off Honshu Island, Japan*	° F.	Fms.		
3697	May 5	Manazuru Zaki, 26°, W. 6.0 m.	65	265; 120	gy. m. vol. s	8′ Tnr.
3698	May 5	Manazuru Zaki, N. 8°, W. 4.5 m.	65	153	gn. m. vol. a. s	Do.
3699	May 6	Entr. Port Arari, S. 74°, E. 5.6 m.	60	726; 400	gy. m. vol. part	Do.
3700	May 7	Seno Umi, N. 4°, E. 2 m	63	63	vol. m. s	Grapnels, tangles.
3701	May 7	Seno Umi, N. 10°, W. 2.3 m	64	73; 41		5½′ Blk.
3702	May 7	Seno Umi, N. 13°, W. 1.5 m	64	41; 31	vol. m. s. r	Grapnel swab.
3703	May 7	Seno Umi, N. 16°, E. ⅛ m	64	31	vol. s. g	5½′ Blk.
3704	May 7	Seno Umi, S. 30°, E. 1.1 m	64	94; 150	fne. vol. s	Do.
3705	May 7	Seno Umi S. 18°, W. 5.3 m	64	Did not sound.		Surf.
3706	May 8	Entr. Port Heda, N. 86°, E. 2 m.	64	337	gn. vol. m	8′ Tnr.
3707	May 8	Ose Zaki, S. 53°, W. 2¼ m	65	63; 75; 70	vol. s. a. g	Do.
3708	May 8	Ose Zaki, S. 55°, W. 2.25 m	65	60; 70	gn. m. vol. s. a	Do.
3709	May 10	Spithead Shimizu Harbor, N. 77°, W. 1.5 m.	63	173; 260	stf. bl. vol. m. r	5½′ Blk.
3710	May 10	Entr. Port Heda, N. 88°, E. 6.5 m.	62	800; 677	vol. m. s	Do.
3711	May 10	Entr. Port Heda, S. 63°, E. 6.2 m.	64	677; 500	vol. m. s	Do.
3712	May 10	Ose Zaki, S. 72°, E. 6.5 m	64	500; 600	vol. m. s	Surf.
3713	May 11	Ose Zaki, S. 81°, W. 4.2 m	65	45; 48	vol. s. sh. r	8′ Tnr.
3714	May 11	Ose Zaki, S. 82°, W. 3.3 m	65	48; 60	vol. s. sh. r	Do.
3715	May 11	Ose Zaki, S. 56°, W. 1.6 m	65	68; 65	vol. s. sh. r	8′ Tnr.
3716	May 11	Ose Zaki, S. 36°, W. 0.8 m	66	65; 125	vol. s. sh. r	Do.
3717	May 11	Ose Zaki, S. 34°, E. 0.8 m	66	75; 100; 63	vol. s. sh. r	Do.
3718	May 11	Ose Zaki, S. 37°, W. 1.2 m	65	65	vol. s. sh. r	5½′ Blk.
3719	May 11	Ose Zaki, S. 13°, W. 1.5 m	66	90; 70	vol. s. sh. r	8′ Tnr.
3720	May 11	Ose Zaki, S. 36°, W. 0.8 m	66	63	vol. s. sh	Do.
3721	May 12	Oi Gawa, N. 49°, W. 2.8 m	64	207; 250	gy. m	Do.
3722	May 15	Yokkaichi Lt., S. 89°, W. 3.7 m.	63	9	m. s. p. sh	Do.
3723	May 15	Yokkaichi Lt., N. 23°, W. 6.7 m.	62	13; 16	m. s. p. sh	Do.
3724	May 15	Noma Saki, S. 86°, E. 5.7 m	64	20	m. s. p. sh	Do.
3725	May 15	Noma Saki, N. 18°, E. 8.8 m	64	13	s. sh. g	Do.
3726	May 15	Takamatsu Zaki, N. 5°, W. 5.7 m.	63	26	gy. vol. s	Do.
3727	May 16	Omai Zaki Lt., N. 17°, E. 9.7 m.	62	34	m. crs. s. blk. sh	Do.
3728	May 16	Omai Zaki Lt., N. 17°, E. 11.25 m.	64	34	m. stf. c	Do.
3729	May 16	Omai Zaki Lt., N. 17°, E. 12.7 m.	64	34	m. g	Do.
3730	May 16	Omai Zaki Lt., N. 17°, E. 14.5 m.	64	34; 37	m g. r	Surf.
3731	May 16	Omai Zaki Lt., N. 17°, E. 16.25 m.	64	37	crs. s. brk. sh. r	8′ Tnr.
3732	May 16	Omai Zaki Lt., N. 17°, E. 16.5 m.	65	41	crs. s. brk. sh. r	5½′ Blk.
3733	May 16	Omai Zaki Lt., N. 24°, E. 9.5 m.	64	49	fne. gy. vol. s	8′ Tnr.
3734	May 16	Omai Zaki Lt., N. 25°, E. 11 m.	64	48; 36	crs. gy. vol. s. brk. sh.	Do.
3735	May 16	Omai Zaki Lt., N. 15°, E. 11.4 m.	65	36	crs. gy. vol. s. brk. sh.	Do.
3736	May 17	Ose Zaki, S. 83°, E. 8.1 m	64	599; 480	stf. bl. m. st	Do.
3737	May 17	Ent. Port Heda, N. 49°, E. 1.9 m.	65	161; 167	gn. m. vol. s	Tangles.
3738	May 17	Ent. Port Heda, N. 84°, E. 1.2 m.	67	167	stf. bl. m	8′ Tnr.
3739	May 17	Ose Zaki, S. 25°, W. 0.25 m	65	55; 65	vol. s. sh. r	Tangle bar.
3740	May 17	Ose Zaki, S. 50°, W. 0.83 m	65	65	vol. s. sh. r	Do.
3741	May 17	Ose Zaki, S. 29°, W. 0.75 m	66	68; 63	vol. s. sh. p	8′ Tnr.
3742	May 19	Suno Saki, N. 89°, E. 9.8 m	64	88; 57	gy. yl. s	5½′ Blk.
3743	May 19	Suno Saki, N. 88°, E. 9.25 m.	64	57; 46	gy. yl. s	Tangle bar.
3744	May 19	Suno Saki, E. 8.83 m	64	46	fne. yl. g	Do.
3745	May 19	Suno Saki, N. 89°, E. 8.75 m.	64	46; 49	gy. s. g	Do.
3746	May 19	Suno Saki, N. 87°, E. 8.5 m.	64	49	gy. s. p	Tangles.
3747	May 19	Suno Saki, N. 88°, E. 7.9 m.	64	48; 45	co. g	Hand lines.
3748	May 19	Suno Saki, S. 88°, E. 8.8 m.	64	73; 200	yl. s. rot. co	Tangles.
3749	May 19	Suno Saki, S. 85°, E. 9.4 m.	64	158; 83	bk. s. sh	Do.

Record of dredging and trawling stations of the Albatross—Continued.

Serial No.	Date.	Position.	Surface temp.	Depth.	Kind of bottom.	Instrument used, etc.
	1900.	*Off Honshu Island, Japan*	° F.	*Fms.*		
3750	May 19	Suno Saki, S. 89°, E. 9.25 m.	65	83; 140	gy. s. brk, sh. p	4′ Blk.
3751	May 19	Suno Saki, S. 87°, E. 8.5 m.	65	148; 140	gn. m. vol. s	Do.
3752	May 19	Suno Saki, S. 71°, E. 3.25 m.	66	58; 100; 54	gy. s. g	Tangles.
3753	May 19	Suno Saki, S. 58°, E. 3.6 m.	66	54; 48	gn. m. s. g	Tangle bar.
3754	May 19	Suno Saki, S. 69°, E. 3.2 m.	67	48; 52	gy. s	8′ Tnr.
3755	May 19	Suno Saki, S. 63°, E. 3.6 m.	66	52; 77	gy. s. co	Do.
3756	May 19	Suno Saki, S. 60°, E. 3 m.	66	77; 50	rot. co	Do.
3757	May 19	Suno Saki, S. 64°, E. 2.5 m.	65	50; 41	crs. co. s. g	Do.
3758	May 22	Suno Saki, S. 55°, E. 2.1 m.	65	73; 52	bl. c. r	Do.
3759	May 22	Suno Saki, S. 53°, E. 2.3 m.	66	52; 60	gy. s. fne. g. brk. sh. r	Do.
3760	May 22	Suno Saki, S. 53°, E. 3 m.	66	83; 50	gy. s. g	Do.
3761	May 22	Suno Saki, S. 55°, E. 2.5 m.	66	35; 42	gy. s. g	Do.
3762	May 22	Suno Saki, S. 59°, E. 2.8 m.	66	42; 40	gy. s. bk. sp. brk. sh	Do.
3763	May 22	Suno Saki, S. 63°, E. 3.3 m.	66	49; 52	gy. s. brk. sh	Do.
3764	May 22	Suno Saki, S. 64°, E. 2.8 m.	66	44; 50	fne. g. brk. sh	Do.
3765	May 22	Suno Saki, S. 51°, W. 2 m.	66	68; 45	gn. m. s	Do.
3766	June 3	Shioya Saki Lt., N. 78°, W. 108 m.	69	.....	.....	Surf.
3767	June 5	Oboro Saki, N. 67°, E. 2.3 m.	67	14; 18	gy. s	8′ Tnr.
3768	June 5	Daikoku Saki, N. 63°, E. 4.25 m.	64	25; 27	lt. gy. s	Do.
3769	June 5	Nagane Saki, N. 55°, E. 5.3 m.	64	40; 42	gn. m. s	Do.
3770	June 5	Nagane Saki, N. 41°, E. 4.7 m.	62	42; 45	gn. m. s	Do.
3771	June 5	Doumiki Saki, N. 19°, W. 4.5 m.	63	61	gn. m. s	Do.
3772	June 5	Kinkwasan Lt., N. 34°, W. 7.5 m.	59	79	gn. m. s	Do.
3773	June 5	Kinkwasan Lt., N. 49°, W. 5.9 m.	61	78	bk. s	Do.
3774	June 5	Kinkwasan Lt., N. 81°, W. 5.4 m.	61	81	gy. s	Do.
3775	June 5	Kinkwasan Lt., N. 15°, E. 3.2 m.	60	57	gn. m. s	Do.
		Off Kamchatka.				
3776	June 21	Avatcha Village, N. 44°, W. 2 m.	48	13	sft. gn. m. sh. stk	8′ Tnr.
3777	June 21	Avatcha Village, N. 7°, W. 3.8 m.	49	13	sft. gn. m. sh. stk	Do.
3778	June 21	N. Ent. Tareinski Hbr., N. 73°, W. 2.1 m.	49	15; 12	gn. m. s. sh. g	Do.
3779	June 21	N. Ent. Tareinski Hbr., N. 16°, E. 1.6 m.	49	12	gn. m. s. sh. g	Do.
3780	June 21	Id. S. shore Tareineki, S. 43°, W. 0.7 m.	49	12	gn. m. s. sh. g	Do.
3781	June 23	Cape Nalacheff, N. 5°, E. 10.75 m.	50	39; 42	gy. s. g	Do.
3782	June 23	Cape Nalacheff, N. 5°, W. 10.5 m.	50	42	gy. s. g	Do.
3783	June 25	S. E. Cape, Copper Id., N. NE. ¼, E. 40 m., approx.	46	1567	gy. vol. s. gn. m	Do.
		North of Aleutian Islands.				
3784	June 27	Lat. 54° 32′ N., Long. 178° 31′ E.	45	85	gn. m. fne. gy. s	Do.
3785	June 27	Rat Ids., Aleutian Chain, S. 150 m.	45	270	gy. s. brk. sh	Do.
3786	June 27	Lat. 54° 47′ 30″ N., Long. W. 178° 51′ 00″.	46	2106	gy. s. yl. m	Do.

HYDROGRAPHIC RECORDS.

Record of hydrographic soundings of the Albatross during the years 1883–1900.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Depth.	Character of bottom.
		Cape Hatteras to Cape May.			
	1883.	° ′ ″	° ′ ″	*Fms.*	
1	May 19	37 11 20	75 15 25	15	gy. s.
2	May 19	37 15 15	75 03 30	18	gy. s.
3	May 19	37 18 21	74 53 54	23	gy. s.
4	May 19	37 21 27	74 44 18	26	gy. s. bk. sp.
5	May 19	37 24 33	74 34 42	34	gy. s. bk. sp.
6	May 19	37 27 39	74 25 06	55	lost lead.
7	May 19	37 30 45	74 15 30	312	br. m. f. s.
8	May 20	37 24 30	74 23 30	358	br. m. f. s.
9	May 20	37 29 15	74 27 00	48	wh. s. bk. sp.
10	May 20	37 34 45	74 28 00	44	gy. s. bk. sp.
11	May 20	37 35 40	74 27 00	38	gy. s. bk. sp.
12	May 20	37 44 25	74 25 30	37	gy. s gr.
13	May 20	37 48 00	74 24 15	37	gy. s. bk. sp.
14	May 20	37 49 48	74 19 46	39	gy. s. bk.
15	May 20	37 51 36	74 15 17	48	s. gr. bk. sp.
16	May 20	37 53 24	74 10 45	56	gy. s. g.
17	May 20	37 55 12	74 06 19	68	bk. s.
18	May 20	37 57 00	74 01 50	74	gy. s. bk. sp.
19	May 20	37 58 05	73 58 20	85	gy. s. bk. sp.
20	May 21	37 53 20	74 03 10	172	gy. m. fne. s.
21	May 21	37 48 33	74 08 00	96	gy. s.
22	May 21	37 43 47	74 12 50	86	gy. s.
23	May 21	37 39 00	74 17 40	68	gy. s. bk. sp.
24	May 21	37 32 42	74 17 00	158	gy. s.
25	May 21	37 40 30	74 03 00	218	bu. m. fne. s.
		Cape May to Nantucket.			
26	May 25	40 05 55	70 28 00	59	no specimen.
27	May 26	39 27 25	72 06 40	802	bu. m. fne. s.
28	May 26	39 29 30	72 09 40	459	bu. m.
29	May 26	39 31 00	72 12 00	364	bu. m.
30	May 26	39 32 00	72 19 10	182	gn. m.
31	May 26	39 32 54	72 17 30	328	bu. m.
32	July 28	37 54 49	68 05 25	2,976	glob. oz.
33	July 31	39 55 00	68 31 00	1,385	glob. oz.
34	July 31	40 02 20	68 50 30	369	crs. s.
35	Sept. 20	40 02 30	70 37 00	90	gu. m.
		Cape Hatteras to West Indies.			
	1884.				
a 36	Jan. 11	33 50 20	71 42 00	2,953	lt. choc. oz.
b 37	Jan. 13	31 15 42	67 39 10	2,787	lt. choc. oz. glob.
38	Jan. 14	28 17 07	66 17 37	2,957	lt. choc. oz. glob.
c 39	Jan. 15	24 35 14	65 13 07	3,006	stf. choc. c.
		Caribbean Sea.			
40	Jan. 17	19 15 00	65 07 00	3,468	glob. oz.
d 41	Jan. 17	18 59 00	65 07 00	1,902	
e 42	Jan. 24	18 09 00	64 58 50	516	co. r.
43	Jan. 24	18 04 30	65 01 10	1,146	co. s. for.
44	Jan. 24	18 00 00	65 04 00	1,975	
45	Jan. 24	17 55 30	65 06 00	2,501	co. s. for.
46	Jan. 24	17 51 00	65 08 05	2,423	fne. co. s. for.
47	Jan. 25	17 46 30	65 10 25	1,482	crs. co. s. brk. sh. for.
48	Jan. 25	17 42 00	65 12 40	978	co. oz. for.
49	Jan. 25	17 37 30	65 15 00	928	oz. for.
50	Jan. 25	17 33 00	65 17 20	949	co. s. for.
51	Jan. 25	17 28 30	65 19 40	1,265	co. oz. lge. pter. sh. for.
52	Jan. 25	17 24 00	65 22 00	1,895	co s. for.
53	Jan. 25	17 29 10	65 23 30	1,358	oz. for.
54	Jan. 25	17 34 20	65 25 00	900	co. s. for.
55	Jan. 25	17 39 30	65 26 30	933	pter. co. s. for.
56	Jan. 25	17 44 15	65 27 50	1,243	pter. co. oz. for.
57	Jan. 25	17 49 06	65 29 00	2,188	oz. for.
58	Jan. 25	17 45 20	65 35 35	1,345	oz. for.
59	Jan. 25	17 42 10	65 39 40	789	oz. for.
60	Jan. 25	17 39 00	65 44 00	578	co. s. for.
61	Jan. 25	17 35 50	65 48 10	1,303	fne. co. s. for.
62	Jan. 25	17 32 40	65 52 20	2,017	pter. co. s. for.
63	Jan. 26	17 15 30	65 36 20	2,690	co. s. sh.
64	Jan. 26	16 52 00	65 19 20	2,543	fne. co. s. sh.
65	Jan. 26	16 42 02	65 02 20	2,312	fne. co. s. sh. for.
66	Jan. 26	16 28 00	64 42 30	2,192	co. s. for.
67	Jan. 26	16 13 45	64 22 30	2,009	co. s. for. sh.

a Near Ashton Shoal. *b* Near Perseverenza Shoal. *c* Near Mourand Shoal.
d Parted wire at 10 fathoms. Light westerly current.
e St. Thomas light NNE. ¼ E. (mag.). Sail rock NW. ¼ N. (mag.). Slight SW. set.

THE ALBATROSS, WITH SOUNDING APPARATUS READY FOR USE.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Depth.	Character of bottom.
		Lat. N.	Long. W.		
		Caribbean Sea.			
	1884.	° ′ ″	° ′ ″	*Fms.*	
68	Jan. 27	16 04 15	64 07 00	1,920	yl. oz. for.
69	Jan. 27	15 54 46	63 52 00	1,060	co. s. for.
70	Jan. 27	15 48 00	63 45 20	1,091	co. s. for.
71	Jan. 27	15 44 10	63 42 10	950	brk. co. sh.
a 72	Jan. 27	15 41 00	63 42 00	808	fne. co. s. sh.
b 73	Jan. 27	15 40 18	63 38 36	355	co. brk. sh.
74	Jan. 27	15 38 32	63 37 36	15	co.
75	Jan. 27	15 33 55	63 35 38	172	fne. co. s.
76	Jan. 27	15 29 18	63 33 40	307	fne. co. s.
77	Jan. 27	15 08 20	63 26 00	776	co. s. for.
78	Jan. 27	14 44 25	63 18 00	871	fne. co. s. sh.
79	Jan. 27	14 20 30	63 10 00	821	co. s. sh. for.
80	Jan. 28	13 56 35	63 02 00	684	gy. m. for.
81	Jan. 28	13 34 35	62 51 20	815	m. for.
82	Jan. 28	13 20 00	62 42 40	1,051	for. m. bk. sp.
83	Jan. 28	13 23 00	62 34 15	1,686	for. m. bk. sp.
84	Jan. 28	13 15 00	62 39 00	1,640	for. m. bk. sp.
85	Jan. 28	13 07 10	62 43 40	1,634	for. m. bk. sp.
86	Jan. 28	12 58 40	62 48 00	1,635	bu. m. for. bk. sp.
87	Jan. 29	12 50 40	62 53 00	1,642	m. bk. sp. for.
88	Jan. 29	12 29 00	62 38 30	1,630	m. bk. sp. for.
89	Jan. 29	12 07 30	62 24 00	1,552	bu. m. for.
90	Jan. 29	12 03 00	62 22 20	1,437	bu. m.
91	Jan. 29	11 58 00	62 20 50	1,121	gy. bu. m.
92	Jan. 29	11 53 19	62 19 10	1,247	gy. m.
93	Jan. 29	11 42 40	62 17 00	828	hrd.
94	Jan. 29	11 34 20	62 15 40	441	gy. m. fne. s.
95	Jan. 29	11 27 00	62 13 00	280	bk. m.
96	Jan. 29	11 19 40	62 10 00	70½	crs. g. brk. sh.
97	Jan. 30	11 12 20	62 07 10	63	dk. m. crs. s.
98	Jan. 30	11 05 00	62 04 30	83	bu. m.
c 99	Jan. 30	10 44 45	61 48 18	150	m. s.
d 100	Jan. 30	10 43 45	61 48 50	141	bu. m.
101	Feb. 3	10 54 00	61 58 40	61	sft. bu. m.
102	Feb. 3	11 02 30	62 06 00	57	sft. bu. m.
103	Feb. 3	11 19 00	62 22 00	46	brk. sh.
104	Feb. 3	11 34 20	62 38 15	178	bu. m.
105	Feb. 3	11 45 30	63 01 00	387	bu. m.
106	Feb. 3	11 59 00	63 27 40	919	rky.
107	Feb. 4	12 09 00	63 57 20	1,250	gy. m. fne. s.
108	Feb. 4	12 17 30	64 14 30	2,020	
109	Feb. 4	12 22 50	64 38 00	2,371	gy. oz.
110	Feb. 4	12 41 00	64 23 00	1,628	br. gy. m.
111	Feb. 4	12 59 20	64 08 00	1,714	gy. m.
112	Feb. 4	13 15 30	63 52 10	1,463	br. oz. for.
113	Feb. 5	13 32 00	63 36 30	680	gy. oz. for.
114	Feb. 5	13 48 50	63 20 00	652	br. oz. bk. sp.
115	Feb. 5	14 07 10	63 37 55	852	yl. m. fne. s.
116	Feb. 5	14 21 44	63 58 45	1,615	gy. m. for.
117	Feb. 5	14 35 10	64 21 10	1,843	gy. m. for.
118	Feb. 5	14 51 00	64 42 00	2,115	for. oz.
119	Feb. 6	15 26 00	65 19 20	2,461	lt. gy. m. for.
120	Feb. 6	16 01 00	65 50 20	2,492	gy. m. for.
121	Feb. 6	16 36 20	66 41 00	2,501	choc. glob. oz.
122	Feb. 7	16 35 20	68 00 30	2,458	choc. oz. for.
123	Feb. 7	15 49 00	67 36 40	2,616	choc. oz. for.
124	Feb. 7	15 02 00	67 13 30	2,747	choc. oz. for.
125	Feb. 8	14 20 30	66 54 00	2,804	choc. m. co.
126	Feb. 8	13 40 00	66 35 00	2,814	br. m. co.
127	Feb. 8	13 25 04	66 25 00	2,844	br. m. co.
128	Feb. 8	12 54 40	66 11 10	2,708	dk. choc. oz.
129	Feb. 8	12 35 20	66 14 00	2,820	dk. clayey oz
130	Feb. 9	12 10 30	66 11 00	2,707	dk. clayey oz
e 131	Feb. 9	12 04 00	66 16 40	1,806	choc. oz. for.
f 132	Feb. 9	11 49 00	66 16 50	774	gy. s. brk. sh.
133	Feb. 9	11 33 20	66 19 00	533	gy. m. for.
134	Feb. 9	11 18 50	66 24 20	658	
135	Feb. 9	11 05 00	66 30 00	239	gn. m. s.
136	Feb. 9	10 51 00	66 35 00	150	bu. m. fne. s.
g 137	Feb. 9	10 42 30	66 48 20	135	gn. m. fne. s.
138	Feb. 9	10 51 30	67 01 40	164	gy. s. brk. sh
139	Feb. 9	11 01 00	67 14 15	605	gy. m
140	Feb. 9	11 09 40	67 27 00	947	gy. m.

a House on Aves Islet E. (mag.) 4½ m.
b House on Aves Islet NE. by E. (mag.) 1.3 m.
c S. end Chacachacare Island SSE. ¾ E. (mag.). Carlaquita Point SW. ¾ W. (mag.).
d E. end Goose Island SSW. (mag.). E. end Islette WNW. (mag.).
e El Roque light on horizon from a height of 25 feet. Bearing WNW. ¾ W. (mag.).
f Astronomical position; Orchilla Island distant 6 miles; principal peak E. ¾ N. (mag.).
g Line of bearing of sun, and bearing and distance of Punta Anare.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Depth.	Character of bottom.
		Lat. N.	Long. W.		
		Caribbean Sea.			
	1884.	° ′ ″	° ′ ″	*Fms.*	
141	Feb. 10	11 19 50	67 40 00	1,040	lt. choc. m.
142	Feb. 10	11 28 10	67 53 00	1,021	gy. m.
143	Feb. 10	11 37 30	68 06 30	1,030	lt. gy. c.
144	Feb. 10	11 46 40	68 19 50	980	gy. m.
145	Feb. 10	11 52 00	68 35 40	630	wh. s. r.
a 146	Feb. 10	11 55 20	68 46 00	641	yl. m. fne. s.
147	Feb. 10	11 59 00	68 49 00	507	gy. m.
b 148	Feb. 10	12 05 52	68 55 00	74	crs. s.
149	Feb. 18	12 01 20	68 55 30	410	yl. m. s.
150	Feb. 18	11 56 00	68 50 00	733	yl. m. s.
151	Feb. 18	11 50 45	68 56 30	738	yl. m. s.
152	Feb. 18	11 40 25	68 57 30	321	lt. gn. m. grit.
153	Feb. 18	11 35 10	68 58 00	138	gn. m.
c 154	Feb. 18	11 30 00	68 58 30	45	lt. br. m.
155	Feb. 18	11 51 00	69 18 00	458	bu. m. fne. s.
156	Feb. 18	11 58 30	69 26 20	455	lt. gn. m. grit.
157	Feb. 18	12 06 00	69 34 40	305	gn. m. crs. s.
158	Feb. 18	12 13 30	69 43 00	299	gn. m. grit.
d 159	Feb. 19	12 23 30	69 48 00	420	gy. m.
160	Feb. 19	12 32 50	69 50 00	634	gy. m.
161	Feb. 19	12 54 30	69 55 00	797	yl. m. crs. s. for.
162	Feb. 19	13 40 20	70 10 45	2,694	dk. br. m.
163	Feb. 19	14 24 00	70 28 20	2,360	lt. br. m. s.
164	Feb. 20	15 09 20	70 46 50	2,338	lt. br. m. crs. s. for.
165	Feb. 20	15 55 00	71 03 00	2,209	lt. br. m. for.
166	Feb. 20	16 42 00	71 18 00	2,028	lt. br. m. for.
167	Feb. 21	17 17 30	71 35 00	522	lt. br. m. for.
168	Feb. 21	17 26 00	71 44 45	302	wh. co. s. brk. sh.
169	Feb. 21	17 36 30	72 00 00	2,410	wh. s. brk. sh.
170	Feb. 21	17 48 00	72 12 20	2,434	
171	Feb. 21	18 01 30	72 23 00	1,929	gy. m. bk. s. brk. co. sh.
172	Feb. 21	18 07 00	72 29 00	1,538	brk. co. s.
e 173	Feb. 21	18 10 30	72 32 30	253	bu. m.
174	Feb. 21	18 01 00	72 34 00	1,903	gy. m. bk. s. brk. co. sh.
175	Feb. 21	17 44 00	72 35 00	1,594	lt. br. m. for.
176	Feb. 22	17 28 00	72 36 30	1,946	yl. m. s. for.
177	Feb. 22	17 12 45	72 38 00	2,391	br. m. for.
178	Feb. 22	17 24 45	72 47 00	2,393	br. oz. for.
179	Feb. 22	17 36 30	72 56 00	2,423	br. m. for.
180	Feb. 22	17 45 30	73 04 00	2,391	br. oz. for.
181	Feb. 22	17 39 30	73 22 15	2,400	br. oz. for.
182	Feb. 22	17 48 00	73 34 15	2,369	br. oz. for.
183	Feb. 22	17 54 00	73 48 15	1,030	gy. m. fne. s. for.
184	Feb. 23	17 53 30	73 59 30	1,970	gy. m. s. for.
185	Feb. 23	17 53 15	74 11 00	1,672	gy. m. fne. s. for.
186	Feb. 23	17 53 00	74 22 30	1,206	gy. m. fne. s. for.
187	Feb. 23	18 01 00	74 31 45	894	s. m. sh. for.
188	Feb. 23	17 51 40	74 36 30	894	yl. m. sh. for.
189	Feb. 23	17 42 30	74 40 00	803	br. m. for.
190	Feb. 23	17 33 30	74 45 00	955	yl. m. s. bk. sp.
191	Feb. 23	17 23 15	74 51 30	1,146	gy. m. s. for.
192	Feb. 23	17 13 15	74 57 45	1,122	gy. m. s. for.
193	Feb. 23	17 26 30	75 06 45	968	yl. m. fne. s.
194	Feb. 24	18 02 00	74 57 30	1,510	yl. m.
195	Feb. 24	18 18 30	74 53 30	202	hrd.
196	Feb. 24	18 34 00	74 50 00	1,040	gy. s.
197	Feb. 24	18 45 00	74 32 40	1,347	yl. m.
198	Feb. 24	18 50 00	74 12 00	1,537	yl. m.
199	Feb. 24	18 56 00	73 51 00	1,974	dk. m.
200	Feb. 24	18 59 40	73 30 00	342	hrd.
201	Feb. 24	19 19 40	73 27 00	800	yl. m. sh. for.
202	Feb. 25	19 16 30	73 47 30	502	yl. m. s. sh. for.
203	Feb. 25	19 24 30	74 05 15	700	yl. m.
204	Feb. 25	19 32 30	74 23 00	1,908	yl. m. brk. sh. for.
205	Feb. 25	19 40 00	74 42 00	1,923	gy. m. fne. s. for.
f 206	Feb. 25	19 43 21	75 15 30	1,745	gy. m. s.
g 207	Feb. 25	19 44 45	75 24 15	1,380	gy. m. s. sh.
g 208	Feb. 25	19 46 10	75 33 00	1,380	dk. m. bk. s. sh.
g 209	Feb. 26	19 47 30	75 41 30	1,425	br. m. s. sh.
h 210	Feb. 26	19 49 00	75 50 30	1,175	br. m. s. sh.

a Positions checked by bearing and distance of Little Curaçao light plotted in latitude 11° 58′, longitude 68° 39′.
b Fort Rif light north (mag.) 1,800 feet.
c Astronomical position; Zamuro Point SE. (mag.); 1-knot W. by S. current.
d Light on east end Oruba Island W. ¼ S. (mag.) 8 miles.
e Jacmel NW. ¼ N. (mag.); Jacmel Point W. by S. (mag.).
f E. point Guantanamo Port N. by W. (mag.). Barracas Point WNW. ¼ W. (mag.). Latitude by ✳ Rigel. No current.
g ¼ to ½ knot E. set.
h Santiago light N. by W. ¼ W. (mag.) 8½ m. No current.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Depth.	Character of bottom.
		Caribbean Sea.			
	1884.	° ′ ″	° ′ ″	*Fms.*	
a 211	Feb. 27	19 56 33	75 50 40	211	gy. m. fne. s. brk. co.
212	Feb. 27	19 40 00	75 39 00	2,265	gy. m.
213	Feb. 28	19 23 00	75 30 00	2,275	br. m.
214	Feb. 28	19 06 00	75 21 30	1,768	yl. m. brk. sh. for.
215	Feb. 28	18 54 30	75 16 30	1,486	yl. m. brk. sh. for.
216	Feb. 28	18 32 30	75 06 00	870	wh. s. brk. co. sh.
217	Feb. 28	18 34 00	75 21 00	1,015	lt. m. sh. for.
218	Feb. 28	18 32 40	75 36 00	620	yl. m.
219	Feb. 28	18 22 20	75 41 20	646	brk. sh.
220	Feb. 28	18 12 00	75 46 40	1,153	brk. sh. bk. s.
221	Feb. 28	18 01 30	75 52 00	960	gy. m.
b 222	Feb. 29	17 51 00	76 00 30	450	gy. m. s.
223	Feb. 29	17 49 00	75 54 40	762	yl. m.
224	Feb. 29	17 47 40	75 50 00	768	yl. m. s.
225	Feb. 29	17 46 50	75 47 20	830	yl. m.
226	Feb. 29	17 46 15	75 45 30	828	yl. m.
227	Feb. 29	17 45 20	75 42 45	443	co. s.
228	Feb. 29	17 44 40	75 40 50	335	wh. s. brk. sh.
229	Feb. 29	17 43 55	75 39 00	22	co.
230	Feb. 29	17 43 37	75 38 05	86	co. brk. sh.
231	Feb. 29	17 43 20	75 37 10	98	co.
232	Feb. 29	17 44 20	75 37 40	193	co.
233	Feb. 29	17 45 20	75 38 15	448	co. brk. sh.
234	Feb. 29	17 46 30	75 38 50	540	co.
235	Feb. 29	17 45 25	75 39 05	387	wh. co. s. brk. sh
236	Feb. 29	17 44 05	75 39 00	23	co.
237	Feb. 29	17 44 05	75 39 05	22	co.
238	Feb. 29	17 43 35	75 38 55	21	wh. co.
239	Feb. 29	17 43 05	75 38 50	20	co.
240	Feb. 29	17 42 35	75 38 45	32	co.
241	Feb. 29	17 42 10	75 38 40	200	co. brk. sh.
242	Feb. 29	17 42 15	75 37 40	376	co. brk. sh.
243	Feb. 29	17 42 20	75 36 40	329	co. brk. sh.
244	Feb. 29	17 42 45	75 37 15	198	co. brk. sh.
245	Feb. 29	17 43 15	75 37 50	166	co. brk. sh.
246	Feb. 29	17 44 00	75 39 40	22	brk. sh. co.
247	Feb. 29	17 43 55	75 40 20	21	brk. sh. co.
248	Feb. 29	17 43 50	75 41 00	81	brk. sh. co.
249	Feb. 29	17 43 45	75 41 40	141	brk. sh. co.
250	Feb. 29	17 42 50	75 41 35	21	co.
251	Feb. 29	17 42 35	75 42 05	23	co.
252	Feb. 29	17 42 20	75 42 35	24	co. sh.
253	Feb. 29	17 42 05	75 43 05	261	
254	Feb. 29	17 41 25	75 43 05	90	co.
255	Feb. 29	17 40 30	75 43 00	20	co.
256	Feb. 29	17 41 15	75 42 10	19	co.
257	Feb. 29	17 41 55	75 41 25	21	co.
258	Feb. 29	17 42 15	75 41 00	20	co.
259	Feb. 29	17 42 40	75 40 40	21	co.
260	Feb. 29	17 42 50	75 39 20	21	co.
261	Feb. 29	17 41 35	75 39 40	20	co.
262	Feb. 29	17 40 20	75 40 00	17.5	co.
263	Feb. 29	17 39 45	75 40 10	18.5	co.
264	Feb. 29	17 39 10	75 40 20	20	co.
265	Feb. 29	17 38 00	75 40 40	20	co.
266	Feb. 29	17 36 50	75 41 00	51	co.
267	Feb. 29	17 36 50	75 41 50	19	co.
268	Feb. 29	17 36 55	75 42 40	18	co.
269	Feb. 29	17 37 00	75 43 30	20	co.
270	Feb. 29	17 37 00	75 44 20	19	co.
271	Feb. 29	17 37 05	75 45 15	524	
272	Feb. 29	17 36 30	75 44 45	18	co.
273	Feb. 29	17 36 00	75 44 15	360	co.
274	Feb. 29	17 36 00	75 45 10	250	co.
275	Feb. 29	17 36 05	75 46 10	320	co.
276	Feb. 29	17 36 30	75 48 00	838	co.
277	Feb. 29	17 37 35	75 52 10	875	yl. m. sh. for.
278	Mar. 1	17 38 20	75 56 25	863	yl. m. s. sh.
279	Mar. 1	17 39 10	76 00 35	597	yl. m. s. sh.
c 280	Mar. 1	17 40 10	76 04 50	760	yl. m. s. sh.
281	Mar. 1	17 41 20	76 09 40	414	yl. m. s. sh.
282	Mar. 1	17 42 30	76 14 30	490	hrd.
283	Mar. 1	17 43 40	76 19 15	612	co.
d 284	Mar. 1	17 44 50	76 24 00	581	br. m.
d 285	Mar. 1	17 46 00	76 28 40	590	yl. m.
d 286	Mar. 1	17 47 00	76 33 10	542	bu. m.
d 287	Mar. 1	17 48 10	76 37 50	777	gy. m. bk. s.
d 288	Mar. 1	17 49 30	76 43 35	484	gy. m.

a By bearing and mic. distance of Santiago de Cuba light, plotted in latitude 19° 57′ 26″, longitude 75° 52 13″. Light E. set.

b Bearing and dist. Morant light. NE. set.

c Bearing and distance of Morant light.

d Cross-bearings of objects on shore.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Depth.	Character of bottom.
		Lat. N.	Long. W.		
		Caribbean Sea.			
	1884.	° ′ ″	° ′ ″	*Fms.*	
a 289	Mar. 1	17 51 20	76 44 30	400	gy. m.
a 290	Mar. 11	17 53 05	76 43 00	440	bk. m.
a 291	Mar. 11	17 52 20	76 46 05	18	co.
a 292	Mar. 11	17 48 45	76 46 05	355	br. m. fne. s.
a 293	Mar. 11	17 46 10	76 46 05	26	co.
a 294	Mar. 11	17 41 10	76 46 05	700	br. m. crs. s.
295	Mar. 11	17 38 40	76 41 10	890	
296	Mar. 12	17 37 10	76 36 40	980	bk. m. s.
297	Mar. 12	17 35 40	76 32 10	1,043	gy. s.
298	Mar. 12	17 34 10	76 27 40	1,084	bu. m.
299	Mar. 12	17 32 40	76 23 10	934	co.
300	Mar. 12	17 29 40	76 14 10	822	yl. m. sh. for.
301	Mar. 12	17 28 00	76 09 10	808	yl. m. s.
302	Mar. 12	17 26 45	76 04 10	790	hrd.
303	Mar. 12	17 25 40	76 01 10	620	hrd.
304	Mar. 12	17 31 10	75 58 00	794	yl. m.
305	Mar. 12	17 32 30	75 53 00	723	hrd.
306	Mar. 12	17 32 45	75 49 55	218	co.
307	Mar. 12	17 32 50	75 48 20	490	hrd.
308	Mar. 12	17 34 35	75 46 50	527	
309	Mar. 12	17 34 35	75 44 45	505	gy. s.
310	Mar. 12	17 34 35	75 43 40	500	
311	Mar. 12	17 34 35	75 39 35	515	s.
312	Mar. 12	17 23 40	75 38 15	845	hrd.
313	Mar. 13	17 12 00	75 36 30	915	yl. m. s.
314	Mar. 13	16 54 20	75 33 50	1,012	yl. m. s. for.
315	Mar. 13	16 31 00	75 30 10	1,250	yl. m. s. for.
316	Mar. 13	16 07 45	75 26 30	1,230	yl. m. s. for.
317	Mar. 13	15 43 00	75 24 30	1,662	yl. m. s. for.
318	Mar. 13	15 18 30	75 22 30	2,295	
319	Mar. 14	14 42 30	75 18 30	2,315	yl. m. s. for.
320	Mar. 14	14 06 30	75 14 30	2,250	dk. br. m. for.
321	Mar. 14	13 30 00	74 57 00	2,175	dk. br. m. s. for.
322	Mar. 14	12 53 30	74 38 00	2,185	bk. m. for.
323	Mar. 15	12 17 00	74 19 00	2,095	bk. m. s.
324	Mar. 15	12 11 30	74 27 30	2,057	bk. s.
325	Mar. 15	11 46 00	74 27 30	1,250	bk. m.
326	Mar. 15	11 31 00	74 28 00	745	bk. m.
327	Mar. 15	11 21 00	74 28 00	578	bu. m.
328	Mar. 15	11 11 00	74 28 00	420	bk. m. s.
329	Mar. 15	11 22 00	74 41 30	440	bk. s. bu. m.
330	Mar. 16	11 33 30	74 57 00	920	bk. s. bu. m.
331	Mar. 16	11 18 30	74 58 20	615	bk. s. bu. m.
332	Mar. 16	11 13 00	75 05 00	457	bk. m.
333	Mar. 22	11 01 00	75 03 00	10	bk. m.
334	Mar. 22	11 01 15	75 08 40	39	bu. c.
335	Mar. 22	11 01 45	75 19 40	228	bu. m.
336	Mar. 22	11 05 00	75 32 00	625	bu. m.
337	Mar. 22	11 08 00	75 41 40	845	br. m.
338	Mar. 22	11 11 00	75 50 30	1,195	br. m. gn. m.
339	Mar. 22	10 56 00	75 49 50	980	br. m. gn. m.
340	Mar. 22	10 42 30	75 49 00	880	br. m. gn. m.
341	Mar. 22	10 30 30	75 48 30	825	br. m.
342	Mar. 23	10 20 15	76 03 00	1,165	br. m.
343	Mar. 23	10 22 10	76 17 30	1,270	br. m.
344	Mar. 23	10 18 00	76 32 00	1,580	br. m.
345	Mar. 23	10 01 30	76 24 45	750	br. m.
346	Mar. 23	9 46 00	76 18 30	255	gn. m.
347	Mar. 23	9 30 00	76 14 45	38	gn. m. s.
348	Mar. 23	9 32 00	76 34 45	406	hrd.
349	Mar. 23	9 33 30	76 43 45	960	br. m. gn. m.
350	Mar. 24	9 36 20	77 02 45	1,616	choc. oz. for
351	Mar. 24	9 39 40	77 25 00	1,363	br. m. for.
352	Mar. 24	9 43 00	77 47 00	570	br. m. for.
353	Mar. 24	9 44 40	77 56 00	550	lt. br. m.
354	Mar. 24	9 47 00	78 09 30	630	br. m. s.
355	Mar. 24	9 48 00	78 24 00	1,017	br. m. s.
356	Mar. 24	9 47 00	78 39 00	962	br. m.
357	Mar. 24	9 45 30	78 54 00	950	gy. m.
358	Mar. 24	9 47 00	79 03 00	1,060	sft. gy. m.
359	Mar. 24	9 48 30	79 11 45	970	gn. m. br. m.
360	Mar. 25	9 51 15	79 20 30	828	gn. m. gy. m. sh.
361	Mar. 25	9 54 00	79 30 00	1,155	br. m. gn. m.
362	Mar. 25	9 47 00	79 32 30	580	bu. m.
363	Mar. 25	9 45 15	79 34 00	370	bu. m.
364	Mar. 25	9 43 15	79 35 30	58	bu. m.
365	Apr. 2	9 38 30	79 59 22	707	stk. c.
366	Apr. 2	9 47 45	80 02 50	611	br. s.
367	Apr. 2	9 57 00	80 06 20	1,153	gy. m.
368	Apr. 2	10 14 20	80 13 30	1,853	br. m. for.

a Cross-bearings of objects on shore.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Depth.	Character of bottom.
		Caribbean Sea.			
	1884.	° ′ ″	° ′ ″	*Fms.*	
369	Apr. 3	10 35 30	80 22 30	1,900	br. m. for.
370	Apr. 3	10 46 30	80 32 00	1,849	br. m.
371	Apr. 3	11 20 00	80 42 10	1,832	br. m. for.
372	Apr. 3	11 43 30	80 51 30	1,570	br. m. for.
373	Apr. 4	12 08 00	81 03 15	1,736	br. m. for.
374	Apr. 4	12 32 00	81 16 00	1,002	br. m. for.
375	Apr. 4	13 12 00	81 27 20	727	yl. m.
a 376	Apr. 4	13 16 05	81 26 40	339	co. s.
a 377	Apr. 9	13 26 10	81 25 10	601	hrd.
378	Apr. 9	13 30 30	81 23 30	472	fne. co. s.
379	Apr. 9	13 41 20	81 15 30	282	co. s. for.
380	Apr. 9	13 45 15	81 11 30	498	yl. m. co.
381	Apr. 9	13 53 15	81 03 45	625	hrd.
382	Apr. 9	14 01 20	80 56 10	577	co. and s.
383	Apr. 9	14 09 20	80 50 10	596	yl. m.
384	Apr. 9	14 17 00	80 43 30	661	hrd.
385	Apr. 9	14 25 45	80 37 45	889	co.
386	Apr. 10	14 34 30	80 32 00	982	yl. m. for.
387	Apr. 10	14 43 20	80 26 00	1,046	yl. m. for.
388	Apr. 10	14 48 30	80 23 00	1,069	yl. m. fne. co.
389	Apr. 10	14 53 40	80 20 00	1,151	yl. m. fne. co.
390	Apr. 10	14 58 50	80 17 00	971	yl. m. fne. co.
391	Apr. 10	15 09 00	80 23 00	756	yl. co. oz. for.
392	Apr. 10	15 19 00	80 28 45	690	yl. co. oz.
393	Apr. 10	15 47 30	80 46 00	511	br. m. for.
394	Apr. 10	16 02 00	80 53 20	19	co.
395	Apr. 10	16 15 00	81 01 00	19	co.
396	Apr. 10	16 28 30	81 08 00	23	co.
397	Apr. 11	16 41 30	81 21 40	136	brk. co.
398	Apr. 11	17 03 30	81 42 40	444	gy. m. fne. co. for.
399	Apr. 11	17 26 00	82 05 40	920	yl. oz. for.
400	Apr. 11	17 42 00	82 34 00	3,169	yl. oz. for.
401	Apr. 11	18 01 30	82 54 10	2,695	yl. oz. for.
402	Apr. 11	18 18 45	83 01 10	2,299	yl. oz. for.
403	Apr. 12	18 24 20	83 15 15	3,008	yl. oz. for.
404	Apr. 12	18 30 00	83 16 30	2,829	yl. oz. for.
405	Apr. 12	18 43 00	83 30 45	735	yl. oz. for. pter.
406	Apr. 12	18 48 30	83 45 30	708	yl. oz. for.
407	Apr. 12	18 49 00	83 46 45	12	co. .
408	Apr. 12	18 52 00	83 52 45	14	co.
409	Apr. 12	18 54 45	83 53 45	291	yl. oz.
410	Apr. 12	19 11 00	84 01 15	2,014	yl. oz. for.
411	Apr. 12	19 55 00	84 10 45	2,522	yl. oz. for.
412	Apr. 13	20 33 00	84 36 20	2,575	yl. oz. for.
		Gulf of Mexico.			
413	Apr. 13	21 15 41	84 48 00	2,350	yl. oz. for.
414	Apr. 13	21 40 00	84 57 00	1,550	yl. oz. for.
b 415	Apr. 13	21 44 40	84 58 45	950	yl. oz. for.
c 416	Apr. 14	23 48 14	84 06 55	1,356	yl. oz. for.
d 420	May 1	23 06 00	83 03 45	625	co.
421	May 2	22 04 15	84 59 35	476	yl. co. m.
422	May 2	22 01 25	85 00 39	243	co.
423	May 2	22 00 25	85 00 25	314	co.
424	May 2	22 00 00	85 00 15	355	co.
425	May 2	21 59 00	84 59 55	357	co.
426	May 2	21 58 00	84 59 35	279	co.
427	May 2	21 59 15	85 00 35	370	fne. s.
e 428	May 2	22 00 42	85 02 00	15.5	co.
429	May 2	22 01 10	85 02 20	19	co.
430	May 2	22 01 30	85 02 40	114	co.
431	May 2	22 01 20	85 03 30	258	co.
432	May 2	22 00 20	85 03 25	250	fne. co.
433	May 2	22 00 25	85 03 05	207	co.
434	May 2	22 00 30	85 02 50	128	co.
435	May 2	22 00 35	85 02 30	10	co.
436	May 2	22 00 10	85 02 15	252	co. brk. sh.
437	May 2	22 00 20	85 01 45	227	co. brk. sh.
438	May 2	22 00 48	85 01 30	15.5	co.
439	May 2	22 01 16	85 01 15	14.5	co.
440	May 2	22 01 44	85 01 00	16.5	co.
441	May 2	22 02 12	85 01 45	24.5	co. brk. sh.
442	May 2	22 02 40	85 00 30	251	co. br. r.
443	May 2	22 02 45	85 01 50	424	co.
444	May 2	22 02 10	85 02 05	270	co. brk. sh.
445	May 2	22 01 45	85 02 05	21	co.
446	May 2	22 01 15	85 02 05	16.5	co.

a Cross bearings on Old Providence Island.
b Bearing of Cape San Antonio light, and altitude of * Capella.
c Serial Nos. 416 to 418 missing.
d Astronomical observation; cross bearings on shore; 1¼ knots W. set.
e Anchored boat and established position.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Depth.	Character of bottom.
		Gulf of Mexico.			
	1884.	° ′ ″	° ′ ″	*Fms.*	
447	May 2	22 04 18	85 02 15	567	co.
448	May 2	22 05 50	85 04 30	701	yl. oz. for.
449	May 2	22 07 20	85 06 45	913	yl. oz. for.
450	May 2	22 08 55	85 09 00	1,069	yl. oz. for.
451	May 2	22 10 50	85 12 00	1,186	for. pter.
452	May 2	22 09 40	85 18 40	1,238	for. pter.
453	May 2	22 06 30	85 15 00	1,149	co.
454	May 2	22 03 50	85 11 55	871	co.
455	May 2	W. of Antonio Knoll.		277	co.
456	May 2	W. of Antonio Knoll.		490	co.
457	May 3	21 57 10	85 04 30	450	co.
458	May 3	21 55 45	85 02 50	576	co.
459	May 3	About 2.5 miles WNW. of San Antonio light.		402	co.
460	May 3	21 53 00	85 02 55	689	co.
461	May 3	21 54 25	85 07 55	618	co.
462	May 3	21 55 50	85 13 00	691	co.
463	May 3	21 56 30	85 15 20	608	co.
464	May 3	21 59 55	85 13 45	850	co.
465	May 3	21 58 30	85 10 50	543	co.
466	May 3	21 57 00	85 08 00	487	co. brk. sh.
467	May 3	21 55 30	85 05 15	593	co. brk. sh.
468	May 3	21 54 05	85 02 40	523	co.
469	May 3	21 53 05	85 00 40	558	co.
470	May 3	21 52 35	85 00 45	541	co. oz.
471	May 3	21 52 40	85 01 45	629	co. oz.
472	May 3	21 51 55	85 02 30	692	co. oz.
473	May 3	21 52 10	85 05 30	583	co.
474	May 3	21 52 30	85 09 35	885	co. oz.
475	May 3	21 52 50	85 13 25	775	hrd.
476	May 3	21 49 45	85 13 25	923	rky.
477	May 3	21 50 10	85 08 45	887	rky.
478	May 3	21 50 45	85 04 10	815	rky.
479	May 3	21 51 20	84 59 30	263	rky.
480	May 3	21 50 10	85 01 35	342	co.
481	May 3	21 49 05	85 05 50	674	co.
482	May 3	21 47 55	85 10 00	937	co. s.
483	May 3	21 46 25	85 15 20	1,023	co. s.
484	May 3	21 43 20	85 14 00	1,002	fne. co.
485	May 3	21 45 30	85 10 00	971	co.
486	May 3	21 48 00	85 04 45	574	hrd.
487	May 3	21 50 20	84 59 30	306	hrd.
488	May 3	21 47 35	84 57 15	329	hrd.
489	May 4	21 45 50	84 59 15	874	co. br. m.
490	May 4	21 48 00	84 57 30	288	co.
491	May 4	21 50 10	84 58 45	232	co.
492	May 4	21 50 45	84 59 00	255	fne. co.
493	May 4	21 53 05	84 59 30	415	fne. co.
494	May 4	21 54 00	85 00 40	537	co.
495	May 4	21 55 00	85 01 50	516	hrd.
496	May 4	21 54 45	84 58 40	274	hrd.
497	May 4	21 55 55	85 00 15	475	co.
498	May 4	21 57 10	85 01 50	474	co. crs. g.
499	May 4	21 58 25	85 03 40	461	co.
500	May 4	21 59 40	85 05 15	283	hrd.
501	May 4	22 01 05	85 07 10	703	yl. m.
502	May 4	22 00 35	85 08 25	732	yl. oz. for.
503	May 4	22 00 05	85 09 40	776	hrd.
504	May 4	21 59 20	85 08 40	715	yl. oz.
505	May 4	21 59 10	85 06 55	554	yl. oz.
506	May 4	21 59 50	85 07 45	747	yl. oz.
507	May 4	21 58 30	85 06 10	423	brk. sh.
508	May 4	21 58 45	85 04 50	269	hrd.
509	May 4	22 03 00	85 04 50	657	yl. oz.
510	May 4	22 02 20	85 03 00	526	yl. oz.
511	May 5	22 07 05	85 02 45	600	co.
512	May 5	22 09 15	85 03 30	818	hrd.
513	May 5	22 11 40	85 04 15	986	yl. m. brk. co.
514	May 5	22 12 15	85 00 45	953	yl. m. fne. co.
515	May 6	22 09 15	85 00 25	769	yl. oz. for.
516	May 6	22 06 30	85 00 00	499	yl. m.
b 517	May 6	22 41 20	84 15 00	388	yl. oz.
518	May 6	22 45 20	84 15 00	817	yl. oz.
519	May 6	22 49 20	84 15 00	950	fne. co. s.
520	May 6	22 50 10	84 11 00	801	yl. oz. s. for

a Latitudes of positions on Antonio Knoll absolute; those of other soundings and the longitudes of all depend on Cape San Antonio light being in Lat. 21° 51′ 30″ N., Long. 84° 57′ 38″ W.
b N. end of Jutias Cay ENE. (mag.).

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Depth.	Character of bottom.
		Lat. N.	Long. W.		
		Florida to Cape Hatteras.			
	1884.	° ′ ″	° ′ ″	*Fms.*	
521	May 12	30 46 00	78 35 00	470	g. brk. sh.
522	May 14	34 14 00	72 35 30	2,537	br. oz.
523	May 14	34 48 45	72 25 00	2,462	br. oz.
		Cape Hatteras to Nantucket.			
524	July 20	37 57 20	73 56 10	86	g.
525	July 22	39 29 00	72 22 00	79	gn. m. s.
526	July 22	39 30 00	72 18 00	104	gn. m. s.
527	July 22	39 32 00	72 18 20	197	stf. bu. c.
528	July 22	39 20 30	72 14 40	121	gy. m. s.
529	July 22	39 28 00	72 16 00	94	gn. m.
530	July 22	39 27 40	72 18 30	91	bk. m. fne. s.
531	July 22	39 27 20	72 20 40	73	bk. m. s.
532	July 22	39 31 50	72 05 00	143	gy. S. bk. Sp.
533	July 23	39 23 45	71 43 00	992	gn. m. r.
534	Aug. 2	40 00 00	70 38 00	172	gy. m. fne. s.
535	Aug. 2	40 01 30	70 38 00	139	gy. m. fne. s.
536	Aug. 2	40 03 00	70 38 00	101	gn. m. fne. s.
537	Aug. 2	39 58 45	70 55 30	168	gn. m. s.
538	Aug. 3	40 04 30	71 20 00	57	gy. s.
539	Aug. 3	40 02 00	71 13 45	100	gn. m. s. sp.
540	Aug. 3	40 01 30	71 12 30	113	gn. m. s. bk. sp.
541	Aug. 3	39 56 30	71 10 00	194	gn. m. s.
542	Aug. 3	39 56 30	71 08 00	192	gn. m. s.
543	Aug. 3	39 54 00	71 04 00	265	gn. m. s.
544	Aug. 3	39 55 00	71 07 00	221	gn. m. s.
545	Aug. 4	39 47 00	70 16 30	784	gn. m. s.
546	Aug. 5	39 54 30	70 15 40	762	gn. m.
547	Aug. 5	39 50 30	70 15 40	769	gn. m. s.
548	Aug. 19	39 48 30	71 41 15	111	gn. m. s.
549	Aug. 20	39 34 00	71 34 30	925	gy. oz.
550	Aug. 22	40 00 00	70 28 30	243	gn. m.
551	Aug. 22	39 53 00	70 31 45	356	gn. m.
552	Aug. 23	39 40 05	69 23 00	1,094	bu. oz.
553	Sept. 7	37 41 00	69 16 15	2,704	gy. oz.
554	Sept. 11	37 22 53	73 06 30	1,600	gy. glob. oz.
555	Sept. 12	38 38 20	73 10 00	190	gn. m. fne. s.
556	Sept. 12	38 40 00	73 03 00	474	gn. m.
557	Sept. 13	39 08 30	72 12 30	851	gn. m.
558	Sept. 26	40 37 00	70 32 00	37	gn. m.
559	Oct. 18	37 07 30	74 37 00	54	s. g.
560	Oct. 21	35 22 00	74 54 30	43	gy. bk. s.
561	Oct. 21	35 21 30	74 48 30	1,007	yy. m.
		Cape Hatteras to Savannah.			
	1885.				
562	Jan. 5	33 03 30	77 53 00	29	co. s. bk. sh.
563	Jan. 5	32 59 15	77 55 30	62	yl. s. bk. sh.
564	Jan. 5	32 57 30	77 56 30	66	co. s. bk. sh.
		Gulf of Mexico.			
565	Jan. 22	21 00 00	86 24 30	92	co.
566	Feb. 7	29 31 00	85 36 20	16	fne. wh. s.
567	Feb. 7	29 28 00	85 36 50	16	fne. wh. s.
568	Feb. 7	29 25 00	85 37 20	15	fne. s. bk. sh.
569	Feb. 7	29 16 30	85 34 00	27	gy. s. bk. sh.
570	Feb. 7	29 15 19	85 34 00	30	gy. s. bk. sh.
571	Feb. 11	29 26 45	87 44 00	34	fne. blk. s.
572	Feb. 11	29 22 00	87 46 30	43	crs. gy. s.
573	Feb. 11	29 17 30	87 49 00	99	bu. m.
574	Feb. 11	29 13 00	87 51 30	206	blk. m.
575	Feb. 11	29 08 30	87 54 00	362	blk. m.
576	Feb. 11	29 04 00	87 56 30	599	gn. m.
577	Feb. 11	28 58 15	88 00 00	740	bu. m.
578	Feb. 11	28 54 00	88 02 30	698	gy. m.
579	Feb. 11	28 56 30	87 58 30	747	gy. m.
580	Feb. 11	28 59 00	87 55 30	611	gy. m.
581	Feb. 11	29 02 45	87 53 00	737	gn. m.
582	Feb. 11	28 59 30	88 06 00	573	gn. m.
583	Feb. 11	28 58 20	88 14 00	486	gn. m.
584	Feb. 11	29 19 30	88 11 30	46	gy. m.
585	Feb. 11	29 21 45	88 14 00	35	gy. s.
586	Feb. 11	29 22 30	88 17 00	32	gy. s. m.
587	Feb. 11	29 22 15	88 21 00	30	gn. m.
588	Feb. 11	29 17 30	88 21 00	36	gn. m.
589	Mar. 4	29 17 15	88 05 30	54	bu. m.
590	Mar. 4	29 22 00	88 04 30	40	bu. m. blk. sp.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Gulf of Mexico.						
	1885.	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	*Fms.*	
591	Mar. 4	29 28 00	88 03 00	60	60	.....	25	gy. s.
592	Mar. 4	29 24 00	87 52 00	64	62	.....	36	fne. gy. s. bk. sp.
593	Mar. 4	29 33 00	87 39 00	61	60	.....	25	crs. s. bk. sp. brk. sh.
594	Mar. 4	29 36 30	87 36 00	60	61	.....	22	fne. wh. s.
595	Mar. 4	29 40 30	87 32 30	59	60	.....	22	fne. wh. s.
596	Mar. 7	29 16 19	85 49 30	58	64	.....	30	gy. s. bk. sp. brk. sh.
597	Mar. 7	29 16 00	85 47 30	58	64	.....	29	yl. s. bk. sp. brk. sh.
598	Mar. 7	29 17 20	85 45 30	58	64	.....	31	yl. s. bk. sp. brk. sh.
599	Mar. 7	29 18 40	85 43 30	61	62	.....	30	yl. s. bk. sp. brk. sh.
600	Mar. 7	29 20 00	85 41 30	60	61	.....	27	yl. s. bk. sp. brk. sh.
601	Mar. 7	29 19 00	85 41 45	60	61	.....	29	yl. s. bk. sp. brk. sh.
602	Mar. 7	29 18 15	85 41 00	60	61	.....	28	yl. s. bk. sp. brk. sh.
603	Mar. 7	29 17 30	85 40 15	61	60	.....	29	yl. s. bk. sp. brk. sh.
604	Mar. 7	29 16 45	85 39 30	61	60	.....	28	yl. s. bk. sp. brk. sh.
605	Mar. 7	29 16 00	85 38 45	61	60	.....	31	yl. s. bk. sp. brk. sh.
606	Mar. 7	29 15 11	85 38 00	61	60	.....	33	gy. s. bk. sp.
607	Mar. 7	29 15 10	85 37 00	61	60	.....	32	fne. gy. s. bk. sp.
608	Mar. 7	29 15 10	85 36 00	63	61	.....	31	fne. gy. s. bk. sp.
609	Mar. 7	29 15 40	85 35 15	65	62	.....	29	fne. gy. s.
610	Mar. 7	29 16 15	85 34 30	65	62	.....	25	crs. r. bk. s. sh.
611	Mar. 7	29 15 00	85 34 30	65	63	.....	27	wh. s. bk. sp. sh.
612	Mar. 7	29 14 00	85 33 30	65	63	.....	27	fne. s. bk. sp.
613	Mar. 7	29 13 00	85 32 30	65	63	.....	26	fne. wh. s. bk. sp.
614	Mar. 7	29 12 30	85 32 00	65	63	.....	26	crs. s. bk. sp. sh.
615	Mar. 7	29 15 10	85 34 30	65	64	.....	29	fne. wh. s. bk. sp.
616	Mar. 7	29 16 30	85 36 00	65	64	.....	29	fne. wh. s. bk. sp.
617	Mar. 7	29 17 10	85 36 30	64	64	.....	27	fne. wh. s. bk. sp.
618	Mar. 7	29 17 50	85 37 00	63	64	.....	27	fne. s. bk. sp. brk. sh.
619	Mar. 7	29 18 30	85 37 30	63	64	.....	28	gy. bk. s. brk. sh.
620	Mar. 7	29 19 15	85 38 00	63	64	.....	26	gy. bk. s. brk. sh.
621	Mar. 7	29 19 40	85 39 20	63	63	.....	26	gy. bk. s. brk. sh.
622	Mar. 7	29 20 05	85 40 40	63	63	.....	26	gy. bk. s. brk. sh.
623	Mar. 7	29 20 30	85 42 00	63	63	.....	26	gy. bk. s. brk. sh.
624	Mar. 7	29 19 45	85 42 50	62	63	.....	28	gy. bk. s. brk. sh.
625	Mar. 7	29 19 20	85 43 15	62	63	.....	28	gy. bk. s. brk. sh.
626	Mar. 7	29 19 00	85 43 15	62	63	.....	28	gy. bk. s. brk. sh.
627	Mar. 8	29 16 15	85 42 30	58	60	.....	30	gy. bk. s. brk. sh.
628	Mar. 8	29 16 45	85 41 00	58	59	.....	29	gy. bk. s. brk. sh.
629	Mar. 8	29 15 30	85 40 15	57	60	.....	29	gy. bk. s. brk. sh.
630	Mar. 8	29 17 45	85 42 00	57	60	.....	31	gy. bk. s. brk. sh.
631	Mar. 8	29 20 30	85 44 00	57	60	.....	27	gy. bk. s. brk. sh.
632	Mar. 8	29 19 30	85 45 00	57	60	.....	29	gy. bk. s. brk. sh.
633	Mar. 8	29 20 15	85 45 40	57	60	.....	29	gy. bk. s. brk. sh.
634	Mar. 8	29 21 00	85 46 20	56	60	.....	28	g. brk. s. sh.
635	Mar. 8	28 51 20	85 10 00	64	65	.....	31	gy. s. brk. sh.
636	Mar. 8	28 52 10	85 09 20	64	65	.....	30	crs. gy. s. brk. sh.
637	Mar. 8	28 53 00	85 08 40	64	65	.....	29	gy. s. brk. sh.
638	Mar. 8	28 54 00	85 08 00	63	65	.....	28	gy. s. bk. sp. brk. sh.
639	Mar. 15	28 48 00	84 36 00	64	63	.....	24	s. co. brk. sh.
640	Mar. 15	28 47 00	84 35 50	63	62	.....	24	s. co. brk. sh.
641	Mar. 15	28 46 00	84 35 40	62	61	.....	23	s. co. brk. sh.
642	Mar. 15	28 45 00	84 35 30	61	60	.....	24	s. co. brk. sh.
643	Mar. 15	28 44 00	84 35 20	60	59	.....	24	s. co.
644	Mar. 15	28 43 00	84 35 30	60	62	62.1	24	s. co. brk. sh.
645	Mar. 15	28 42 00	84 35 40	60	61	.....	26	s. bk. sp. brk. sh.
646	Mar. 15	28 41 30	84 35 50	60	61	.....	26	crs. bk. gy. s. co.
647	Mar. 15	28 41 00	84 36 00	60	61	.....	27	gy. s. bk. sp. co.
648	Mar. 15	28 40 45	84 35 30	59	61	.....	26	wh. s. bk. sp. brk. sh.
649	Mar. 15	28 40 00	84 32 40	58	62	.....	26	wh. s. brk. sh.
650	Mar. 15	28 42 00	84 20 50	58	62	.....	24	yl. s. bk. sp. brk. sh.
651	Mar. 15	28 43 20	84 28 00	58	62	.....	22	co.
652	Mar. 15	28 44 00	84 27 00	58	62	.....	23	fne. wh. s. brk. sh.
653	Mar. 15	28 44 40	84 26 00	58	62	.....	21	crs. gy. s.
654	Mar. 16	28 50 00	84 32 30	59	62	.....	21	brk. sh.
655	Mar. 16	28 45 00	84 33 15	59	62	.....	24	fne. wh. s. bk. sp. brk. sh.
656	Mar. 16	28 40 00	84 32 00	60	63	.....	27	fne. wh. s. bk. sp.
657	Mar. 16	28 38 45	84 28 30	59	63	.....	24	fne. wh. s. brk. sh.
658	Mar. 16	28 32 45	84 27 00	60	64	.....	24	crs. gy. s. brk. sh.
659	Mar. 16	28 25 00	84 21 00	62	63	.....	24	crs. s. bk. sp. sh.
660	Mar. 16	28 21 00	84 18 00	62	63	.....	23	crs. s. bk. sp. sh.
661	Mar. 16	28 20 00	84 12 00	62	63	.....	22	gy. s.
662	Mar. 16	28 19 45	84 06 00	59	63	.....	21	wh. s. bk. sp. brk. sh.
663	Mar. 16	28 15 45	84 02 35	60	62	.....	21	wh. s. bk. sp. brk. sh.
664	Mar. 16	28 11 45	83 59 10	61	63	.....	22	wh. s. bk. sp. brk. sh.
665	Mar. 16	28 07 45	83 55 40	60	64	.....	22	wh. s. bk. sp.
666	Mar. 16	28 03 45	83 52 15	60	64	.....	22	fne. gy. s. bk. sp.
667	Mar. 16	27 59 40	83 48 50	60	63	.....	22	crs. s. brk. sh.
668	Mar. 16	27 55 30	83 45 25	60	63	.....	22	gy. bk. s.
669	Mar. 16	27 51 30	83 42 00	60	63	.....	21	fne. wh. s. bk. sp.
670	Mar. 16	27 50 00	83 36 15	60	62	.....	20	wh. s. bk. sp.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Gulf of Mexico.						
	1885.	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	*Fms.*	
671	Mar. 16	27 49 00	83 30 30	60	61	.....	18	crs. s. bk. sp. brk. sh.
672	Mar. 16	27 48 10	83 24 45	60	66	.....	10½	gy. s. brk. sh.
673	Mar. 16	27 47 30	83 19 00	60	62	.....	15	gy. s. bk. sp.
674	Mar. 16	27 46 45	83 13 15	60	62	.....	12	crs. gy. s. bk. sp. brk. sh.
675	Mar. 16	27 46 10	83 07 30	60	62	.....	10	crs. gy. s. bk. sp.
676	Mar. 16	27 46 00	83 02 00	60	62	.....	8	gy. s. bk. sp. brk. sh.
677	Mar. 18	27 16 00	83 10 00	65	64	.....	18	gy. bk. s.
678	Mar. 18	27 08 30	83 19 30	67	66	.....	25	crs. gy. bk. s.
679	Mar. 18	26 58 00	83 22 30	68	66	.....	26	crs. gy. s. brk. sh.
680	Mar. 18	26 53 00	83 24 00	67	66	.....	27	wh. s. bk. sp. brk. sh.
681	Mar. 18	26 42 30	83 22 45	80	67	.....	29	crs. s. bk. sp. brk. sh.
682	Mar. 18	26 38 00	83 20 00	73	67	.....	28	crs. s. bk. sp.
683	Mar. 19	26 28 15	83 11 00	63	67	.....	26	fne. wh. s. bk. sp.
684	Mar. 19	26 23 15	83 11 15	61	67	.....	28	crs. gy. s. bk. sp. brk. sh.
685	Mar. 19	26 12 30	83 06 30	63	66	.....	27	crs. gy. s. bk. sp. brk. sh.
686	Mar. 19	26 08 30	83 03 45	63	66	.....	25	fne. wh. s. bk. sp. brk. sh.
687	Mar. 19	26 04 30	83 01 00	63	66	.....	24	fne. wh. s. bk. sp. brk. sh.
688	Mar. 19	25 54 00	82 59 30	67	66	.....	24	fne. wh. s.
689	Mar. 19	25 49 00	83 01 00	66	67	.....	25	fne. wh. s.
690	Mar. 19	25 44 30	83 02 30	67	68	.....	27	s. co.
691	Mar. 19	25 29 30	83 01 00	68	69	.....	27	gy. s. brk. sh.
692	Mar. 19	25 34 30	83 01 00	67	69	.....	27	gy. s. bk. sp.
693	Mar. 19	25 29 30	83 01 00	67	69	.....	28	crs. gy. s. brk. sh.
694	Mar. 19	25 24 30	83 00 00	67	69	.....	27	gy. s. bk. sp.
695	Mar. 19	25 19 30	82 59 30	68	69	.....	27	gy. m. brk. sh.
696	Mar. 19	25 14 30	82 59 00	68	69	.....	27	gy. m. fne. s. brk. sh.
697	Mar. 19	25 09 30	82 59 00	67	69	.....	27	brk. sh.
		Savannah to Cape Hatteras.						
698	Apr. 1	31 55 00	79 20 00	66	69	60.8	54	gy. bk. s. brk. sh.
699	Apr. 1	31 54 45	79 17 00	66	69	60.3	86	gy. m. brk. sh.
700	Apr. 2	33 21 30	77 09 00	64	70	66.8	71	gy. s.
701	Apr. 2	33 35 00	76 42 15	65	72	65.2	91	fne. gy. s.
702	Apr. 3	36 30 00	73 14 00	69	72	36.8	2,340	bu. oz.
703	Apr. 4	36 45 00	73 28 00	68	66	37.2	1,646	bu. oz.
704	Apr. 4	36 57 30	73 47 00	61	55	37.5	1,436	bu. oz.
705	Apr. 4	37 01 08	74 10 00	50	52	38.7	1,208	bu. oz.
706	Apr. 4	37 09 23	74 30 30	45	46	.....	336	gn. m.
707	Apr. 5	37 03 00	74 39 00	42	46	.....	50	fne. yl. s. bk. sp.
708	Apr. 5	37 03 45	74 37 10	42	46	46.8	51	fne. yl. s. bk. sp.
709	Apr. 5	37 03 40	74 35 00	42	47	46.8	54	yl. s. bk. sp. brk. sh.
710	Apr. 5	37 03 30	74 33 30	42	47	47.7	59	g. crs. s. brk. sh.
711	Apr. 5	37 03 00	74 33 00	42	49	.....	67	(Lost lead.)
712	Apr. 5	37 01 30	74 32 00	43	49	.....	98	bk. s.
713	Apr. 5	37 05 00	74 57 30	42	44	43	24	gy. s. brk. sh.
714	Apr. 5	37 02 30	75 22 00	43	40	40.5	17	fne. wh. s. bk. sp.
715	Apr. 5	36 59 00	75 45 00	44	42	41.3	9	fne. gy. s. bk. sp.
716	Apr. 5	36 57 30	75 58 00	46	43	42	6	gy. bk. s.
717	Apr. 5	37 07 30	76 08 30	50	44	42.5	6½	m. brk. sh.
718	Apr. 5	37 32 00	76 08 00	48	44	40.5	7½	gn. m.
719	Apr. 6	37 54 00	76 09 00	50	42	37.7	14	bu. m.
720	Apr. 6	38 07 30	76 32 00	52	43	38.7	12	bu. m.
721	June 3	37 07 30	74 34 00	61	60	.....	75	fne. gy. s.
722	June 3	37 08 00	74 34 45	61	61	54	61	crs. gy. sp.
723	June 3	37 08 20	74 34 00	66	67	52.5	68	crs. gy. bk. brk. sh.
724	June 3	37 09 30	74 33 45	67	67	52.5	75	crs. gy. s. bk. sp. brk. sh.
725	June 3	37 10 15	74 31 00	65	67	.....	307	gn. m.
726	June 3	37 11 30	74 32 30	65	67	51.5	103	gy. m. crs. s. bk. sp.
727	June 4	36 40 30	74 42 00	69	68	48.8	135	m. fne. bk. s.
728	June 4	36 43 00	74 41 00	74	69	48.8	160	bk. m.
729	June 4	36 43 00	74 42 00	75	70	52	98	brk. sh. g
730	June 4	36 43.00	74 40 30	75	70	.....	78	s. g.
731	June 5	35 26 00	74 42 00	75	76	39.5	87	gy. m.
732	June 5	35 26 30	74 44 00	76	74	40.5	388	bk. m.
733	June 5	35 27 00	74 46 00	76	74	44	210	bk. m.
734	June 5	35 27 15	74 42 30	72	75	54	69	bk. m.
735	June 5	35 12 00	75 09 30	75	75	72.5	17	gy. s. brk. sh.
736	June 5	35 12 15	75 05 00	76	76	65	50½	fne. gy. s. bk. sp. brk. sh.
737	June 5	35 12 30	75 03 30	76	76	60	72	crs. gy. s. brk. sh.
738	June 5	35 12 45	75 02 00	76	76	60	68	r. co.
739	June 5	35 13 00	75 01 00	76	76	53	123	gy. s. bk. sp. brk. sh.
740	June 5	35 11 00	75 07 00	78	75	65	52	crs gy. s. bk. sp.
741	June 6	34 58 00	75 12 00	66	75	58	66	fne gy. s. bk. sp.
742	June 6	34 59 00	75 13 00	66	75	61	54	fne. gy. s. bk. sp.
		Cape Cod to Newfoundland.						
743	June 19	41 15 30	64 23 00	66	69	37.1	1,915	yl. oz.
744	June 19	41 18 15	63 55 00	68	66	.....	2,044	yl. oz.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Cape Cod to Newfoundland.						
	1885.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
745	June 19	41 19 23	63 35 30	71	69	37	2,071	gy. oz.
746	June 19	41 23 20	63 23 15	67	59	36.8	2,035	br. oz.
747	June 19	41 26 15	63 15 00	63	57	36.8	2,020	br. oz.
748	June 19	41 22 00	63 10 00	61	60	36.7	2,094	yl. oz.
749	June 19	41 20 30	62 57 00	61	61	37	2,178	gy. oz.
750	June 20	40 40 30	60 33 00	63	75	36.5	2,995	yl. oz.
751	June 21	40 21 00	56 27 00	64	68	37.8	3,103	gy. oz.
752	June 21	40 24 30	54 24 00	78	74	36.8	2,057	gy. oz.
753	June 21	40 18 00	53 39 30	66	70	36.8	2,863	gy. oz.
754	June 22	40 16 00	53 16 30	66	69	37	2,882	gy. oz.
755	June 22	40 13 00	53 02 00	66	70	38.6	2,897	gy. oz.
756	June 22	40 55 30	52 02 30	71	67	36.8	2,873	gy. oz.
757	June 22	41 51 00	51 31 00	56	54	38.3	2,118	gy. oz.
758	June 23	42 18 30	51 16 00	51	52	37.2	1,499	gy. oz.
759	June 23	42 37 00	51 05 30	51	50	38	1,070	gn. oz.
760	June 23	42 51 30	50 55 00	52	45	38.7	970	hrd.
761	June 23	42 56 00	50 50 00	51	45	38.7	309	gn. m. s.
762	June 24	43 38 00	49 42 00	53	48	39.2	30	s. brk. sh.
763	June 24	43 38 00	49 34 30	53	48	36	38	wh. s. bk. sp. brk. sh.
764	June 24	43 38 00	49 27 00	53	49	.....	125	gn. m. crs. gy. s.
765	June 24	44 26 00	49 33 00	51	45	35.1	34	wh. s. brk. sh.
766	June 24	44 57 00	49 38 00	46	44	32.7	36	wh. s brk. sh.
767	June 25	46 29 00	49 39 30	48	43	34.4	39	gy. s.
768	July 2	46 02 30	53 26 00	48	47	29.5	76	crs. gy. bk. s.
769	July 3	45 54 00	53 53 00	49	47	29.5	78	dk. gn. s. brk. sh.
770	July 3	45 52 00	53 59 00	49	47	29.5	75	fne. gy. s.
771	July 3	45 49 45	54 06 30	50	46	29.7	67	bk. s.
772	July 4	44 21 30	56 52 15	56	52	38.7	761	gy. oz.
773	July 4	44 22 50	56 56 30	59	54	38.7	795	gy. oz.
774	July 4	44 24 10	57 00 40	59	53	38.7	566	hrd.
775	July 4	44 25 30	57 04 45	59	53	39.7	366	gy. oz. p.
776	July 4	44 26 00	57 06 15	59	53	39.7	454	gy. oz.
777	July 4	44 27 00	57 09 15	59	53	40	333	crs. s. g.
778	July 4	44 30 30	57 12 45	54	51	.....	99	crs. s. p.
779	July 5	44 05 15	57 14 15	54	54	.....	340	gy. c.
780	July 5	44 05 15	57 15 30	54	54	.....	375	s. brk. co.
781	July 5	44 06 00	57 17 00	53	52	.....	90	wh. s. p.
782	July 5	44 06 30	57 17 00	54	52	.....	142	hrd. wh. s.
783	July 5	44 11 00	57 14 45	55	53	.....	183	p.
784	July 5	44 13 30	57 13 45	55	53	.....	155	lge. p.
785	July 5	44 24 45	57 10 15	59	54	.....	201	gy. s.
786	July 5	44 26 30	57 10 45	57	54	.....	175	crs. s.
787	July 5	44 28 30	57 10 45	57	54	.....	186	fne. s.
788	July 5	44 28 30	57 12 45	57	54	39.7	145	fne. gy. s.
789	July 5	44 29 00	57 14 45	57	54	.....	40	hrd. crs. p.
790	July 5	44 31 00	57 14 45	57	54	.....	42	hrd. crs. p.
791	July 5	44 33 00	57 14 45	57	54	.....	48	fne. wh. s.
792	July 5	44 35 00	57 14 45	57	54	.....	90	yl. s.
793	July 5	44 35 00	57 12 15	56	53	.....	188	m. fne. s.
794	July 5	44 39 00	57 17 00	55	53	.....	124	wh. s.
795	July 6	45 03 00	57 56 00	50	52	32	39	hrd.
796	July 6	45 16 00	58 11 45	50	52	33.5	75	wh. s.
797	July 6	45 21 30	58 18 45	50	52	32	54	rot. co.
798	July 6	45 27 00	58 28 45	50	52	.....	45	fne. wh. s. bk. sp.
799	July 6	45 24 00	58 36 45	51	53	.....	67	fne. m.
800	July 6	45 21 30	58 44 45	51	53	32	42	wh. s. p.
801	July 6	45 18 30	58 52 45	52	53	.....	45	yl. s.
802	July 6	45 14 00	59 08 15	54	54	.....	48	s. g.
803	July 6	45 09 30	59 25 15	54	54	.....	43	hrd.
804	July 6	45 07 00	59 28 45	58	56	.....	46	yl. s.
805	July 6	45 06 00	59 31 30	58	56	32.3	48	yl. s.
806	July 6	45 05 00	59 34 00	58	55	.....	52	yl. s.
807	July 6	45 03 00	59 39 45	60	56	.....	58	yl. s.
808	July 6	44 36 00	59 51 45	59	58	35.8	48	yl. s. g.
809	July 6	44 32 30	59 46 45	59	58	35.3	70	fne. wh. s.
810	July 7	44 40 00	59 53 45	58	58	34.8	48	s. g.
811	July 7	44 39 30	59 57 45	58	58	.....	54	s. brk. p.
812	July 7	44 38 00	60 03 45	58	58	.....	57	fne. gy. bk. s.
813	July 7	44 32 00	60 11 15	57	58	.....	74	s. g.
814	July 7	44 28 00	60 16 15	59	58	.....	33	s. g.
815	July 7	44 26 30	60 21 45	59	58	.....	26	s. g.
816	July 7	44 19 00	60 40 45	60	57	.....	63	yl. s. p.
817	July 7	44 22 00	60 44 15	65	57	34.1	54	yl. s.
818	July 8	44 20 30	63 11 00	64	61	34.6	51	hrd.
819	July 8	44 30 30	63 19 00	65	61	.....	40	r.
820	July 11	43 12 00	64 00 30	60	58	37.8	54	hrd.
820	July 11	43 12 00	64 00 30	60	58	37.8	54	hrd.
821	July 12	43 01 00	64 45 30	60	60	38.7	47	hrd.
822	July 12	42 12 30	65 14 00	61	62	.....	100	g.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Cape Cod to Newfoundland.						
	1885.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
823	July 12	42 05 00	65 22 00	60	62	.....	74	crs. g.
824	July 13	41 58 00	65 30 00	60	62	.....	339	bu. m.
825	July 13	41 49 50	65 45 30	62	60	42.6	85	s. g.
826	July 13	41 49 30	65 45 30	63	60	.....	82	s. g.
827	July 13	41 49 00	65 45 30	63	60	42.3	81	s. g.
828	July 13	41 47 00	65 47 15	63	60	42.6	75	s. g.
829	July 13	41 44 30	65 47 00	63	60	45.2	79	stf. bu. c. g.
830	July 13	41 44 45	65 45 30	63	60	45.2	84	s. g.
831	July 13	41 42 45	65 45 45	63	60	.....	83	s. g.
832	July 13	41 42 00	65 45 30	65	66	.....	84	crs. s. g.
833	July 13	41 40 30	65 45 00	66	66	.....	278	wh. s. bk. sp.
834	July 13	41 42 30	65 44 15	66	66	.....	303	s. p.
835	July 13	41 55 10	65 44 00	64	60	41.6	120	crs. s. g.
836	July 13	41 55 50	65 42 30	64	60	.....	136	hrd.
837	July 13	41 56 25	65 41 00	64	60	.....	175	brk. sh.
838	July 13	41 57 00	65 39 40	66	61	.....	176	brk. sh.
839	July 13	41 58 00	65 37 30	66	61	.....	128	p.
		Nantucket to Charleston, S. C.						
840	Aug. 8	39 57 45	70 23 30	71	75	41.6	234	gn. s.
841	Aug. 8	40 00 45	70 24 00	71	75	46.2	154	gn. s. bk. sp.
842	Aug. 8	39 59 00	70 22 45	71	74	45.7	167	gn. s. bk. sp. brk. sh.
843	Aug. 8	39 56 15	70 21 30	71	72	41.9	233	gn. m. s.
844	Aug. 8	39 53 28	70 20 30	73	72	40.6	300	gn. m. s.
845	Aug. 8	39 56 00	70 20 45	70	76	41.6	237	gn. m.
846	Aug. 8	39 51 30	70 15 30	76	76	43.9	344	gn. m.
847	Aug. 8	39 52 30	70 21 00	70	74	39.6	416	stf. gn. m.
848	Aug. 9	39 54 15	70 29 00	71	76	41.6	315	hrd.
849	Aug. 9	39 49 00	70 42 00	71	77	39.6	452	gy. m.
850	Aug. 10	39 44 30	71 20 30	71	76	39.3	502	gn. m.
851	Aug. 10	39 47 15	71 24 30	71	76	39.6	397	gy. oz.
852	Aug. 10	39 49 40	71 27 30	69	74	40.6	298	gn. oz.
853	Aug. 10	39 52 00	71 30 30	72	75	43.6	206	gn. m.
854	Aug. 10	39 41 00	71 42 00	76	77	39.6	378	gn. s.
855	Aug. 31	38 45 00	68 04 00	72	75	36.4	1,949	lt. bu. glob. oz.
856	Sept. 1	39 44 00	67 03 00	71	72	36.8	2,009	gy. oz.
857	Sept. 3	40 52 30	65 07 00	63	71	.....	2,009	yl. glob. oz.
858	Sept. 18	39 47 00	71 39 45	68	70	.....	291	gn. m.
859	Sept. 19	39 04 00	72 23 00	71	72	38.5	659	gn. m.
860	Sept. 19	39 05 30	72 25 30	72	72	39	519	gn. m.
861	Sept. 20	39 04 00	72 16 00	70	72	(*a*)	877	
862	Sept. 20	39 05 30	72 20 00	70	62	38.7	715	gy. m.
863	Sept. 21	39 04 30	73 02 00	67	70	48.8	47	crs. gy. s. bk. sp.
864	Sept. 21	39 02 00	72 59 30	66	70	48.8	47	crs. gy. s. bk. sp.
865	Sept. 21	38 58 30	72 55 00	66	70	50.9	55	crs. dk. gy. s.
866	Oct. 17	35 02 00	75 09 30	70	79	.....	197	gy. m.
867	Oct. 18	34 38 00	75 32 00	75	78	46.7	210	gn. m.
868	Oct. 20	33 40 30	77 37 00	76	77	.....	15	fne. gy. s. brk. sh.
	1886.	*Bahama Islands.*						
869	Feb. 23	28 41 00	78 03 00	69	70	39.7	557	gy. s. bk. sp.
870	Feb. 23	28 40 00	77 52 00	71	68	39.7	570	gy. s. bk. sp.
871	Feb. 23	28 40 30	77 37 00	73	73	39.7	572	gy. s. bk. sp.
872	Feb. 23	28 41 30	77 28 00	86	74	39.7	581	gy. s. bk. sp.
873	Feb. 23	28 42 00	77 09 00	86	74	39.2	600	wh. s.
874	Feb. 23	28 42 30	76 53 30	71	70	39.2	623	gy. s. bk. sp.
875	Feb. 23	28 42 45	76 30 00	67	70	39.7	702	oz.
876	Feb. 23	28 43 00	76 26 55	70	70	36.8	2,845	oz.
877	Feb. 24	28 34 42	76 10 25	68	69	36.8	3,196	oz.
878	Feb. 24	28 24 06	76 15 55	69	71	37.8	1,407	No specimen.
879	Feb. 24	28 12 30	76 15 00	69	71	39.2	691	gy. s.
880	Feb. 24	28 01 00	76 13 00	69	71	39.2	622	yl. oz. gy. s.
881	Feb. 24	27 49 00	76 12 00	70	71	39.5	633	gy. and br. s.
882	Feb. 24	27 38 00	76 23 24	72	71	39.0	677	br. s.
883	Feb. 24	27 37 00	76 12 00	74	71	39.1	705	gy. and br. s.
884	Feb. 24	27 42 00	76 02 00	70	72	39.2	762	for.
885	Feb. 24	27 51 00	75 53 30	71	73	.....	2,599	No specimen.
886	Feb. 25	27 30 00	75 35 00	70	71	.....	2,761	No specimen.
887	Feb. 26	25 29 00	74 50 00	73	72	.....	2,589	for. oz.
888	Feb. 26	24 50 00	74 36 45	74	73	36.7	2,709	br. oz.
889	Feb. 26	24 25 00	74 36 00	76	75	37.6	2,639	br. oz.
890	Feb. 26	24 08 00	74 35 00	74	73	38.6	1,135	hrd.
891	Feb. 27	23 57 00	74 36 30	77	75	43.8	535	co.
892	Feb. 27	23 50 00	74 38 00	77	76	38.2	1,264	wh. s. co.
893	Feb. 27	23 43 00	74 39 30	79	77	38.2	1,263	lt. br. oz.
894	Mar. 8	23 37 20	74 57 40	78	75	39.1	850	co. s.

a Wire parted, losing thermometer and 800 turns of wire.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Bahamas to Cuba.						
	1886.	° ′ ″	° ′ ″	° F.	° F.	° F.	*Fms.*	
895	Mar. 8	23 42 20	74 59 30	78	75	40.1	657	co. s.
896	Mar. 8	23 44 35	75 01 35	78	75	38.7	1,017	co. s.
897	Mar. 8	23 46 30	75 03 50	78	75	42.3	578	co. s.
898	Mar. 8	23 49 30	75 08 30	75	73	67.8	115	wh. co. s.
899	Mar. 8	23 55 20	75 11 20	74	75	39.2	845	co. s. bk. sp.
900	Mar. 8	24 01 20	75 13 30	73	75	39.5	741	wh. s. rd. and bk. sp. for.
901	Mar. 8	24 08 30	75 15 00	73	74	74.3	22	wh. s. sp. and brk. sh.
902	Mar. 8	24 09 00	75 00 00	72	74	37.2	2,194	br. m. co. s.
903	Mar. 8	24 08 00	74 56 30	72	74	36.7	2,482	br. oz.
904	Mar. 9	24 08 00	74 45 00	72	74	36.5	2,255	br. oz.
905	Mar. 9	24 07 00	74 38 00	72	74	36.7	2,061	br. oz.
906	Mar. 9	23 35 00	74 47 30	78	75	65.1	149	co. s. sh.
907	Mar. 10	23 37 00	75 06 30	71	74	38.4	1,398	co. s.
908	Mar. 10	23 40 30	75 13 45	72	74	38.2	1,338	co. s.
909	Mar. 10	23 43 45	75 20 45	72	74	48.3	448	co. s.
910	Mar. 10	23 50 30	75 23 30	69	73	38.5	1,047	co. s.
911	Mar. 10	23 56 30	75 26 30	68	73	38.3	1,211	co. s.
912	Mar. 10	24 02 45	75 29 00	69	73	54.3	361	co. s.
913	Mar. 10	24 06 30	75 30 45	70	73	n. t.	273	hrd. co. s.
914	Mar. 11	24 07 00	75 32 30	68	72	n. t.	515	co. s.
915	Mar. 11	24 01 15	75 38 45	67	72	38.6	1,051	co. s. bk. sp.
916	Mar. 11	23 55 20	75 45 10	68	73	38.6	1,056	co. s.
917	Mar. 11	23 49 30	75 51 40	68	73	39.1	974	co. s. bk. sp.
918	Mar. 11	23 43 30	75 58 00	69	73	68.3	124	co. s.
919	Mar. 11	23 52 00	76 00 15	67	73	39.1	863	gy. oz.
920	Mar. 11	24 00 40	76 02 45	66	73	38.6	907	wh. co. s.
921	Mar. 11	24 09 00	76 05 00	66	72	38.6	990	wh. co. s.
922	Mar. 11	24 17 20	76 07 30	66	72	38.6	1,002	wh. co. s.
923	Mar. 12	24 25 40	76 09 50	64	69	38.6	971	gy. oz.
924	Mar. 12	24 33 40	76 11 20	65	71	38.6	937	gy. oz.
925	Mar. 12	24 39 40	76 13 50	66	68	39.0	781	co. s.
926	Mar. 13	24 36 30	76 12 00	72	71	39.0	899	co. s.
927	Mar. 13	24 33 00	76 24 30	73	71	38.6	923	co. s.
928	Mar. 13	24 29 00	76 31 15	73	72	39.1	801	wh. oz.
929	Mar. 13	24 25 00	76 37 00	73	72	70.2	143	wh. oz.
930	Mar. 13	24 33 00	76 35 30	76	73	38.8	842	co. s.
931	Mar. 13	24 41 30	76 33 45	80	74	38.8	804	co. s.
932	Mar. 13	24 49 20	76 32 15	80	74	39.1	764	co. s.
933	Mar. 13	24 52 30	76 31 30	78	74	56.2	325	gy. oz.
934	Mar. 13	24 35 20	76 02 45	75	74	46.5	416	wh. oz.
935	Mar. 13	24 38 20	76 01 45	75	74	n. t.	926	wh. oz.
936	Mar. 13	24 46 50	75 55 45	74	73	36.7	1,965	gy. oz.
937	Mar. 14	24 54 30	75 49 20	75	73	36.7	2,432	br. oz.
938	Mar. 14	25 02 45	75 43 00	75	73	36.7	2,664	br. oz.
939	Mar. 14	25 35 00	76 35 15	71	72	n. t.	11	co. s.
940	Mar. 14	25 35 30	76 34 30	71	72	n. t.	14	co. s.
941	Mar. 14	25 36 30	76 34 45	71	72	n. t.	29	co. s. rd. sp.
942	Mar. 14	25 37 15	76 34 00	71	72	n. t.	139	hrd. co.
943	Mar. 14	25 40 15	76 29 15	73	72	38.1	1,927	co. s.
944	Mar. 14	25 44 45	76 23 15	72	72	36.7	2,663	br. oz.
945	Mar. 24	25 07 00	77 21 30	69	72	n. t.	375	co. s.
946	Mar. 24	25 15 30	77 24 45	71	73	38.4	1,409	br. oz. co.
947	Mar. 24	25 25 30	77 27 50	70	74	39.1	1,490	br. oz.
948	Mar. 24	25 35 30	77 27 45	69	74	39.1	1,079	hrd. co. s.
949	Mar. 24	25 47 00	77 20 30	68	74	38.6	1,164	hrd. co. s.
950	Mar. 24	25 53 15	77 33 00	65	71	38.4	1,312	gy. oz.
951	Mar. 25	25 59 00	78 12 00	66	71	49.8	411	gy. oz.
952	Mar. 25	26 04 00	78 20 00	69	74	51.8	383	br. and gy. oz.
953	Mar. 25	26 07 00	78 45 30	69	75	58.3	281	wh. oz.
954	Apr. 3	24 14 00	81 30 00	72	73	46.3	145	brk. sh.
955	Apr. 3	24 05 45	81 30 30	72	75	41.6	445	wh. oz.
956	Apr. 4	23 58 30	81 31 00	72	75	40.5	589	gy. s. yl. sp.
957	Apr. 4	23 51 00	81 31 45	73	76	39.9	980	gy. s. bk. sp.
958	Apr. 4	23 43 00	81 32 15	73	76	39.6	777	br. oz.
959	Apr. 4	23 35 30	81 32 45	74	76	39.6	815	lt. br. oz.
960	Apr. 4	23 28 00	81 33 15	74	77	39.6	792	lt. br. oz.
961	Apr. 4	23 20 30	81 33 45	73	77	40.6	707	br. oz.
962	Apr. 4	23 13 00	81 34 30	76	77	50.0	398	br. oz. sh.
963	Apr. 4	23 08 00	81 35 30	76	77	56.7	261	br. s. sh.
964	Apr. 10	26 21 00	78 50 45	68	76	48.4	443	wh. oz.
965	Apr. 10	26 27 00	78 38 00	70	74	60.6	290	br. s. brk. sh.
966	Apr. 10	26 25 30	78 27 50	70	73	40.7	528	br. s.
967	Apr. 10	26 31 30	78 21 00	70	73	53.0	367	yl. m.
968	Apr. 10	26 33 00	78 24 20	71	73	73.2	18	co. s.
969	Apr. 10	26 32 30	78 24 00	71	73	n. t.	148	co. s.
970	Apr. 10	26 30 30	78 18 30	71	73	74.7	18	co.
971	Apr. 10	26 38 30	78 14 00	71	74	62 3	274	co. lt. br. oz.
972	Apr. 10	26 39 00	78 09 00	72	74	67.2	157	gy. oz.
973	Apr. 10	26 38 45	78 00 00	71	73	n. t.	15	gy. s. fne. sh.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Bahama Islands.						
	1886.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
974	Apr. 10	26 34 00	77 58 45	71	73	63.8	234	gy. oz.
975	Apr. 10	26 22 00	78 08 00	70	73	39.6	867	wh. oz.
976	Apr. 10	26 16 00	77 55 00	69	73	39.6	711	br. oz.
977	Apr. 12	23 39 15	76 47 00	74	74	39.6	740	wh. oz.
978	Apr. 12	23 44 00	77 00 00	73	74	40.2	756	wh. oz.
979	Apr. 13	23 49 00	77 13 00	73	74	39.4	769	wh. oz.
980	Apr. 13	23 50 00	77 25 30	73	73	39.6	740	lt. br. oz.
981	Apr. 13	23 58 00	77 20 00	73	73	39.4	805	lt. br. oz.
982	Apr. 13	23 57 00	77 12 15	73	73	40.4	514	lt. br. oz.
983	Apr. 13	24 07 00	77 21 00	82	74	57.3	809	wh. oz.
984	Apr. 13	24 13 00	77 30 30	78	74	39.4	822	lt. br. oz.
985	Apr. 13	24 19 30	77 24 30	70	74	47.6	852	lt. br. oz.
986	Apr. 13	24 25 00	77 18 15	74	74	59.8	639	wh. m.
987	Apr. 14	24 29 30	77 19 00	72	73	45.7	444	wh. m.
988	Apr. 14	24 37 00	77 30 00	80	73	39.1	939	co. m.
989	Apr. 14	24 43 00	77 42 00	76	74	39.6	734	lt. br. oz.
990	Apr. 14	25 19 30	77 57 30	71	73	38.6	959	lt. br. oz.
991	Apr. 15	25 11 00	77 47 30	69	73	40.7	1,195	lt. br. glcb. oz.
992	Apr. 15	25 02 30	77 40 00	74	73	39.8	1,084	yl. m.
993	Apr. 17	25 06 00	77 32 00	72	73	39.4	794	co. s.
994	Apr. 30	25 35 45	76 57 00	79	76	44.2	1,527	lt. br. oz.
995	Apr. 30	25 39 30	76 53 45	79	76	86.9	1,922	wh. co. oz.
996	Apr. 30	25 43 00	76 58 00	79	76	39.1	2,222	br. oz.
997	Apr. 30	25 47 00	77 03 00	77	76	37.0	1,773	gy. s. bk. sp.
998	Apr. 30	25 50 45	77 09 00	77	76	.....	11	No specimen.
999	May 1	26 40 00	76 49 30	75	77	39.1	942	brk. sh.
1000	May 1	26 43 00	76 38 30	75	77	36.8	2,800	br. oz.
1001	May 1	26 45 00	76 26 00	77	76	38.1	2,764	gy. co. s.
1002	May 1	26 47 00	76 15 00	76	74	38.4	2,693	br. co. s.
1003	May 1	26 50 00	76 04 45	76	74	38.1	2,670	br. oz.
1004	May 1	27 11 00	76 19 00	76	73	38.1	2,715	co. s. for.
1005	May 2	27 41 00	76 41 00	69	72	38.6	943	gy. oz. bk. sp.
1006	May 2	27 45 00	76 52 30	69	72	41.1	671	yl. oz. bk. sp.
1007	May 2	27 49 00	77 04 00	69	72	41.1	690	yl. oz. bk. sp.
1008	May 2	27 53 00	77 16 00	71	73	39.9	699	yl. oz. bk. sp.
1009	May 2	27 49 30	77 35 00	72	73	.....	661	co. s. for.
1010	May 2	27 42 30	77 45 00	74	74	40.5	603	lt. br. oz.
1011	May 2	27 35 45	77 51 00	74	74	.....	682	Wire parted, lost 400 turns, thermometer, and lead.
1012	May 2	27 27 00	77 59 00	74	74	40.8	610	wh. s.
1013	May 5	31 27 00	79 12 00	76	77	50.2	280	crs. gy. s.
		New York to Newfoundland.						
1014	July 18	39 57 00	71 24 45	72	71	53.1	58	br. s. sh.
1015	July 18	39 54 00	71 24 00	72	71	51.0	110	gn. m.
1016	July 18	39 50 00	71 20 30	72	71	43.1	226	gn. m.
1017	Aug. 3	40 14 00	65 56 00	68	75	36.7	2,224	br. oz. c.
1018	Aug. 3	40 15 00	65 35 00	68	74	36.2	2,951	br. oz.
1019	Aug. 4	40 20 00	64 54 00	68	73	37.3	2,575	gy. and br. oz.
1020	Aug. 4	40 52 24	63 53 00	67	73	.....	2,337	lt. br. oz.
1021	Aug. 4	41 29 28	63 27 30	70	66	37.5	1,919	lt. br. oz.
1022	Aug. 4	41 26 28	63 21 00	69	64	37.7	1,932	lt. br. oz.
1023	Aug. 4	41 29 28	63 17 00	68	64	37.3	1,969	lt. br. oz.
1024	Aug. 4	41 29 28	63 10 15	69	64	37.3	1,980	lt. br. oz.
1025	Aug. 4	41 29 28	63 05 15	65	66	.....	1,998	lt. br. oz.
1026	Aug. 4	41 25 30	63 08 00	65	66	36.2	2,025	lt. br. oz.
1027	Aug. 4	41 24 00	63 19 00	66	65	36.3	2,033	lt. br. oz.
1028	Aug. 5	41 22 20	63 29 30	65	66	36.2	2,054	lt. br. oz.
1029	Aug. 5	41 31 00	63 27 30	65	66	36.2	1,930	lt. br. oz.
1030	Aug. 5	41 30 30	63 15 00	64	63	36.2	1,978	lt. br. oz.
1031	Aug. 5	41 32 30	63 00 30	62	64	36.3	2,033	lt. br. oz.
1032	Aug. 5	41 29 30	62 47 30	62	64	36.2	2,069	lt. br. oz.
1033	Aug. 5	41 53 00	62 35 15	67	67	.....	1,768	No specimen.
1034	Aug. 5	42 21 00	62 18 00	69	66	38.2	1,138	br. oz.
1035	Aug. 5	42 43 00	62 03 00	67	64	40.8	231	gy. s. bk. sp.
1036	Aug. 6	43 30 00	57 40 00	64	62	37.2	1,731	lt. br. oz.
1037	Aug. 7	43 45 00	56 09 00	62	62	37.2	1,758	stk. br. m.
1038	Aug. 7	44 02 00	54 39 00	66	64	36.9	1,780	lt. gy. m.
1039	Aug. 7	44 13 00	53 47 00	63	63	37.7	1,172	br. oz.
1040	Aug. 8	44 23 00	52 42 00	61	62	31.9	81	for. bk. sp.
1041	Aug. 8	44 52 00	50 25 24	62	62	39.7	34	rd. s. bk. sp.
1042	Aug. 8	45 00 00	49 15 00	60	62	31.1	35	wh. s. brk. sh.
1043	Aug. 8	45 00 00	49 09 00	60	62	31.0	35	hrd.
1044	Aug. 8	45 00 00	49 03 00	57	59	30.9	35	wh. s.
1045	Aug. 8	45 00 00	48 57 00	57	58	31.4	38	p.
1046	Aug. 8	45 00 00	48 51 00	57	58	30.4	41	p. wh. s. brk. sh.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		New York to Newfoundland.						
	1886.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1047	Aug. 8	45 00 30	48 45 00	57	56	31.9	115	crs. wh. s. brk. sh.
1048	Aug. 8	45 02 00	48 20 00	57	56	37.8	1,169	lt. br. oz.
1049	Aug. 9	45 02 00	47 08 00	62	59	38.2	1,916	lt. br. oz.
1050	Aug. 9	45 02 00	45 58 00	65	62	36.3	1,981	br. oz.
1051	Aug. 9	45 04 00	44 38 00	65	63	36.2	2,549	br. oz.
1052	Aug. 10	45 06 00	43 23 30	67	68	36.8	2,621	lt. br. oz.
1053	Aug. 10	45 14 00	42 03 00	69	70	37.8	2,658	br. oz. for.
1054	Aug. 10	45 43 00	43 00 00	69	68	36.8	2,577	lt. br. oz.
1055	Aug. 11	46 21 00	43 47 00	57	60	37.3	2,135	s. g.
1056	Aug. 11	47 02 30	45 06 30	59	58	38.2	103	hrd.
1057	Aug. 11	47 14 00	45 31 30	58	57	39.7	155	wh. s. bk. sp.
1058	Aug. 12	47 27 00	46 11 30	56	57	38.7	423	br. oz.
1059	Aug. 12	47 32 12	46 53 30	53	49	.....	477	No specimen.
1060	Aug. 12	47 44 00	48 12 30	55	50	37.1	170	gy. s. p.
1061	Aug. 12	47 46 00	48 19 30	55	51	36.5	168	gy. s. bk. sp.
1062	Aug. 12	47 49 00	48 41 30	54	51	35.2	147	gy. s. bk. sp. brk. sh.
1063	Aug. 13	47 57 00	49 24 30	54	52	32.4	106	gy. s. bk. sp.
1064	Aug. 13	48 02 00	50 10 30	55	53	30.4	100	gy. m.
1065	Aug. 13	47 31 00	50 17 00	56	54	30.1	62	gy. s. bk. sp. p.
1066	Aug. 13	47 26 00	51 00 30	57	54	.....	74	fne. gy. s. bk. sp.
1067	Aug. 13	47 30 00	51 45 00	55	55	.....	98	gn. m.
1068	Aug. 22	44 40 00	56 43 30	60	58	40.4	226	gy. m.
1069	Aug. 22	44 31 00	57 09 00	60	58	33.7	38	gy. s. p.
1070	Aug. 23	44 25 00	57 35 00	63	59	.....	32	wh. s. bk. sp.
1071	Aug. 23	43 38 00	59 18 30	67	62	35.6	63	gy. s. bk. sp.
1072	Aug. 25	41 37 00	62 58 00	63	65	36.9	1,943	dk. br. oz.
1073	Aug. 25	41 37 00	63 05 00	63	68	36.7	1,854	dk. br. oz.
1074	Aug. 25	41 37 00	63 11 30	63	65	37.2	1,798	dk. br. oz.
1075	Aug. 25	41 37 00	63 18 00	64	65	37.1	1,779	dk. br. oz.
1076	Aug. 25	41 37 00	63 26 00	70	73	36.9	1,762	dk. br. oz.
1077	Aug. 25	41 37 00	63 34 00	70	73	36.9	1,741	dk. br. oz.
1078	Aug. 25	41 42 00	63 34 00	70	72	37.2	1,644	dk. br. oz.
1079	Aug. 25	41 42 00	63 27 00	70	72	36.9	1,693	dk. br. oz.
1080	Aug. 25	41 42 00	63 21 00	70	72	36.9	1,697	dk. br. oz.
1081	Aug. 25	41 42 00	63 14 30	70	71	37.5	1,713	lt. br. oz. for.
1082	Aug. 26	41 49 00	63 50 00	73	73	37.5	1,587	br. oz. gy. m.
1083	Aug. 26	41 42 00	63 47 30	74	73	37.2	1,620	br. oz. for.
1084	Aug. 26	41 37 00	63 45 00	74	74	37.2	1,699	br. oz. for.
1085	Aug. 26	41 32 00	63 43 00	74	74	36.7	1,805	br. oz. for.
1086	Aug. 26	41 26 00	63 40 45	74	73	36.7	1,910	br. oz. for.
1087	Aug. 26	41 27 00	63 51 30	70	73	36.7	1,880	lt. br. oz.
1088	Aug. 27	41 27 00	64 22 30	67	72	36.7	1,879	lt. br. oz. for.
1089	Aug. 27	41 28 00	64 51 30	68	72	.....	1,696	No specimen.
	1887.	*Off Virginia.*						
1090	Sept. 17	37 37 00	74 11 00	64	70	39.5	352	hrd.
1091	Sept. 18	38 31 00	73 15 00	62	68	41	255	gy. s.
		Off Atlantic coast, South America.						
1092	Dec. 6	9 47 00	55 51 00	85	82	36.5	2,069	br. glob. oz.
1093	Dec. 8	6 25 00	50 29 30	82	80	37.5	2,406	br. glob. oz.
1094	Dec. 9	5 01 00	46 44 00	80	80	.....	1,876	No specimen.
1095	Dec. 11	1 53 00	43 00 00	82	80	.....	2,449	glob. oz.
		Lat. S.						
1096	Dec. 15	4 38 00	35 55 00	78	79	37.9	1,203	co.
1097	Dec. 17	10 10 00	35 32 00	81	79	37.9	1,276	br. co.
1098	Dec. 31	24 40 00	43 45 00	75	75	38.9	889	br. glob. oz.
1099	Dec. 31	25 24 00	44 14 00	75	75	38.9	1,061	Pter. oz.
1100	Dec. 31	25 45 00	44 38 00	78	75	38.9	1,069	br. glob. oz.
1101	Dec. 31	25 51 00	44 48 00	78	75	38.9	1,019	br. glob. oz.
1102	Dec. 31	25 41 00	44 48 00	78	76	38.4	945	br. glob. oz.
1103	Dec. 31	25 42 00	44 58 30	78	76	37.9	777	br. glob. oz.
1104	Dec. 31	26 23 00	45 31 30	77	76	37.9	756	br. glob. oz.
	1888.							
1105	Jan. 2	31 05 00	49 45 00	82	76	.....	78	s. and brk. sh.
1106	Jan. 3	32 51 00	51 48 00	71	71	.....	24	s. and g.
1107	Jan. 3	33 17 00	52 19 00	72	71	.....	11	gy. s.
1108	Jan. 3	33 46 10	52 45 00	72	70	.....	14	gy. s.
1109	Jan. 3	33 55 00	52 53 00	70	70	.....	14	fne. dk. s.
1110	Jan. 3	34 01 00	53 00 00	68	70	.....	11½	fne. dk. s.
1111	Jan. 3	34 09 00	53 08 00	67	70	.....	13	fne. dk. s.
1112	Jan. 12	36 56 00	56 23 00	69	68	.....	12	s. brk. sh.
		Pacific coast, South America.						
		Lat. N.						
1113	Mar. 31	6 44 00	80 27 00	77	77	35.9	1,927	gn. m.
1114	Apr. 1	5 16 00	83 09 00	80	79	36.9	1,729	gn. m.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Pacific coast, South America.						
	1888.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1115	Apr. 1	4 18 00	85 14 00	82	82	35.9	1,882	dk. br. m. and for.
1116	Apr. 2	4 14 00	85 11 00	83	83	35.9	1,657	dk. br. m. and for.
1117	Apr. 2	4 02 00	85 25 30	81	80	35.9	1,724	gy. glob. oz.
1118	Apr. 2	2 53 00	86 24 00	84	83	35.9	1,616	br. glob. oz.
1119	Apr. 3	1 13 00 Lat. S.	88 02 00	80	80	35.9	1,341	br. glob. oz.
1120	Apr. 7	1 08 00	89 39 00	80	78	-------	287	hrd.
1121	Apr. 7	1 23 00	89 58 00	78	80	45.9	280	gy. s. bk. sp.
1122	Apr. 8	1 25 00	90 07 00	80	79	53.9	191	fne. gy. s.
1123	Apr. 13	00 53 00	90 15 30	81	79	58.1	108	wh. s.
1124	Apr. 14	00 53 30	90 05 30	80	78	56.2	130	wh. co. s.
1125	Apr. 14	00 51 00 Lat. N.	89 43 30	79	78	45.6	329	fne. gy. s.
1126	Apr. 17	4 44 00	93 02 00	83	83	35.9	1,976	rd. br. oz.
		Off Central America and Mexico.						
1127	Apr. 19	8 26 00	95 30 00	83	81	35.9	1,997	gn. m.
1128	Apr. 20	11 45 00	97 03 00	84	84	35.9	2,256	gn. m.
1129	Apr. 21	14 33 00	98 14 00	87	75	35.9	1,862	gn. m.
		Off Alaska.						
1130	July 19	52 15 00	156 37 00	51	51	34.9	2,550	br. oz.
1131	July 19	52 12 00	158 20 00	51	49	-------	2,581	Wire carried away.
1132	July 19	52 15 00	160 00 00	50	48	35	2,558	gy. oz. p.
1133	July 20	52 15 00	161 40 30	51	50	-------	2,573	Wire carried away.
1134	July 20	52 17 00	162 48 00	55	51	35.2	2,678	gy. oz.
1135	July 20	52 18 00	163 54 00	54	50	35.2	2,848	gy. oz.
1136	July 20	52 20 00	165 00 00	52	50	35.7	3,820	gy. oz.
1137	July 21	52 20 00	166 05 00	55	50	35.2	2,654	gy. oz.
1138	July 21	52 40 00	166 35 00	52	51	35.2	2,267	gy. oz.
1139	July 21	52 53 00	166 44 00	52	50	35.2	1,961	gy. oz.
1140	July 21	53 05 00	166 49 00	53	50	41.2	169	bk. s.
1141	July 21	53 11 00	166 51 00	52	50	40.6	84	bk. s. p.
1142	July 21	53 17 00	166 54 00	54	50	-------	57	s. bk. sp.
1143	July 21	53 22 00	166 55 30	54	50	42.7	41	s. bk. sp.
1144	July 21	53 23 00	166 56 00	54	50	42.2	28	s. bk. sp.
1145	July 21	53 19 00	166 50 00	51.5	48	41.7	55	bk. s. p.
1146	July 21	53 17 00	166 42 00	51	48	41.2	58	gy. s.
1147	July 21	53 15 00	166 35 00	51	48	41.2	83	bk. s.
1148	July 21	53 13 00	166 27 00	51	49	41.2	174	bk. s.
1149	July 21	53 16 00	166 10 00	51	49	39.5	228	bk. s.
1150	July 22	53 25 00	166 02 30	51	49	41.2	94	crs. bk. s.
1151	July 22	53 27 00	165 46 00	51	49	41.2	113	crs. bk. s. p.
1152	July 22	53 30 00	165 30 00	51	49	39.7	201	gr. m.
1153	July 22	53 37 00	165 18 30	50	48	40.7	99	gy. s. p.
1154	July 22	53 39 00	165 04 00	50	48	41.2	133	fne. gy. s.
1155	July 22	53 42 00	164 46 00	50	49	40.2	103	bk. s.
1156	July 22	53 48 00	164 32 00	50	49	40.2	66	bk. s. g.
1157	July 22	53 43 00	164 38 00	52	49	40.7	111	bk. s. sh.
1158	July 22	53 43 00	164 31 00	52	50	40.7	73	bk. s. fne. g.
1159	July 22	53 39 00	164 34 00	52	50	40.2	185	lt. s.
1160	July 22	53 39 00	164 26 00	52	50	40.1	211	gy. s. bk. sp.
1161	July 22	53 41 30	164 20 00	52	50	40.5	89	bk. s.
1162	July 22	53 43 00	164 13 00	52	50	40.4	68	gy. s. bk. sp. p.
1163	July 22	53 42 30	164 05 00	51	49	40.4	63	gy. s. bk. sp.
1164	July 22	53 42 00	163 57 30	51	49	40.2	95	gr. m.
1165	July 22	53 51 00	163 51 00	51	49	40.2	43	bk. s.
1166	July 22	54 00 00	163 45 00	51	50	41.7	45	fne. gy. s.
1167	July 22	54 09 00	163 41 00	51	50	41.2	45	bk. s. bk. sp.
1168	July 22	54 13 00	164 02 00	51	49	39.2	51	r. fne. g.
1169	July 23	54 16 00	164 23 00	52	49	41.2	56	gy. s. bk. sp.
1170	July 23	54 18 00	164 38 00	52	50	42.2	45	gy. s. bk. sp.
1171	July 23	54 20 00	164 49 00	51	48	43.9	30	g.
1172	July 23	54 22 00	165 00 00	51	48	45.2	42	crs. bk. s. g.
1173	July 23	54 23 00	165 09 00	50	45	42.2	72	crs. bk. s.
1174	July 23	54 25 00	165 19 00	50	45	40.7	80	bk. s.
1175	July 23	54 24 00	165 25 00	50	45	40.2	85	bk. s. g.
1176	July 23	54 22 00	165 34 30	48	44	40.7	78	bk. s. g.
1177	July 23	54 21 00	165 41 00	51	45	41 2	51	bk. s. g.
1178	July 23	54 19 00	165 49 00	51	45	41.2	53	p.
1179	July 28	53 56 00	166 07 00	48	49	44.4	36	bk. s. brk. sh.
1180	July 28	53 56 00	165 48 00	52	46	43.2	51	brk. sh. g.
1181	July 28	53 55 30	165 22 00	51	48	41.2	57	bk. s.
1182	July 28	53 55 00	165 05 30	52	52	43.2	53	bk. s. g.
1183	July 28	54 00 00	164 51 00	51	51	44.2	59	brk. sh. p.
1184	July 28	53 58 00	164 39 00	49	50	41.2	61	gy. s. g.
1185	July 28	53 55 00	164 22 00	50	50	40 2	50	crs. bk. s.
1186	July 29	53 53 00	164 05 00	51	50	41.2	45	gy. s.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off Alaska.						
	1888.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1187	July 29	53 49 00	163 40 00	51	50	39.2	342	bk. s.
1188	July 29	54 00 00	163 37 00	52	51	41.2	62	bk. s.
1189	July 29	54 01 00	163 45 00	52	51	40.2	49	bk. s.
1190	July 29	54 02 00	163 53 30	52	51	41.7	48	bk. s.
1191	July 29	54 04 00	164 01 00	52	51	42.2	46	bk. s.
1192	July 29	54 06 00	164 17 00	53	51	43.2	41	bk. s. g.
1193	July 29	54 08 00	164 25 00	53	51	42.2	52	bk. s.
1194	July 29	54 09 00	164 33 00	52	50	41.2	52	bk. s. g.
1195	July 29	54 10 00	164 42 00	51	50	41.2	49	brk. sh.
1196	July 29	54 11 00	164 48 00	51	50	43.2	52	rky.
1197	July 29	54 15 00	164 41 00	50	51	40.7	71	crs. bk. s.
1198	July 29	54 25 00	164 21 00	52	51	40.6	63	r. bk. s.
1199	July 29	54 22 00	164 01 00	51	49	41.2	55	bk s.
1200	July 29	54 20 00	163 41 00	51	49	40.2	72	bk. s.
1201	July 29	54 18 00	163 21 00	51	50	40.2	44	bk. s. g.
1202	July 29	54 18 00	163 18 00	51	50	42.2	32	rky.
1202a	July 29	54 16 00	163 19 30	51	50	.....	28	No specimen.
1202b	July 29	54 15 00	163 21 00	51	50	.....	25	No specimen.
1203	July 30	54 14 00	163 21 30	51	50	40.2	39	gy. s. bk. sp.
1204	July 30	54 10 00	163 24 00	51	51	42.3	42	gy. s. bk. sp.
1205	July 30	54 09 00	163 14 00	50	50	42.2	44	bk. s. g.
1206	July 30	54 09 00	163 04 00	51	50	42.2	43	g.
1207	July 30	54 09 00	162 58 00	51	50	.....	43	bk. s.
1208	July 30	54 08 00	162 54 00	51	50	42.2	41	gy. s. bk. sp.
1209	July 30	54 03 00	162 43 00	51	50	41.2	51	g.
1210	July 30	53 58 00	162 42 00	51	50	42.2	464	rky.
1211	July 30	54 03 00	162 33 00	51	50	39.2	285	rky.
1212	July 30	54 08 00	162 22 00	51	50	40.2	90	crs. s. p.
1213	July 30	54 12 00	162 17 00	51	50	42.2	47	bk. s. fne. g.
1214	July 30	54 09 00	162 10 00	51	51	40.2	67	rky.
1215	July 30	54 12 00	162 02 00	51	50	41.2	51	rky. fne. g.
1216	July 30	54 16 00	161 53 00	51	50	42.2	37	rky.
1217	July 30	54 20 00	161 46 00	51	50	40.7	38	p.
1218	July 30	54 26 00	161 45 00	52	50	39.8	80	gr. m.
1219	July 30	54 31 00	161 44 00	52	50	40.2	82	gr. m.
1220	July 30	54 34 00	161 48 00	52	50	41.2	58	rky.
1221	July 30	54 27 00	161 53 00	51	49	40.2	81	gr. m.
1222	July 30	54 32 00	161 39 00	51	49	40.2	81	rky.
1223	July 30	54 37 00	161 27 00	51	49	41.7	59	bk. s.
1224	July 31	54 42 00	161 13 00	51	49	42.2	64	bk. s.
1225	July 31	54 47 00	161 09 00	51	49	42.2	47	bk. s. g.
1226	July 31	54 51 00	160 47 00	51	49	.....	45	gy. s. p.
1227	July 31	54 56 00	160 33 00	51	50	41.8	52	gy. s.
1228	July 31	54 59 00	160 26 00	51	51	41.7	60	gy. s.
1229	Aug. 2	55 08 00	160 05 00	51	49	40.9	18	fne. gy. s.
1230	Aug. 3	55 04 00	160 26 00	58	51	45.7	34	brk. sh.
1231	Aug. 3	55 05 00	160 42 00	54	51	44.2	38	rky.
1232	Aug. 3	55 00 00	160 56 00	53	52	40.2	71	dk. m.
1233	Aug. 3	54 52 00	161 17 00	54	51	41.7	74	dk. m.
1234	Aug. 3	54 47 00	161 26 00	54	51	43.2	41	rky.
1235	Aug. 3	54 44 00	161 27 00	52	51	.....	45	rky.
1236	Aug. 3	54 38 00	161 39 00	52	51	43.2	49	bk. s. g.
1237	Aug. 3	54 32 00	161 53 00	52	51	41.2	75	bk. s.
1238	Aug. 3	54 25 00	162 05 00	52	51	40.2	63	bk. s.
1239	Aug. 3	54 23 00	161 56 00	51	51	43.5	34	p.
1240	Aug. 3	54 20 00	162 02 00	51	50	43	30	sh.
1241	Aug. 3	54 16 00	162 08 00	52	50	42.2	40	brk. sh. g.
1242	Aug. 3	54 07 00	162 07 00	51	50	38.2	435	dk. m.
1243	Aug. 3	54 10 00	161 54 00	52	50	39.7	52	rky.
1244	Aug. 3	54 13 00	161 47 00	52	51	40.2	50	bk. s. p.
1245	Aug. 3	54 17 00	161 40 00	52	51	41.7	44	crs. s.
1246	Aug. 3	54 18 00	161 34 00	52	51	42.2	42	s. r.
1247	Aug. 4	54 22 00	161 22 00	52	51	41.2	61	r. g.
1248	Aug. 4	54 27 00	161 08 00	52	50	41.2	59	bk. s.
1249	Aug. 4	54 31 00	160 54 00	52	50	40.2	71	bk. s.
1250	Aug. 4	54 35 00	160 41 00	52	51	40.2	72	bu. m.
1251	Aug. 4	54 39 00	160 28 00	52	50	40.4	62	gy. s. p.
1252	Aug. 4	54 43 00	160 14 00	53	51	40.6	50	fne. gy. s.
1253	Aug. 4	54 47 00	160 00 00	53	51	42.2	43	gy. s. bk. sp.
1254	Aug. 4	54 49 00	159 54 00	53	51	43.7	40	fne. gy. s.
1255	Aug. 4	54 57 00	159 55 00	51	50	48.3	25	gy. s.
1256	Aug. 4	55 00 00	159 54 00	51	50	45.2	27	rky.
1257	Aug. 4	54 59 00	159 45 00	51	50	45.2	26	bk. s. p.
1258	Aug. 4	55 02 00	159 41 00	53	50	44.7	37	gy. s. brk. sh.
1259	Aug. 4	55 06 00	159 39 00	53	48	44.2	57	s. brk. sh.
1260	Aug. 4	55 10 00	159 40 00	53	48	44.2	39	s. brk. sh.
1261	Aug. 4	55 15 00	159 28 00	53	48	42.0	23	r. c.
1262	Aug. 5	55 03 00	159 15 00	51	49	45.7	27	brk. sh.
1263	Aug. 5	55 01 00	159 08 00	51	49	43.2	44	g.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off Alaska.						
	1888.	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	*Fms.*	
1264	Aug. 5	54 59 00	159 00 00	51	49	42.2	48	gy. s.
1265	Aug. 5	54 57 00	158 52 00	51	49	42.2	43	gy. s. g.
1266	Aug. 5	54 55 00	158 46 00	51	49	42.2	46	gy. s. brk. sh.
1267	Aug. 5	54 53 00	158 38 00	52	51	40.2	70	gy. s.
1268	Aug. 5	54 49 00	158 42 00	51	51	40.9	56	gy. s. p.
1269	Aug. 5	54 51 00	158 49 00	51	51	42.2	46	gy. s. brk. sh.
1270	Aug. 5	54 52 00	158 54 00	51	51	.....	45	rky.
1271	Aug. 5	54 53 00	158 57 00	51	51	42.7	41	s. r.
1272	Aug. 5	54 54 00	159 01 00	51	52	.....	45	rky.
1273	Aug. 5	54 55 00	159 05 00	52	52	43.2	35	rky.
1274	Aug. 5	54 52 00	159 07 00	52	52	.....	38	gy. s. p. brk. sh.
1275	Aug. 5	54 50 00	159 08 30	52	52	44.2	35	rky.
1276	Aug. 5	54 49 00	159 05 00	52	52	.....	57	rky.
1277	Aug. 5	54 48 00	159 01 00	52	52	43.2	44	sh. fne. g.
1278	Aug. 5	54 47 00	158 55 00	54	51	42.2	47	r. sh.
1279	Aug. 5	54 46 00	158 53 00	54	51	42.5	49	r.
1280	Aug. 5	54 44 00	158 44 00	54	51	41.7	55	rky.
1281	Aug. 5	54 35 00	158 51 00	54	51	40.7	99	bu. m. p.
1282	Aug. 5	54 37 00	158 58 00	54	51	40.2	69	gy. s. p.
1283	Aug. 5	54 38 00	159 02 00	53	51	41.3	56	gy. s. p.
1284	Aug. 5	54 39 00	159 09 00	53	51	42.5	46	p.
1285	Aug. 5	54 41 00	159 16 00	53	51	43.2	41	gy. s. sh.
1286	Aug. 5	54 42 00	159 24 00	51	49	44.2	35	rky.
1287	Aug. 5	54 41 00	159 29 30	51	49	44.2	35	rky.
1288	Aug. 5	54 37 00	159 25 00	51	49	.....	43	rky.
1289	Aug. 5	54 32 00	159 17 00	51	51	.....	115	rky.
1290	Aug. 5	54 25 00	159 40 00	50	50	41.2	105	bk. s.
1291	Aug. 6	54 36 00	159 39 00	50	51	42.4	49	bk. s.
1292	Aug. 6	54 41 00	159 39 00	50	51	43.0	42	p.
1293	Aug. 6	54 42 00	159 47 00	50	51	43.2	44	r.
1294	Aug. 6	54 37 00	159 52 00	50	51	42.2	49	r. gy. s.
1295	Aug. 6	54 28 00	160 00 00	50	51	40.6	67	p.
1296	Aug. 6	54 25 00	160 03 00	50	51	41.2	119	fne. gy. s.
1297	Aug. 6	54 39 00	158 43 00	58	51	41.2	52	rky.
1298	Aug. 6	54 40 00	158 35 00	55	51	40.7	57	rky.
1299	Aug. 6	54 41 00	158 25 00	54	53	41.2	86	p.
1300	Aug. 6	54 46 00	158 22 00	54	53	41.2	110	gy. s.
1301	Aug. 6	54 50 00	158 30 00	54	53	41.2	87	gy. s.
1302	Aug. 6	54 56 00	158 30 00	56	53	40.4	90	g.
1303	Aug. 6	55 01 00	158 30 00	53	53	40.6	114	gr. m.
1304	Aug. 6	55 03 00	158 38 00	53	52	39.9	87	g.
1305	Aug. 6	55 04 00	158 48 00	53	52	40.4	79	gy. s.
1306	Aug. 6	55 07 00	158 55 00	51	50	41.5	50	gy. s.
1307	Aug. 6	55 09 00	159 03 00	51	50	41.9	47	gy. s. p.
1308	Aug. 6	55 11 00	159 11 00	52	51	43.2	53	gy. s.
1309	Aug. 6	55 13 00	159 18 00	51	51	42.2	58	gy. s.
1310	Aug. 6	55 17 00	159 19 00	51	51	40.4	102	bu. m.
1311	Aug. 6	55 18 00	159 02 00	51	51	40.2	103	bm. m.
1312	Aug. 7	55 20 00	158 45 00	51	51	41.2	97	gy. s.
1313	Aug. 7	55 21 00	158 29 00	50	52	40.2	80	gy. s.
1314	Aug. 7	55 22 00	158 12 00	50	52	.....	68	m.
1315	Aug. 7	55 23 00	157 55 00	50	50	42.1	50	g. brk. sh.
1316	Aug. 7	55 25 00	157 37 00	51	50	42.0	46	yl. s.
1317	Aug. 7	55 28 00	157 28 00	51	50	42.1	47	gn. m.
1318	Aug. 7	55 30 00	157 44 00	50	50	41.9	53	gy. s. g.
1319	Aug. 7	55 34 00	158 00 00	51	51	40.1	78	fne. gy. s.
1320	Aug. 7	55 39 00	158 14 00	51	51	42.1	78	m. fne. gy. s.
1321	Aug. 7	55 47 00	158 27 00	51	51	41.9	64	fne. gy. s.
1322	Aug. 7	55 54 00	158 40 00	53	51	43.1	68	bu. m.
1323	Aug. 7	55 57 00	158 47 00	53	52	42.1	82	bu. m.
1324	Aug. 8	55 52 00	158 29 00	52	50	42.1	67	fne. gy. s.
1325	Aug. 8	55 49 00	158 12 00	53	51	43.3	44	sh. g.
1326	Aug. 8	55 47 00	157 55 00	53	51	44.3	57	gy. s.
1327	Aug. 8	55 45 00	157 39 00	54	53	41.3	67	fne. bk. s.
1328	Aug. 8	55 44 00	157 30 00	54	53	41.5	59	br. s.
1329	Aug. 8	55 42 00	157 24 00	54	53	.....	54	rky.
1330	Aug. 8	55 41 00	157 24 00	54	53	.....	49	br. s. g.
1331	Aug. 8	55 40 00	157 10 00	56	52	43.9	48	bk. s. g.
1332	Aug. 8	55 39 00	157 07 00	56	52	45.1	47	crs. gy. s.
1333	Aug. 8	55 37 00	156 57 00	54	51	42.9	50	gy. s.
1334	Aug. 8	55 36 00	156 47 00	53	52	41.7	55	fne. gy. s.
1335	Aug. 8	55 34 00	156 30 00	53	52	41.1	135	gn. m.
1336	Aug. 8	55 44 00	156 19 00	54	52	41.1	137	bu. m.
1337	Aug. 8	55 53 00	156 06 00	54	52	41.3	119	bu. m.
1338	Aug. 9	55 46 00	155 55 00	53	50	41.1	89	p.
1339	Aug. 9	55 39 00	155 44 00	52	50	42.6	60	rky.
1340	Aug. 9	55 32 00	155 32 00	52	50	42.1	90	gy. sp.
1341	Aug. 9	55 39 00	155 27 00	52	50	40.1	57	gy. s.
1342	Aug. 9	55 47 00	155 22 00	52	50	48.2	26	gy. s.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off Alaska.						
	1888.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1343	Aug. 9	55 49 00	155 20 00	52	50	48.0	27	gy. s. brk. sp.
1344	Aug. 9	55 44 00	155 14 00	50	48	41.9	76	gy. s.
1345	Aug. 9	55 39 00	155 09 00	50	48	38.9	287	gy. s.
1346	Aug. 9	55 47 00	155 00 00	52	52	41.6	89	gy. s.
1347	Aug. 9	55 55 00	154 51 00	55	54	41.3	81	fne. br. s.
1348	Aug. 9	55 59 00	154 47 00	58	54	42.5	76	fne. gy. s.
1349	Aug. 9	56 04 00	154 44 00	58	54	41.5	80	fne. gy. s.
1350	Aug. 9	56 07 00	154 38 00	58	54	42.5	37	gy. s.
1351	Aug. 9	56 05 00	154 33 00	55	55	41.6	61	fne. gy. s.
1352	Aug. 9	56 03 00	154 25 00	55	55	41.6	66	gy. s. p. co.
1353	Aug. 9	56 09 00	154 15 00	55	53	41.9	75	bk. s.
1354	Aug. 9	56 18 00	154 10 00	54	53	43.1	54	gy. s. bk. sp.
1355	Aug. 9	56 28 00	154 05 00	53	50	48.2	28	gy. s.
1356	Aug. 9	56 27 00	153 55 00	53	52	48	23	brk. sh.
1357	Aug. 9	56 24 00	153 47 00	53	52	43.1	52	bn. s.
1358	Aug. 9	56 18 00	153 33 00	53	52	43.2	46	g.
1359	Aug. 9	56 15 00	153 25 00	54	53	41.4	52	gy. s. p.
1360	Aug. 9	56 12 00	153 18 00	54	53	41.5	88	fne. gy. s.
1361	Aug. 9	56 23 00	153 24 00	54	52	44.5	36	sh.
1362	Aug. 10	56 28 00	153 26 00	53	51	44.1	45	gy. s. sh.
1363	Aug. 10	56 34 00	153 29 00	52	51	41.1	73	bu. m.
1364	Aug. 10	56 35 00	153 19 00	54	53	42.1	53	gy. s. c.
1365	Aug. 10	56 36 00	153 10 00	54	51	42.6	58	bu. m.
1366	Aug. 10	56 37 00	153 00 00	53	51	42.1	49	bu. m.
1367	Aug. 10	56 39 00	152 50 00	53	51	42.1	44	rky.
1368	Aug. 10	56 40 00	152 40 00	53	51	42.6	51	gy. s.
1369	Aug. 10	56 41 00	152 30 00	53	51	42.1	49	rky.
1370	Aug. 10	56 42 00	152 21 00	54	52	43.3	37	s. p.
1371	Aug. 10	56 46 00	152 35 00	66	54	41 9	61	s. p.
1372	Aug. 10	56 51 00	152 50 00	66	54	44.7	37	gy. s. brk. sh.
1373	Aug. 10	56 58 00	153 10 00	57	55	47.3	18	brk. sh.
1374	Aug. 10	57 04 00	153 18 00	57	55	43.2	68	bk. m.
1375	Aug. 10	57 07 00	153 18 00	57	55	44.1	57	br. m.
1376	Aug. 12	56 55 00	153 19 00	54	53	43.8	71	fne. gy. s.
1377	Aug. 12	56 51 00	153 13 00	54	55	39.9	111	gn. m.
1378	Aug. 12	56 43 00	153 00 00	53	54	40.9	60	rky.
1379	Aug. 12	56 35 00	152 48 00	53	54	41.9	46	s. p.
1380	Aug. 12	56 28 00	152 36 00	52	53	42.6	38	p.
1381	Aug. 12	56 20 00	152 23 00	52	54	39.1	347	gn. m.
1382	Aug. 12	56 29 00	152 11 00	52	54	40.1	173	gy. s.
1383	Aug. 13	56 38 00	151 59 00	53	54	44.6	28	rky.
1384	Aug. 13	56 35 00	151 50 00	53	54	42.1	60	gy. s. r.
1385	Aug. 13	56 33 00	151 42 00	53	54	39.6	298	gy. s.
1386	Aug. 13	56 42 00	151 29 00	53	54	39.1	485	rky.
1387	Aug. 13	56 49 00	151 42 00	53	54	42.9	58	gy. s.
1388	Aug. 13	56 56 00	151 56 00	53	53	44.8	49	gy. s.
1389	Aug. 13	57 03 00	152 10 00	53	52	43.9	44	rky.
1390	Aug. 13	57 10 00	152 23 00	54	52	41.4	86	fne. gy. s.
1391	Aug. 13	57 12 00	152 27 00	55	53	44.4	53	fne. gy. s.
1392	Aug. 13	57 16 00	152 22 00	55	50	45.3	39	bn. s. g.
1393	Aug. 13	57 20 00	152 15 00	57	52	47.5	25	rky.
1394	Aug. 13	57 17 00	152 07 00	52	49	44.6	45	brk. sh.
1395	Aug. 13	57 11 00	151 52 00	52	49	45.1	43	gy. s. brk. sh.
1396	Aug. 13	57 05 00	151 37 00	52	53	45.1	46	co.
1397	Aug. 13	57 00 00	151 23 00	56	53	41.4	90	gy. s.
1398	Aug. 13	57 11 00	151 05 00	55	53	41.8	75	gy. s.
1399	Aug. 13	57 18 00	151 19 00	53	53	43.4	71	g.
1400	Aug. 13	57 24 00	151 33 00	52	50	45.5	39	rky.
1401	Aug. 13	57 30 00	151 46 00	52	50	44.9	57	rky.
1402	Aug. 13	57 35 00	151 52 00	52	50	42.9	81	rky.
1403	Aug. 21	57 43 00	152 14 00	60	54	46.5	69	bu. m.
1404	Aug. 21	57 42 00	152 09 00	60	54		17	rky.
1405	Aug. 21	57 46 00	152 01 00	57	53	48.5	28	sh.
1406	Aug. 21	57 49 00	151 53 00	57	53	44.6	56	gy. s. brk. sh.
1407	Aug. 21	57 52 00	151 47 00	56	55	45.1	47	gy. s.
1408	Aug. 21	57 49 00	151 39 00	56	55	47.3	30	g. sh.
1409	Aug. 21	57 46 00	151 32 00	62	55	48.8	33	g. sh.
1410	Aug. 21	57 43 00	151 25 00	56	52	48.1	35	crs. gy. s. brk. sh.
1411	Aug. 21	57 39 00	151 18 00	56	52	47.3	38	sh. co.
1412	Aug. 21	57 36 00	151 11 00	55	52	46	42	sh.
1413	Aug. 21	57 29 00	150 56 00	54	53	44.3	48	gy. s. sh.
1414	Aug. 21	57 23 00	150 41 00	55	55	42.7	57	gy. s.
1415	Aug. 22	57 19 00	150 35 00	55	56	41.6	72	gy. s. p.
1416	Aug. 22	57 26 00	150 06 00	56	57	39.6	200	gy. s. bk. sp.
1417	Aug. 22	57 32 00	150 18 00	56	56	42.6	59	gy. s. g.
1418	Aug. 22	57 39 00	150 33 00	54	52	45.1	51	s. brk. sh.
1419	Aug. 22	57 44 00	150 46 00	55	53	46.8	43	s. brk. sh.
1420	Aug. 22	57 51 00	151 00 00	58	53	46.5	40	s. g.
1421	Aug. 22	57 57 00	151 08 00	55	54	46.5	36	brk. s. g.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off Alaska.						
	1888.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1422	Aug. 22	58 03 00	151 26 00	55	54	44.1	78	fne. gy. s.
1423	Aug. 22	58 14 00	151 23 00	59	56	44.1	41	g.
1424	Aug. 22	58 20 00	151 11 00	59	53	43.6	60	gy. s. g.
1425	Aug. 22	58 12 00	151 01 00	63	53	44.1	56	gy. s. brk. sh.
1426	Aug. 22	57 58 00	150 32 00	59	56	41.3	102	gy. s.
1427	Aug. 22	57 52 00	150 16 00	56	55	41.1	114	gy. s. bk. sp.
1428	Aug. 22	57 47 00	150 00 00	54	55	41.3	113	gy. s. bk. sp.
1429	Aug. 23	57 41 00	149 44 00	55	56	41.1	140	gy. s. bk. sp.
1430	Aug. 23	57 47 00	149 31 00	55	56	41.6	119	gy. s. bk. sp.
1431	Aug. 23	57 53 00	149 19 00	55	56	41.1	166	gy. s. bk. sp.
1432	Aug. 28	57 59 00	149 33 00	54	56	41.5	112	gy. s.
1433	Aug. 23	58 05 00	149 48 00	59	55	41.3	128	gy. s.
1434	Aug. 23	58 11 00	150 03 00	63	56	44.1	69	gy. s. p.
1435	Aug. 23	58 17 00	150 17 00	64	56	49.1	37	brk. sh. g.
1436	Aug. 23	58 23 00	150 32 00	58	53	48.5	37	brk. sh.
1437	Aug. 23	58 29 00	150 48 00	58	54	44.1	50	s. p. brk. sh.
1438	Aug. 23	58 35 00	151 03 00	57	54	41.1	99	gy. s.
1439	Aug. 23	58 40 00	151 16 00	56	54	41.1	99	rky.
1440	Aug. 23	58 50 00	151 07 00	56	54	41.6	76	gy. s.
1441	Aug. 23	58 57 00	151 00 00	56	54	41.2	97	gy. m.
1442	Aug. 23	58 51 00	150 47 00	55	56	41.2	84	gy. s.
1443	Aug. 23	58 46 00	150 33 00	55	55	41.3	105	brk. sh. p.
1444	Aug. 23	58 40 00	150 17 00	55	54	41.1	69	gy. s. brk. sh.
1445	Aug. 23	58 33 00	150 03 00	55	54	41.1	67	gy. s. p.
1446	Aug. 23	58 27 00	149 47 00	55	54	40.9	84	bk. s.
1447	Aug. 24	58 21 00	149 33 00	56	56	41.3	90	gy. s.
1448	Aug. 24	58 14 00	149 17 00	56	56	41.2	85	gy. s.
1449	Aug. 24	58 08 00	149 04 00	56	56	41.7	77	gy s. p.
1450	Aug. 24	58 01 00	148 49 00	56	56	41.6	98	gy. s.
1451	Aug. 24	57 54 00	148 34 00	57	56	38.1	507	bu. m.
1452	Aug. 24	58 00 00	148 20 00	60	59	37.6	594	bk. s. g.
1453	Aug. 24	58 10 00	148 20 00	62	59	37	701	bu. m.
1454	Aug. 24	58 24 00	148 46 00	60	59	41.7	71	gy. s.
1455	Aug. 24	58 31 00	148 57 00	58	57	41.8	66	gy. s. g. sh.
1456	Aug. 24	58 39 00	149 08 00	58	57	42.1	72	gy. s.
1457	Aug. 24	58 46 00	149 17 00	57	56	41.6	103	bu. m.
1458	Aug. 24	58 53 00	149 30 00	57	57	41.6	122	gy. m.
1459	Aug. 24	58 44 00	149 02 00	57	56	.....	118	gy. s.
1460	Aug. 24	58 37 00	148 45 00	57	56	41.8	99	gy. s.
1461	Aug. 24	58 30 00	148 29 00	57	57	41.5	106	g. s.
1462	Aug. 25	58 23 00	148 07 00	57	57	36	902	bu. m.
1463	Aug. 25	58 32 00	148 07 00	57	58	39.1	358	bu. m.
1464	Aug. 25	58 41 00	148 07 00	57	58	40.9	151	gy. s.
1465	Aug. 25	58 37 00	147 50 00	57	58	.....	301	s. g.
1466	Aug. 25	58 45 00	147 50 00	62	59	38	537	bu. m.
1467	Aug. 25	58 54 00	147 50 00	63	57	41.8	87	sh.
1468	Aug. 25	59 02 00	147 50 00	64	56	41.7	101	m. g.
1469	Aug. 25	59 05 00	147 33 00	62	56	39.2	308	s. r.
1470	Aug. 25	59 10 00	147 17 00	61	57	40.1	252	rky.
1471	Aug. 25	59 15 00	147 00 00	59	53	41.1	109	bu. m.
1472	Aug. 25	59 20 00	146 42 00	57	53	42.6	92	bu. m.
1473	Aug. 25	59 21 00	146 26 00	59	53	44.8	45	rky.
1474	Aug. 25	59 24 00	146 19 00	58	53	51.8	11	rky.
1475	Aug. 26	59 20 00	146 23 00	61	53	49.8	15	g. p.
1476	Aug. 26	59 12 00	146 20 00	58	53	.....	22	No specimen.
1477	Aug. 26	59 09 00	146 13 00	58	53	41.2	141	p.
1478	Aug. 26	59 03 00	145 56 00	61	57	37	620	bu. m.
1479	Aug. 26	58 51 00	145 25 00	59	56	35	2,425	m.
1480	Aug. 27	59 01 00	144 22 00	59	59	35	2,220	gy. oz.
1481	Aug. 27	59 08 00	143 30 00	60	59	35	2,138	gy. oz.
1482	Aug. 27	59 12 00	143 00 00	63	59	35.1	1,528	gy. oz.
1483	Aug. 27	59 00 00	142 37 00	65	60	35	1,764	gy. oz.
1484	Aug. 27	58 54 00	142 33 00	64	60	35	1,745	br. and gy. oz.
1485	Aug. 27	58 56 00	142 18 00	62	60	35	1,675	br. and gy. oz.
1486	Aug. 27	58 58 00	141 59 00	60	59	35	1,500	gy. oz.
1487	Aug. 27	58 51 00	141 46 00	60	60	35.1	1,548	gy. oz.
1488	Aug. 28	58 17 00	140 35 00	60	60	35	1,815	gy. oz.
1489	Aug. 28	57 45 00	139 25 00	56	58	.....	1,778	br. and gy. oz.
1490	Aug. 29	56 35 00	137 55 00	57	57	.....	1,433	No specimen.
		Off British Columbia.						
1491	Aug. 30	54 02 00	134 34 00	57	57	35.3	1,571	br. and gy. oz.
1492	Aug. 30	52 32 00	133 05 00	67	60	35.1	1,601	gy. oz.
1493	Aug. 31	51 34 00	131 25 00	59	59	35.9	1,099	gn. m.
1494	Aug. 31	51 09 00	129 07 00	69	60	44.2	83	bn. m.
1495	Aug. 31	51 01 00	128 25 00	61	55	46.5	52	gy. s.
1496	Sept. 1	50 56 00	128 09 00	56	56	.....	22	No specimen.
1497	Sept. 1	50 55 00	128 04 30	56	56	.....	16	No specimen.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1888.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1498	Sept. 19	48 20 00	124 58 00	54	52	44.2	82	rky.
1499	Sept. 19	48 18 00	125 05 30	54	52	44.2	106	bk. s.
1500	Sept. 19	48 16 00	125 12 30	57	52	43.7	108	r.
1501	Sept. 19	48 14 00	125 19 30	57	57	.....	55	yl. s.
1502	Sept. 19	48 12 00	125 26 30	57	57	45.7	70	bk. s.
1503	Sept. 19	48 10 00	125 33 30	59	60	45.2	86	bk. s.
1504	Sept. 19	48 08 00	125 40 30	59	61	44.8	105	bk. s.
1505	Sept. 19	48 06 00	125 47 30	59	61	38.2	586	gn. m.
1506	Sept. 19	48 04 00	125 54 30	59	59	38.6	505	gn. m.
1507	Sept. 19	48 03 00	126 01 30	60	59	38	092	gn. m.
1508	Sept. 19	48 01 00	126 09 00	62	60	37.2	768	br. m.
1509	Sept. 19	47 59 00	126 15 00	62	60	36.7	856	br. m.
1510	Sept. 19	47 57 00	126 22 30	62	60	36.7	816	br. m.
1511	Sept. 19	47 55 00	126 29 00	61	59	.....	1,239	br. m.
1512	Sept. 20	48 07 00	125 03 00	57	58	44.7	80	gn. m.
1513	Sept. 20	48 07 00	125 00 30	58	58	.....	178	fne. gy. s.
1514	Sept 20	48 05 00	125 08 00	58	58	44.7	77	gy. s. and p.
1515	Sept. 20	48 03 00	125 15 00	59	57	44.7	82	p.
1516	Sept. 20	48 01 00	125 22 00	59	59	42.7	218	bu. m. and g.
1517	Sept. 21	47 59 00	125 29 00	59	59	44.7	90	s. and g.
1518	Sept. 21	47 58 00	125 35 00	58	57	43.2	141	s. and g.
1519	Sept. 21	47 56 00	125 42 30	59	59	39.7	378	gn. m.
1520	Sept. 21	47 52 00	125 35 00	59	58	40.2	274	g.
1521	Sept. 21	47 49 00	125 28 00	58	58	39.7	402	yl. oz.
1522	Sept. 21	47 46 00	125 20 30	58	58	39.1	522	yl. oz.
1523	Sept. 21	47 47 00	125 14 00	60	58	40.1	378	yl. oz.
1524	Sept. 21	47 48 00	125 07 00	60	58	42.9	206	gy. oz.
1525	Sept. 21	47 49 00	124 59 00	60	58	45.1	67	No specimen.
1526	Sept. 21	47 51 00	124 52 00	63	58	46.5	52	gy. s and p.
1527	Sept. 21	47 48 00	124 43 00	61	58	48.1	30	gy. s.
1528	Sept. 21	47 43 00	124 41 00	61	59	48.1	33	fne. gy. s.
1529	Sept. 21	47 38 00	124 46 00	63	58	49.1	53	bk. s.
1530	Sept. 21	47 35 00	124 53 00	63	58	45.7	75	fne. gy. s.
1531	Sept. 21	47 33 00	125 01 00	63	58	44.9	111	fne. bk. s.
1532	Sept. 21	47 32 00	125 08 00	63	58	41.1	287	bu. m.
1533	Sept. 21	47 27 00	125 06 00	60	59	39.2	535	bu. m.
1534	Sept. 21	47 22 00	125 03 30	60	59	37.1	758	gy. oz.
1535	Sept. 21	47 17 00	125 01 30	59	59	38.3	578	gy. oz.
1536	Sept. 21	47 18 00	124 54 00	58	58	40.1	386	No specimen.
1537	Sept. 22	47 19 00	124 47 00	58	58	44.9	82	bu. m.
1538	Sept. 22	47 21 00	124 39 30	57	57	45.9	51	fne. bk. s.
1539	Sept. 22	47 22 00	124 32 00	57	57	46.9	28	g. and p.
1540	Sept. 22	47 17 00	124 30 00	57	57	47.6	28	gy. s.
1541	Sept. 22	47 12 00	124 28 00	57	57	46.9	28	p.
1542	Sept. 22	47 07 00	124 26 00	56	57	48.1	28	gy. s.
1543	Sept. 22	47 05 00	124 32 30	56	57	46.6	41	bk. s.
1544	Sept. 22	47 04 00	124 39 30	56	57	46	56	bk. s.
1545	Sept. 22	47 02 00	124 47 00	56	57	45.9	74	bk. s. p.
1546	Sept. 22	47 00 00	124 53 30	54	56	44.9	93	gn. m.
1547	Sept. 22	46 58 00	125 00 30	54	56	39.7	438	gn. m.
1548	Sept. 22	46 53 00	124 57 00	56	58	39.4	450	gn. m.
1549	Sept. 22	46 54 00	124 50 00	56	58	.....	91	No specimen.
1550	Sept. 22	46 56 00	124 43 00	57	59	.....	78	g. s.
1551	Sept. 22	46 51 00	124 41 00	57	59	46	76	g. m.
1552	Sept. 22	46 50 00	124 48 00	57	60	46	87	rky.
1553	Sept. 22	46 48 00	124 55 00	57	59	.....	250	rky.
1554	Sept. 22	46 43 00	124 52 00	58	60	44.9	181	rky.
1555	Sept. 22	46 45 00	124 44 00	58	60	46	80	gy. s.
1556	Sept. 22	46 47 00	124 37 00	60	60	46.1	64	rky.
1557	Sept. 22	46 49 00	124 30 00	60	59	47	42	rky.
1558	Sept. 22	46 51 00	124 22 30	60	59	48.1	33	gy. and bk. s.
1559	Sept. 22	46 54 00	124 15 00	60	59	57.8	18	gy. s.
1560	Sept. 22	46 54 00	124 22 30	57	59	48.3	35	fne. gy. s.
1561	Sept. 22	46 54 00	124 30 00	58	59	47	48	fne. gy. s.
1562	Sept. 22	46 51 00	124 35 00	57	59	46.4	58	fne. gy. s.
1563	Sept. 22	46 55 00	124 39 00	57	59	55.8	64	fne. gy. s.
1564	Sept. 22	46 52 00	124 45 00	57	53	46	78	fne. bk. s.
1565	Sept. 22	46 47 00	124 43 00	58	60	45.5	81	gy. s.
1566	Sept. 22	46 36 00	124 39 00	58	60	46	132	rky.
1567	Sept. 22	46 53 00	124 32 00	58	60	45.4	72	gy. m.
1568	Sept. 22	46 40 00	124 25 00	58	59	46	50	gy. s.
1569	Sept. 23	46 41 00	124 18 00	57	58	46.7	37	gy. s.
1570	Sept. 23	46 37 00	124 17 30	57	58	46.1	37	hrd. s.
1571	Sept. 23	46 35 00	124 24 30	58	58	.....	51	hrd. s.
1572	Sept. 23	46 33 00	124 31 00	58	58	45.1	82	hrd. s.
1573	Sept. 23	46 31 00	124 38 00	58	58	39.2	433	No specimen.
1574	Sept. 25	48 34 00	124 53 00	55	51	45.8	65	gn. m.
1575	Sept. 29	48 27 00	125 09 00	54	53	45.2	60	s. r.
1576	Oct. 10	48 16 00	123 40 00	52	49	45.2	101	s. g.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1888.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1577	Oct. 11	46 34 00	124 12 30	60	57	52.9	20	gy. s.
1578	Oct. 11	46 33 00	124 19 00	61	58	47	38	fne. gy. s.
1579	Oct. 11	46 32 00	124 26 00	61	58	47	51	fne. gy. s.
1580	Oct. 11	46 31 00	124 33 00	61	58	45	153	gr. m.
1581	Oct. 11	46 30 00	124 39 30	61	58	39.6	432	br. oz.
1582	Oct. 11	46 28 00	124 33 00	61	58	44.8	98	fne. gy. s.
1583	Oct. 11	46 27 00	124 26 00	61	58	47	55	bk. s.
1584	Oct. 11	46 25 00	124 20 00	60	58	47.9	40	bu. m.
1585	Oct. 11	46 23 00	124 27 00	60	58	47	59	fne. br. s.
1586	Oct. 11	46 22 00	124 34 00	58	59	46.5	78	fne. gy. s.
1587	Oct. 11	46 21 00	124 41 00	58	59	42.5	260	bu. m.
1588	Oct. 13	46 03 00	124 22 00	57	57	45.1	73	fne. gy. s.
1589	Oct. 13	46 02 00	124 29 00	57	57	45.8	82	fne. gy. s.
1590	Oct. 13	46 00 00	124 36 00	58	56	46	96	br. s.
1591	Oct. 13	45 58 00	124 42 30	58	56	43.8	199	gy. oz.
1592	Oct. 13	46 03 00	124 45 00	60	61	44.2	174	gy. oz.
1593	Oct. 13	46 07 00	124 48 00	62	62	38.8	601	br. oz.
1594	Oct. 13	46 08 00	124 39 00	64	60	45.9	102	bk. s.
1595	Oct. 13	46 08 00	124 31 00	64	60	46.1	78	fne. gy. s.
1596	Oct. 13	46 17 00	124 21 30	62	60	46.6	81	bu. m.
1597	Oct. 13	46 16 00	124 28 30	58	57	43.1	231	bu. m.
1598	Oct. 13	46 15 00	124 36 00	57	57	39.8	421	br. oz.
1599	Oct. 13	46 14 00	124 42 30	57	56	39.6	475	gy. oz.
1600	Oct. 13	46 13 00	124 50 00	56	56	39.3	506	br. oz.
1601	Oct. 19	44 04 00	124 53 00	57	57	47.1	56	m.
1602	Oct. 19	44 02 00	124 55 00	57	57	47.6	51	crs. bk. s.
1603	Oct. 19	43 59 00	125 02 00	60	58	46.2	91	bk. s. g.
1604	Oct. 19	43 59 00	125 05 00	60	58	38.7	563	gy. m.
1605	Oct 19	43 54 00	125 05 00	60	59	40.3	355	bk. s.
1606	Oct. 19	43 50 00	125 01 30	60	59	42.1	299	gy. c.
	1889.							
1607	Jan. 5	34 00 00	120 30 00	64	59	46.8	226	gy. s.
1608	Jan. 8	34 25 30	120 20 30	------	------	------	21	gy. s. m. brk. sh.
1609	Jan. 15	32 36 30	117 20 30	57	59	53	97	yl. m.
1610	Jan. 15	32 36 00	117 26 00	57	59	43	324	yl. m.
1611	Jan. 15	32 35 30	117 32 00	56	59	38.7	600	br. oz.
1612	Jan. 15	32 34 30	117 43 30	56	59	44.5	266	rky.
1613	Jan. 15	32 33 30	117 55 00	55	58	46	211	rky.
1614	Jan. 15	32 32 00	118 07 00	57	58	37	1,047	gy. m.
1615	Jan. 16	32 31 00	118 18 30	55	59	37.8	770	fne. s. bk. sp.
1616	Jan. 16	32 30 00	118 30 30	55	59	37.5	615	fne. s. g.
1617	Jan. 16	32 29 00	118 42 00	55	59	------	324	r.
1618	Jan. 16	32 28 30	118 48 00	55	59	38.6	741	gn. oz.
1619	Jan. 16	32 28 00	118 53 30	55	59	43.2	602	gn. oz.
1620	Jan. 16	32 27 30	118 59 00	55	59	42.2	389	gy. s. brk. sh.
1621	Jan. 16	32 25 30	119 05 00	56	59	59.5	17	rky.
1622a	Jan. 16	32 25 15	119 04 30	56	59	------	6	rky.
1622	Jan. 16	32 20 00	119 04 30	56	59	43	337	s. g.
1623	Jan. 16	32 15 00	119 06 30	56	59	38	713	gy. m.
1624	Jan. 16	32 20 00	119 08 30	57	59	40.8	449	rky.
1625	Jan. 16	32 22 30	119 09 30	57	59	46.3	186	gy. s.
1626	Jan. 16	32 24 30	119 10 30	57	58	51.1	77	gy. s.
1627	Jan. 16	32 23 00	119 12 00	57	58	46.6	176	gy. s.
1628	Jan. 16	32 21 00	119 15 00	57	58	42.2	386	gy. s.
1629	Jan. 17	32 17 30	119 19 00	56	59	44.7	205	rky.
1630	Jan. 17	32 27 30	119 15 30	57	58	48.7	156	gy. s.
1631	Jan. 17	32 29 30	119 14 30	57	58	54.3	47	bk. s. g.
1632	Jan. 17	32 29 45	119 13 00	57	59	58.6	26	bk. s. g.
1633	Jan. 17	32 29 00	119 14 00	59	59	------	43	bk. s. g.
1634	Jan. 17	32 27 30	119 12 30	59	60	54.1	46	gy. s.
1635	Jan. 17	32 28 00	119 11 30	59	60	55.4	44	rky.
1636	Jan. 17	32 28 30	119 11 00	64	59	54.9	45	gy. s. bk. sp. c.
1637	Jan. 17	32 27 00	119 11 00	64	59	54.7	48	co. brk. sh.
1638	Jan. 17	32 26 45	119 09 30	64	59	55.3	47	bk. s. brk. sh.
1639	Jan. 17	32 26 30	119 08 30	64	60	59.4	30	gy. s. brk. sh.
1640	Jan. 17	32 26 30	119 07 30	60	59	------	11	rky.
1641	Jan. 17	32 28 00	119 05 30	60	59	54.5	51	r. gy. s. brk. sh.
1642	Jan. 17	32 30 00	119 06 15	57	58	49.1	113	gy. s. g.
1643	Jan. 17	32 32 00	119 07 00	57	58	46.9	174	r.
1644	Jan. 17	32 34 15	119 08 00	57	58	47.4	153	gy. s.
1645	Jan. 17	32 30 00	119 10 00	55	57	50.1	106	brk. sh. g.
1646	Jan. 17	32 45 00	119 11 30	55	57	53.4	59	gy. s.
1647	Jan. 17	32 47 45	119 12 30	56	58	55.4	243	gy. s.
1648	Jan. 17	32 53 00	119 12 30	56	58	40.3	495	br. m.
1649	Jan. 17	32 59 00	119 14 00	56	58	39.4	614	br. m.
1650	Jan. 18	33 05 00	119 15 00	56	58	39	802	m.
1651	Jan. 18	33 10 00	119 21 00	55	58	43.5	310	m.
1652	Jan. 18	33 12 00	119 23 00	55	58	54.1	47	fne. gy. s.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1889.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1653	Jan. 18	33 11 00	119 19 15	59	59	40.8	464	br. s. g.
1654	Jan. 18	33 09 30	119 12 30	64	61	39	950	gn. oz.
1655	Jan. 18	33 06 30	118 58 30	67	61	39	924	m.
1656	Jan. 18	33 03 15	118 45 30	59	59	39.2	766	gy. s.
1657	Jan. 18	33 08 00	118 34 30	58	59	40.7	485	m.
1658	Jan. 18	33 08 30	118 22 30	57	59	40	560	m.
1659	Jan. 18	33 03 00	118 12 30	56	58	39.8	552	m.
1660	Jan. 19	32 57 00	118 02 30	56	58	40.7	426	gy. oz.
1661	Jan. 19	32 52 00	117 52 00	56	59	54.9	360	gy. oz.
1662	Jan. 19	32 46 00	117 41 30	55	59	41.4	428	gn. m.
1663	Jan. 23	32 46 30	118 00 30	58	59	41.6	395	r.
1664	Jan. 24	32 47 30	118 29 30	58	58	46.9	219	r.
1665	Jan. 24	32 47 00	118 37 00	59	59	39	657	gy. m.
1666	Jan. 24	32 46 15	118 44 00	59	59	39	613	r. crs. gy. s.
1667	Jan. 24	32 44 00	118 53 00	59	59	39	807	gn. m.
1668	Jan. 24	32 44 00	119 00 00	58	59	39.5	569	gn. m.
1669	Jan. 24	32 43 45	119 06 45	58	59	45.1	241	yl. s.
1670	Jan. 24	32 43 45	119 09 15	58	59	56.1	56	gy. s. brk. sh.
1671	Jan. 24	32 43 45	119 11 30	59	60	56.1	43	brk. sh. g.
1672	Jan. 24	32 43 45	119 14 00	59	60	55.3	46	r. sh.
1673	Jan. 24	32 43 45	119 16 30	59	60	.....	108	g. brk. sh.
1674	Jan. 24	32 45 45	119 15 15	59	60	52.8	83	yl. s. g.
1675	Jan. 24	32 45 45	119 12 30	59	60	52.8	71	gy. s. brk. sh.
1676	Jan. 24	32 46 00	119 10 00	64	61	52.8	173	gy. s.
1677	Jan. 24	32 46 00	119 07 30	64	61	.....	340	br. m.
1678	Jan. 24	32 42 30	119 05 15	66	61	54.9	53	gy. s.
1679	Jan. 24	32 42 45	119 07 15	66	61	56.9	28	r.
1680	Jan. 24	32 42 45	119 09 30	64	61	.....	48	r. brk. sh.
1681	Jan. 24	32 43 00	119 11 30	64	61	55	62	g. gy. s. brk sh.
1682	Jan. 24	32 43 00	119 14 00	64	61	55	229	r.
1683	Jan. 24	32 41 00	119 12 45	63	61	47.4	153	r.
1684	Jan. 24	32 41 00	119 10 45	63	61	47.4	118	gy. s.
1685	Jan. 24	32 41 15	119 08 45	63	61	47.4	52	s. brk. sh.
1686	Jan. 24	32 41 15	119 06 15	71	61	47.5	55	gy. s. brk. sh.
1687	Jan. 24	32 41 30	119 04 00	71	62	47.4	126	gy. s.
1688	Jan. 24	32 39 45	119 05 15	71	62	47.4	98	gy. s.
1689	Jan. 24	32 39 30	119 07 45	61	59	47.4	159	r.
1690	Jan. 24	32 39 15	119 10 00	61	59	47.3	110	gy. s.
1691	Jan. 24	32 39 00	119 12 15	61	59	47.2	125	gy. s.
1692	Jan. 24	32 36 30	119 12 15	58	59	49	107	gy. s. g.
1693	Jan. 24	32 34 15	119 12 00	58	59	50.5	88	gy. s. brk. sh.
1694	Jan. 24	32 32 00	119 12 00	58	59	53	62	gy. s.
1695	Jan. 24	32 30 15	119 13 30	58	59	.....	31	brk. sh.
1696	Jan. 24	32 29 45	119 11 30	58	59	53.1	47	brk. sh.
1697	Jan. 24	32 31 00	119 09 30	58	59	53.1	55	crs. wh. and bk. s. brk. sh.
1698	Jan. 24	32 32 15	119 07 45	58	59	53.6	63	crs. bk. s. brk. sh.
1699	Jan. 24	32 33 30	119 06 00	58	58	45.6	214	sh.
1700	Jan. 24	32 34 45	119 04 00	58	58	45.4	367	hrd. m.
1701	Jan. 24	32 32 30	119 03 15	59	58	41.8	406	gy. s. brk. sh.
1702	Jan. 24	32 30 30	119 02 30	59	58	41.6	280	gy. s.
1703	Jan. 24	32 28 30	119 01 45	59	58	41.8	141	gy. s.
1704	Jan. 24	32 26 30	119 01 15	59	58	.....	60	gy. s.
1705	Jan. 26	32 24 45	117 21 00	60	59	39.7	533	br m.
1706	Jan. 26	32 25 00	117 18 00	59	59	.....	51	hrd. m.
1707	Feb. 4	32 40 30	117 19 00	58	59	56	45	m.
1708	Feb. 4	32 55 30	117 34 00	60	61	40.8	441	gn. m.
1709	Feb. 4	33 00 00	117 37 30	61	61	40.5	454	gn m.
1710	Feb. 4	33 08 00	117 45 00	62	60	46.4	452	gy. m.
1711	Feb. 4	33 11 30	117 47 30	61	60	40.8	445	gy. m.
1712	Feb. 4	33 15 00	117 51 00	61	60	41	432	gn. m.
1713	Feb. 4	33 18 45	117 53 45	61	60	43.2	327	r. bk. s.
1714	Feb. 4	33 22 30	117 56 00	60	59	43.2	324	gn. m.
1715	Feb. 4	33 26 00	117 59 00	60	60	51	276	gn. m.
1716	Feb. 4	33 29 30	118 02 30	60	60	45	284	gn. m.
1717	Feb. 5	33 33 30	118 05 00	58	59	.....	161	gn. m.
1718	Feb. 5	33 38 30	118 06 00	58	59	59	21	hrd. m.
1719	Feb. 5	33 41 00	118 16 30	54	57	.....	18	fne. gy. s.
1720	Feb. 5	33 40 00	118 16 00	54	57	.....	21	fne. gy. s.
1721	Feb. 5	33 39 00	118 15 00	54	57	57	26	fne. gy. s.
1722	Feb. 5	33 37 00	118 13 45	56	58	58	29	fne. gy. s.
1723	Feb. 5	33 36 15	118 13 00	56	58	58	29	fne. gy. s.
1724	Feb. 5	33 34 30	118 12 00	56	58	58	49	fne. gy. s.
1725	Feb. 5	33 32 45	118 10 45	56	58	49.5	115	fne. gy. s.
1726	Feb. 6	34 06 00	119 32 00	57	60	.....	124	gn. m.
1727	Feb. 6	34 05 00	119 31 30	57	58	.....	88	gn. m.
1728	Feb. 6	34 04 00	119 31 30	57	58	55.5	47	gy. s. bk. sp.
1729	Feb. 6	34 03 00	119 29 15	57	58	55	48	gy. s. bk. sp.
1730	Feb. 6	34 03 30	119 28 45	57	58	55.2	48	gy. s. kb. sp.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1889.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1731	Feb. 6	34 03 45	119 28 15	57	58	56	50	gy. s. bk. sp. brk. sh.
1732	Feb. 6	34 04 00	119 28 00	57	58	54	62	fne. gy. s. g.
1733	Feb. 6	34 04 30	119 27 00	57	58	51.5	91	fne. gy. s.
1734	Feb. 6	34 03 30	119 27 00	57	58	55.8	49	gy. s.
1735	Feb. 6	34 02 30	119 27 45	57	58	56	48	gy. s. brk. sh.
1736	Feb. 6	34 01 45	119 28 00	57	58	55.5	42	wh. s. g. brk. sh.
1737	Feb. 8	33 44 30	119 59 00	58	57	.....	70	p.
1738	Feb. 8	33 48 00	120 10 30	57	59	44.4	281	r.
1739	Feb. 8	33 52 30	120 14 30	58	58	46.7	194	gy. s.
1740	Feb. 8	33 55 00	120 16 30	58	58	48.8	124	fne. gy. s. r.
1741	Feb. 8	34 00 00	120 20 00	58	58	56	30	fne. gy. s.
1742	Feb. 9	34 06 15	120 29 15	59	57	.....	44	r.
1743	Feb. 9	34 07 00	120 26 00	66	57	54.9	41	gy. s.
1744	Feb. 9	34 07 00	120 25 00	66	57	55	36	r.
1745	Feb. 9	34 07 00	120 23 45	66	57	53.9	42	g. brk. sh.
1746	Feb. 9	34 06 30	120 23 30	66	57	54.4	40	gy. s.
1747	Feb. 9	34 06 00	120 23 00	66	57	54.4	34	brk. sh. r.
1748	Feb. 11	34 23 15	119 40 30	62	59	.....	13	co. sponge.
1749	Feb. 11	34 22 45	119 40 00	62	59	.....	22	m.
1750	Feb. 11	34 23 15	119 39 45	62	60	.....	13¼	r.
1751	Feb. 11	34 23 40	119 39 50	62	60	.....	13	m.
1752	Feb. 11	34 21 10	119 38 40	62	60	59	20	m.
1753	Feb. 11	34 21 00	119 37 45	66	61	59	26	gy. s. r.
1754	Feb. 11	34 18 45	119 42 00	63	60	53.5	68	gn. m.
1755	Feb. 11	34 20 30	119 44 45	63	60	54.8	50	gn. m. r.
1756	Feb. 12	33 59 45	119 21 30	70	60	.....	52	gy. s.
1757	Feb. 12	34 00 00	119 21 30	70	60	.....	36	co. s. brk. sh.
1758	Feb. 12	33 42 45	119 24 30	67	61	40.5	825	gn. m.
1759	Feb. 12	33 37 30	119 25 00	64	61	40	917	gn. m.
1760	Feb. 12	33 30 30	119 25 30	64	61	39.8	899	gn. m.
1761	Feb. 12	33 24 00	119 26 30	62	60	41	416	bk. s.
1762	Feb. 12	33 19 30	119 27 00	62	60	57	40	brk. sh.
1763	Feb. 13	33 17 30	119 24 30	61	58	55.5	42	g. brk. sh. r.
1764	Feb. 13	33 17 45	119 28 30	61	58	.....	32	gy. s.
1765	Feb. 13	33 14 15	119 23 30	60	58	.....	21	g.
1766	Feb. 13	33 14 00	119 24 00	60	57	.....	22½	no specimen.
1767	Feb. 13	33 16 15	119 20 00	60	57	51.4	71	co.
1768	Feb. 13	33 20 00	119 14 30	62	58	39.5	644	gy. s.
1769	Feb. 14	33 28 15	118 58 00	55	56	46	185	fne. bk. and wh. s.
1770	Feb. 14	33 27 30	118 51 00	55	56	39.4	718	gn. m.
1771	Feb. 14	33 26 15	118 43 15	56	57	40	551	gn. m.
1772	Feb. 26	32 22 30	117 18 00	61	60	52.8	76	gy. s. g.
1773	Feb. 26	32 17 30	117 19 30	61	60	38	735	gn. m.
1774	Feb. 26	32 05 45	117 23 15	63	59	37.8	773	gy. m.
		Off west coast of Mexico.						
1775	Feb. 26	31 50 00	117 27 30	61	59	37.5	801	gy. oz.
1776	Feb. 26	31 29 30	117 33 00	60	59	37.5	803	gy. oz.
1777	Feb. 27	31 03 30	117 40 15	60	60	37.5	856	gy. m.
1778	Feb. 27	30 21 00	117 51 30	61	60	35.3	1,512	choc. oz.
1779	Feb. 27	29 56 30	117 58 00	60	60	35	1,776	br. m.
1780	Feb. 27	29 38 00	118 06 15	62	62	35.2	1,857	br. m.
1781	Feb. 27	29 14 30	118 17 00	64	62	35.4	1,424	gy. m. s.
1782	Feb. 27	29 08 30	118 13 30	63	61	35.5	1,447	gy. s.
1783	Feb. 28	28 56 15	118 18 00	61	61	.....	20	gy. s. brk. sh.
1784	Feb. 28	28 57 00	118 16 00	61	61	59	42	g. sh.
1785	Feb. 28	28 57 30	118 17 00	61	61	.....	19½	gy. s.
1786	Feb. 28	28 48 00	118 17 00	61	61	36	1,121	gy. m. s.
1787	Feb. 28	28 31 00	118 05 00	61	61	35	1,737	gy. m.
1788	Mar. 1	27 46 30	117 36 00	60	62	.....	2,135	
1789	Mar. 1	26 58 00	117 04 00	65	63	34.8	2,045	br. oz.
1790	Mar. 1	26 12 00	116 37 00	75	65	34.9	2,124	br. oz.
1791	Mar. 2	25 29 00	116 09 00	65	64	35	2,105	br. m.
1792	Mar. 2	25 15 00	116 00 00	64	64	34.9	2,131	br. oz.
1793	Mar. 2	25 05 00	115 50 00	66	64	35.4	1,343	br. m. s.
1794	Mar. 2	24 53 05	115 51 45	64	65	64.4	55	g. coralline.
1795	Mar. 2	24 54 00	115 43 00	64	65	40.5	493	r. bk. s.
1796	Mar. 2	24 51 00	115 43 00	65	65	35.4	1,312	br. m. s.
1797	Mar. 2	24 35 00	115 41 00	67	66	34.9	2,131	no specimen.
1798	Mar. 2	23 46 00	115 34 00	66	65	35	2,119	br. m.
1799	Mar. 8	22 57 00	115 25 00	67	66	34.9	2,107	br. oz.
1800	Mar. 3	22 07 30	115 13 00	67	68	35	2,280	br. m.
1801	Mar. 3	21 17 30	115 04 00	72	71	35	1,845	br. m.
1802	Mar. 3	20 26 00	114 58 00	68	69	35	2,072	br. oz.
1803	Mar. 4	19 35 00	114 52 00	67	69	34.9	2,032	br. m.
1804	Mar. 4	18 44 00	114 45 00	70	70	35	1,025	fne. bk. s.
1805	Mar. 4	18 33 30	114 44 00	72	71	35	1,732	gy. s. g.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of Mexico.						
	1889.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1806	Mar. 4	18 25 30	114 41 00	71	71	46.4	281	bk. s.
1807	Mar. 6	18 23 00	114 36 00	71	70	39.8	651	bk. and co. s. glob.
1808	Mar. 6	18 23 00	114 18 15	71	74	35.3	1,987	br. m.
1809	Mar. 7	18 23 30	113 48 00	70	72	35.1	2,008	br. m.
1810	Mar. 7	18 24 30	113 15 00	69	72	36.7	2,012	br. m.
1811	Mar. 7	18 25 00	112 44 00	71	73	35.3	1,951	br. m.
1812	Mar. 7	18 28 30	112 12 00	75	74	35.4	1,854	br. m.
1813	Mar. 7	18 32 00	111 41 00	70	72	-------	1,829	br. m.
1814	Mar. 7	18 35 00	111 21 00	70	71	35.3	1,786	br. m.
1815	Mar. 7	18 38 00	111 11 00	70	70	35.3	1,823	r.
1816	Mar. 7	18 39 00	111 07 00	69	70	35.5	1,619	rky.
1817	Mar. 8	18 39 45	111 02 00	70	70	36.2	1,161	rky.
1818	Mar. 8	18 40 45	110 58 30	70	70	39.4	651	rky.
1819	Mar. 10	18 53 00	110 51 00	70	70	35.8	1,264	br. m. bk. s.
1820	Mar. 10	19 03 00	110 50 30	71	70	35.6	1,635	br. m.
1821	Mar. 10	19 12 00	110 50 00	71	72	37.5	910	br. m.
1822	Mar. 10	19 15 30	110 49 15	71	73	50.3	210	rky.
1823	Mar. 10	19 21 30	110 47 00	73	73	44	375	bk. s.
1824	Mar. 10	19 26 15	110 45 30	72	73	39.2	665	r.
1825	Mar. 10	19 40 15	110 41 15	72	73	35.5	1,807	br. m.
1826	Mar. 10	20 09 00	110 32 30	70	70	35.5	1,643	br. m.
1827	Mar. 11	20 55 15	110 18 30	69	70	35.5	1,761	dk. br. m.
1828	Mar. 11	21 41 00	110 04 30	72	74	35.4	1,694	gn. m.
1829	Mar. 11	22 25 30	109 42 15	69	71	35.5	1,711	gn. m.
1830	Mar. 20	27 37 15	111 09 00	70	66	39.8	601	gn. m.
1831	Mar. 24	28 44 15	112 32 15	64	61	64.2	89	s. brk. sh.
1832	Mar. 27	31 23 00	114 25 00	66	65	65	10	m. s.
1833	Mar. 27	31 13 30	114 27 15	66	63.9	63.9	18	m.
		Off west coast of United States.						
1834	June 7	46 45 30	124 36 00	56	56	45.7	55	fne. gy. s.
1835	June 7	46 44 45	124 32 45	56	56	45.1	58	rky.
1836	June 8	44 04 00	124 53 30	54	52	48.6	48	bu. m.
1837	June 8	43 54 30	124 47 30	59	57	43.9	95	m.
1838	June 8	43 57 30	124 49 00	59	57	47.3	61	m. and g.
1839	June 8	44 59 30	124 50 30	57	56	52.1	43	m. and g.
1840	June 8	44 09 30	124 51 30	57	56	43.6	95	fne. bk. s.
1841	June 8	44 11 15	124 48 15	57	56	-------	68	g.
1842	June 8	44 16 00	124 42 00	56	56	45.9	70	g.
1843	June 8	44 19 00	124 40 00	57	55	46.4	61	g.
1844	June 8	44 22 15	124 38 00	57	55	-------	60	m. and g.
1845	June 8	44 25 30	124 36 00	57	55	47.2	73	fne. gy. s.
1846	June 9	44 28 30	124 34 00	57	55	45.6	78	fne. bk. s.
1847	June 9	44 31 15	124 31 45	56	56	45.1	75	gl.
1848	June 9	44 34 30	124 29 15	56	56	45.8	60	rky.
1849	June 9	44 37 30	124 27 00	57	57	46.6	59	fne. p. and bk. s.
1850	June 9	44 40 15	124 25 00	57	57	46.6	57	fne. bk. s.
1851	June 9	44 43 30	124 22 30	56	57	46.6	65	fne. gy. s.
1852	June 9	44 41 00	124 16 15	56	57	46.1	45	fne. gy. s. bk. sp.
1853	June 9	44 39 00	124 11 00	55	57	46.1	34	fne. gy. s.
1854	June 13	45 55 30	124 01 15	56	54	48.6	25	fne. gy. s.
1855	June 14	48 29 00	124 55 15	56	54	46.6	45	rky. and g.
1856	June 14	48 29 30	124 56 30	56	54	47.1	31	g. and brk. sh.
1857	June 29	47 23 00	125 44 00	57	54	36.7	860	gn. m.
1858	Aug. 28	45 52 00	124 10 30	60	59	45.6	53	fne. gy. s.
1859	Aug. 29	45 51 30	124 17 00	60	58	45.6	73	fne. gy. s. bk. sp.
1860	Aug. 29	45 50 45	124 23 30	60	58	45.8	83	fne. gy. s. m.
1861	Aug. 29	45 50 15	124 29 30	59	58	45.3	87	fne. gy. s. m.
1862	Aug. 29	45 49 45	124 36 00	59	58	45.1	81	c.
1863	Aug. 29	45 49 15	124 43 00	59	59	44.6	120	fne. gy. s.
1864	Aug. 29	45 39 00	124 40 00	59	59	43.5	186	m.
1865	Aug. 29	45 38 30	124 32 30	60	59	45	123	m.
1866	Aug. 29	45 38 30	124 25 00	60	59	45.3	91	m.
1867	Aug. 29	45 38 00	124 17 30	60	60	45.2	81	m. and fne. gy. s.
1868	Aug. 29	45 38 00	124 10 00	61	60	45.7	58	fne. gy. s.
1869	Aug. 29	45 37 30	124 04 00	61	60	47.4	42	fne. gy. s. and sh.
1870	Aug. 29	45 33 30	124 03.30	61	60	47.2	45	fne. gy. s.
1871	Aug. 29	45 29 00	124 04 00	60	60	46.7	48	fne. gy. s.
1872	Aug. 29	45 28 30	124 10 45	61	62	45.6	73	fne. gy. s.
1873	Aug. 29	45 28 30	124 17 30	62	62	45.3	94	gn. m.
1874	Aug. 29	45 28 30	124 25 00	62	61	45.1	120	gy. s. bk. sp.
1875	Aug. 29	45 28 30	124 32 00	62	61	42.4	259	gn. m.
1876	Aug. 29	45 23 45	124 32 00	63	62	42.8	216	gn. m.
1877	Aug. 29	45 18 30	124 32 15	64	63	42.6	238	yl. m.
1878	Aug. 29	45 18 00	124 25 15	64	66	42.8	217	m.
1879	Aug. 29	45 17 30	124 17 30	67	66	44.4	130	m.
1880	Aug. 29	45 17 30	124 12 00	68	64	45.6	88	gn. m.
1881	Aug. 29	45 17 30	124 05 00	68	64	46.1	52	fne. gy. s.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1889.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1882	Aug. 29	45 12 30	124 05 45	63	61	45.9	49	fne. gy. s.
1883	Aug. 29	45 07 30	124 06 00	62	61	46.8	48	fne. gy. s.
1884	Aug. 29	45 07 00	124 13 00	62	61	45.6	85	gy. s. bk. sp.
1885	Aug. 29	45 06 45	124 19 45	62	60	44.8	119	gn. m.
1886	Aug. 29	45 06 30	124 27 15	62	60	43.4	190	gn. m.
1887	Aug. 29	45 06 15	124 34 30	62	60	43.4	191	gn. m.
1888	Aug. 30	45 01 00	124 35 00	62	62	42.6	245	m.
1889	Aug. 30	44 55 00	124 36 00	62	62	43.5	203	m.
1890	Aug. 30	44 54 30	124 29 15	62	62	45.4	100	m.
1891	Aug. 30	44 54 00	124 22 30	62	61	.....	79	m.
1892	Aug. 30	44 53 30	124 15 30	62	61	45.7	63	m. and s.
1893	Aug. 30	44 53 00	124 00 00	62	61	47.7	35	fne. gy. s.
1894	Aug. 30	44 47 30	124 08 15	62	61	48	33	fne. gy. s.
1895	Aug. 30	44 43 15	124 09 00	62	61	47.9	33	fne. gy. s.
1896	Aug. 30	44 43 00	124 16 30	60	61	47.7	46	fne. gy. s.
1897	Aug. 30	44 43 00	124 23 45	60	60	45.8	64	fne. gy. s.
1898	Aug. 30	44 43 00	124 30 30	60	60	45.5	87	fne. gy. s.
1899	Aug. 30	44 43 00	124 43 00	60	60	44.2	156	fne. gy. s. bk. sp.
1900	Aug. 30	44 43 00	124 46 00	61	61	41.7	217	yl. m.
1901	Aug. 30	44 38 00	124 46 30	62	61	44.7	130	bk. s.
1902	Aug. 30	44 38 00	124 54 00	62	61	40.9	311	gn. m.
1903	Aug. 30	44 33 00	124 54 30	61	61	40.9	340	fne. bk. s.
1904	Aug. 30	44 33 30	124 48 00	61	61	44.5	185	gn. m.
1905	Aug. 30	44 33 45	123 41 30	60	61	44.8	123	m.
1906	Aug. 30	44 34 00	124 35 15	57	59	45.1	94	m.
1907	Aug. 30	44 34 15	124 28 30	56	59	46.1	60	fne. bk. s.
1908	Aug. 30	44 34 15	124 23 30	56	59	.....	60	crs. s. brk. sh.
1909	Aug. 30	44 34 30	124 17 00	56	59	46.7	43	fne. gy. s.
1910	Aug. 30	44 30 30	124 10 00	56	56	48.5	28	fne. gy. s.
1911	Aug. 30	44 30 00	124 11 00	56	56	47.5	28	fne. gy. s. bk. sp.
1912	Aug. 30	44 25 30	124 12 30	57	56	46.7	28	fne. gy. s.
1913	Aug. 30	44 26 00	124 19 30	56	56	45.8	43	fne. gy. s.
1914	Aug. 30	44 26 30	124 26 15	56	56	44.8	42	rky.
1915	Aug. 30	44 27 00	124 34 00	56	56	45.2	56	crs. bk. s.
1916	Aug. 30	44 27 30	124 41 00	55	58	45.1	79	fne. gy. s.
1917	Aug. 31	44 28 00	124 48 00	55	58	43.1	167	g.
1918	Aug. 31	44 28 30	124 54 45	56	57	41.3	205	m.
1919	Aug. 31	44 23 15	124 54 45	56	57	40.9	293	m.
1920	Aug. 31	44 18 00	124 54 45	56	58	41.3	282	m.
1921	Aug. 31	44 18 00	124 47 30	59	58	45.7	54	bk. s.
1922	Aug. 31	44 18 00	124 41 00	56	57	46.4	51	c.
1923	Aug. 31	44 18 15	124 34 00	56	57	46.2	56	bk. s. and g.
1924	Aug. 31	44 18 15	124 28 00	56	56	45.7	54	gy. s. bk. sp.
1925	Aug. 31	44 18 30	124 21 00	56	56	46.5	45	gy. s. bk. sp.
1926	Aug. 31	44 18 30	124 15 00	57	56	47.2	35	gy. s. bk. sp.
1927	Aug. 31	44 18 30	124 12 30	57	56	47.7	31	yl. s. bk. sp.
1928	Aug. 31	44 13 30	124 12 30	57	56	48.9	31	fne. gy. s.
1929	Aug. 31	44 07 30	124 11 00	58	57	47.7	29	fne. gy. s.
1930	Aug. 31	44 07 00	124 18 00	57	57	46.9	45	fne. gy. s.
1931	Aug. 31	44 06 30	124 25 00	57	57	46.2	60	m.
1932	Aug. 31	44 06 00	124 31 30	57	57	45.9	69	gn. m.
1933	Aug. 31	44 06 00	124 37 30	59	59	45.7	70	gn. m.
1934	Aug. 31	44 05 30	124 44 15	59	59	46.1	63	gn. m.
1935	Aug. 31	44 05 30	124 51 30	59	59	47.1	51	br. c. and p.
1936	Aug. 31	44 05 00	124 56 00	59	59	40.9	346	m.
1937	Aug. 31	43 59 30	124 59 00	59	59	41.8	328	fne. gy. s. bk. sp.
1938	Aug. 31	43 53 00	124 59 00	59	59	40.2	902	gn. m.
1939	Aug. 31	43 53 00	124 56 00	68	63	40.4	365	gn. m.
1940	Aug. 31	43 52 45	124 53 00	68	63	41.4	284	gn. m.
1941	Aug. 31	43 52 30	124 50 00	68	63	42.8	175	fne. bk. s.
1942	Aug. 31	43 52 15	124 47 00	61	61	43.7	159	m. and bk. s.
1943	Aug. 31	43 52 00	124 44 00	61	61	43.7	159	m.
1944	Aug. 31	43 52 00	124 40 30	60	60	43.7	159	m.
1945	Aug. 31	43 47 45	124 37 00	60	60	43.7	185	gn. m.
1946	Aug. 31	43 43 30	124 34 30	60	60	45.1	127	gn. m.
1947	Aug. 31	43 39 15	124 30 30	60	60	45.7	97	gn. m.
1948	Aug. 31	43 35 30	124 26 30	59	59	45.7	80	gn. m.
1949	Aug. 31	43 31 00	124 24 15	59	59	45.8	66	fne. gy. s.
1950	Sept. 1	43 36 00	124 22 30	59	59	45.2	65	gn. m.
1951	Sept. 1	43 40 15	124 21 00	56	56	45.7	62	gn. m.
1952	Sept. 1	43 45 30	124 19 00	55	55	46.4	57	gn. m.
1953	Sept. 1	43 38 00	124 24 15	56	55	46.2	62	bk. s. and m.
1954	Sept. 1	43 50 30	124 29 00	56	55	46.1	72	m.
1955	Sept. 1	43 53 00	124 34 00	56	55	45.7	92	gn. m.
1956	Sept. 1	43 55 30	124 38 30	59	59	45.1	120	gn. m.
1957	Sept. 1	43 58 00	124 44 00	59	59	45.5	87	bk. s. and m.
1958	Sept. 1	44 01 00	124 49 15	61	59	.....	58	r.
1959	Sept. 1	44 02 00	124 50 15	61	59	46.2	58	r.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1889.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
1960	Sept. 1	43 59 30	124 49 30	60	59	45.7	77	c.
1961	Sept. 1	43 59 30	124 47 00	60	59	45.8	74	c.
1962	Sept. 1	44 00 15	124 49 30	60	59	45.7	75	c.
1963	Sept. 1	44 01 00	124 52 00	59	59	45.7	61	r.
1964	Sept. 1	44 01 30	124 54 30	59	59	45.8	74	p.
1965	Sept. 1	43 59 15	124 54 30	60	60	45.6	79	rky.
1966	Sept. 1	43 58 00	124 54 15	60	60	43.6	174	gn. m. fne. gy. s.
1967	Sept. 1	43 57 45	124 52 30	60	60	45.5	88	rky.
1968	Sept. 1	43 57 30	124 50 30	60	60	45.2	92	No bottom specimen.
1969	Sept. 1	43 58 30	124 50 00	62	59	45.7	79	gn. m. and s.
1970	Sept. 1	43 54 20	124 49 15	62	60	43.7	155	bk. s.
1971	Sept. 1	43 54 10	124 47 30	62	62	43.9	139	bk. s. and m.
1972	Sept. 1	43 54 00	124 46 00	62	62	44.7	124	bk. s. and m.
1973	Sept. 1	43 54 45	124 46 40	62	62	45.5	90	gn. m. and g.
1974	Sept. 1	43 55 30	124 45 20	62	62	45.7	78	bk. s. and g.
1975	Sept. 1	43 56 15	124 45 00	60	59	45.7	70	c. and g.
1976	Sept. 1	43 57 00	124 44 30	60	59	45.7	70	c.
1977	Sept. 1	43 57 45	124 44 00	60	59	45.7	67	gn. m. and g.
1978	Sept. 1	43 58 30	124 44 20	60	59	45.7	61	rky. brk. sh.
1979	Sept. 1	44 00 00	124 45 00	60	59	47.2	52	co.
1980	Sept. 2	44 00 00	124 11 30	56	56	.....	18	fne. gy. s.
1981	Sept. 2	44 01 30	124 11 30	58	59	48.8	24	yl. s.
1982	Sept. 2	44 16 00	124 12 00	60	59	47.7	31	fne. gy. s.
1983	Sept. 2	44 16 30	124 09 00	62	57	.....	19	fne. gy. s.
1984	Sept. 2	44 18 00	124 08 30	62	56	.....	12	fne. gy. s.
1985	Sept. 2	44 20 00	124 13 00	57	54	47.8	31	wh. s. bk. sp. sh.
1986	Sept. 3	44 37 00	124 15 00	56	54	47.5	44	gy. s.
1987	Sept. 3	44 35 00	124 13 00	55	55	46.2	43	fne. gy. s. and gn. m.
1988	Sept. 3	44 33 00	124 11 00	56	55	46.7	32	bk. s.
1989	Sept. 3	44 28 30	124 23 00	56	56	46.5	45	c. and p.
1990	Sept. 3	44 27 00	124 24 30	56	56	46.5	44	c.
1991	Sept. 3	44 26 30	124 26 00	56	56	46.3	48	c.
1992	Sept. 3	44 28 00	124 24 30	59	56	47.2	43	rky.
1993	Sept. 3	44 39 00	124 08 30	57	56	48.2	29	fne. gy. s. bk. sp.
1994	Sept. 3	44 41 00	124 09 00	55	52	46.9	28	fne. gy. s. bk. sp.
1995	Sept. 7	45 46 15	124 04 45	63	60	45.1	46	fne. gy. s. and g.
1996	Sept. 7	45 45 30	124 02 30	60	56	45.3	40	fne. gy. s.
1997	Sept. 7	45 44 30	123 59 30	60	56	.....	22	fne. gy. s.
1998	Sept. 7	45 43 00	123 58 15	62	56	.....	15	fne. gy. s.
1999	Sept. 8	45 31 15	124 00 45	57	52	47.2	25	fne. gy. s.
2000	Sept. 8	45 35 00	123 58 15	57	52	48.4	18	gy. s. rd. sp.
2001	Sept. 8	45 30 00	123 59 45	57	51	48.5	18	fne. gy. s.
2002	Sept. 8	45 28 30	124 00 00	57	53	48.2	16	fne. gy. s.
2003	Sept. 8	45 26 30	124 00 15	57	56	48	21	rky.
2004	Sept. 8	45 23 00	124 00 30	54	50	.....	18	fne. gy. s.
2005	Sept. 8	45 19 00	124 02 30	54	50	46.7	39	fne. gy. s.
2006	Sept. 8	45 19 00	124 00 30	57	51	47.2	23	fne. bk. s.
2007	Sept. 9	45 17 30	124 00 30	51	48	47.7	19	fne. gy. s. bk. sp.
2008	Sept. 9	45 13 00	124 00 30	51	48	47.7	27	fne. gy. s.
2009	Sept. 9	45 11 30	124 00 00	51	49	.....	19	fne. gy. s. yl. m.
2010	Sept. 9	45 10 30	123 59 45	52	48	.....	15	fne. bk. s.
2011	Sept. 9	45 11 00	124 03 30	52	48	45.8	34	fne. gy. s. bk. sp.
2012	Sept. 9	45 12 00	124 07 00	52	48	45.9	52	fne. gy. s. bk. sp.
2013	Sept. 9	45 13 00	124 10 30	52	48	45.6	69	fne. gy. s.
2014	Sept. 9	45 09 30	124 10 45	55	50	45.4	69	fne. gy. s.
2015	Sept. 9	45 07 30	124 06 00	55	50	45.9	49	crs. s.
2016	Sept. 9	45 07 15	124 03 00	55	50	46.2	33	fne. gy. s.
2017	Sept. 9	45 07 00	124 00 30	55	50	.....	15	fne. gy. s.
2018	Sept. 9	45 04 00	124 02 30	55	50	.....	23	fne. gy. s.
2019	Sept. 9	45 04 00	124 06 15	52	48	46	51	fne. gy. s.
2020	Sept. 9	45 04 00	124 11 00	52	48	45.5	68	fne. gy. s.
2021	Sept. 9	45 02 00	124 13 00	54	57	45.2	71	fne. gy. s. bk. sp.
2022	Sept. 9	45 01 15	124 07 00	55	50	46.2	52	bk. s.
2023	Sept. 9	45 00 45	124 03 45	55	50	.....	27	fne. gy. s.
2024	Sept. 9	45 00 30	124 02 15	55	51	.....	16	fne. gy. s. bk. sp. brk. sh.
2025	Sept. 9	44 58 30	124 04 00	55	49	47.7	19	r. and sh.
2026	Sept. 10	44 03 45	124 12 00	49	51	.....	30	fne. gy. s.
2027	Sept. 10	44 03 15	124 16 30	49	51	46	42	fne. gy. s. and sh.
2028	Sept. 10	43 54 00	124 11 00	49	51	47.1	13	fne. gy. s.
2029	Sept. 10	43 49 00	124 14 00	50	49	46.7	36	fne. gy. s.
2030	Sept. 10	43 47 00	124 12 00	52	49	.....	13	fne. gy. s.
2031	Sept. 10	43 42 30	124 14 30	52	49	.....	28	fne. gy. s.
2032	Sept. 10	43 40 30	124 15 00	57	50	.....	28	fne. gy. s.
2033	Sept. 10	43 37 00	124 16 00	52	51	45.9	53	fne. gy. s.
2034	Sept. 10	43 34 00	124 16 30	53	49	46.7	40	fne. gy. s.
2035	Sept. 10	43 31 00	124 16 00	53	49	.....	11	fne. gy. s.
2036	Sept. 10	43 27 30	124 18 00	52	50	48.2	23	fne. gy. s.
2037	Sept. 10	43 23 30	124 21 30	54	52	.....	17	fne. gy. s.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1889.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
2038	Sept. 10	43 19 00	124 25 30	54	52	48.7	28	fne. gy. s.
2039	Sept. 10	43 13 00	124 26 00	55	52	47.7	27	fne. gy. s.
2040	Sept. 10	43 08 30	124 28 00	55	52	46.1	25	rky. co.
2041	Sept. 10	43 09 00	124 35 00	57	50	45.8	64	p.
2042	Sept. 10	43 09 30	124 42 00	55	51	44.7	134	fne. gy. s.
2043	Sept. 10	43 10 00	124 49 00	54	52	44.7	165	bk. s.
2044	Sept. 10	43 14 15	124 52 00	54	54	42.2	234	bk. s.
2045	Sept. 11	43 17 30	124 55 30	56	57	40.1	384	gn. m.
2046	Sept. 11	43 17 00	124 42 00	59	59	44.9	116	gn. m.
2047	Sept. 11	43 17 00	124 34 30	55	59	46	64	c.
2048	Sept. 11	43 21 00	124 27 00	51	51	45.8	46	fne. gy. s.
2049	Sept. 11	43 23 00	124 35 00	51	51	45.7	68	c.
2050	Sept. 11	43 24 00	124 42 00	51	51	45.3	119	gn. m.
2051	Sept. 11	43 25 30	124 48 30	53	54	41.1	326	gn. m.
2052	Sept. 11	43 20 30	124 49 00	53	54	41.7	306	bk. s. and m.
2053	Sept. 11	43 16 00	124 48 00	55	54	42.7	233	gn. m.
2054	Sept. 11	43 12 00	124 47 30	56	54	44.2	188	gn. m.
2055	Sept. 11	43 06 30	124 47 00	56	54	45.2	141	fne. bk. s.
2056	Sept. 11	43 06 30	124 40 00	56	53	45.7	91	gn. m.
2057	Sept. 11	43 06 30	124 32 00	56	53	45.9	58	gn. m.
2058	Sept. 11	42 59 00	124 36 00	56	53	45.9	49	fne. gy. s.
2059	Sept. 11	42 58 30	124 44 00	55	49	45.9	76	gn. m.
2060	Sept. 11	42 58 00	124 52 30	53	51	45.5	120	gn. m.
2061	Sept. 11	42 58 00	124 00 00	53	51	40.9	407	gn. m.
2062	Sept. 11	42 49 30	124 00 00	53	51	39.9	382	gn. m. and p.
2063	Sept. 11	42 48 30	124 53 00	53	51	44.8	140	rky.
2064	Sept. 11	42 49 00	124 46 00	54	50	45.7	114	fne. gy. s.
2065	Sept. 11	42 59 30	124 40 30	53	49	46.7	47	fne. gy. s. bk. sp.
2066	Sept. 12	43 03 30	124 33 30	50	48	45.8	44	g.
2067	Sept. 12	43 04 30	124 26 30	50	47	46.2	21	fne. gy. s.
2068	Sept. 12	43 08 00	124 27 30	50	48	.....	25	rky.
2069	Sept. 12	43 00 00	124 27 30	50	48	47.2	17	fne. gy. s.
2070	Sept. 12	42 55 00	124 32 30	50	48	46.1	28	fne. gy. s.
2071	Sept. 12	42 53 00	124 34 00	52	47	.....	17	fne. gy. s.
2072	Sept. 12	42 51 15	124 37 00	52	47	47.7	34	fne. gy. s.
2073	Sept. 12	42 48 15	124 37 45	51	47	.....	29	fne. gy. s.
2074	Sept. 12	42 46 45	124 38 00	53	48	.....	44	r. and brk. sh.
2075	Sept. 12	42 45 30	124 38 15	53	48	46.8	34	st. and brk. sh.
2076	Sept. 12	42 44 15	124 33 00	54	48	47.5	23	fne. gy. s.
2077	Sept. 13	42 42 30	124 30 30	56	48	47.7	26	bk. s.
2078	Sept. 13	42 43 00	124 37 00	56	48	45.7	62	fne. gy. s.
2079	Sept. 13	42 43 00	124 42 00	56	48	44.7	161	fne. gy. s.
2080	Sept. 13	42 42 00	124 50 00	56	48	40.8	329	gn. m.
2081	Sept. 13	42 35 30	124 50 00	53	49	39.3	492	gn. m.
2082	Sept. 13	42 35 30	124 42 30	53	49	45.7	151	gn. m.
2083	Sept. 13	42 35 00	124 35 30	53	49	46.7	61	br. m.
2084	Sept. 13	42 34 30	124 29 00	52	49	46.5	34	fne. gy. s.
2085	Sept. 13	42 28 30	124 33 00	51	49	46.8	35	fne. gy. s.
2086	Sept. 13	42 29 00	124 40 00	51	49	46.9	63	fne. gy. s.
2087	Sept. 13	42 29 00	124 46 30	51	48	43.8	206	c.
2088	Sept. 13	42 22 00	124 51 00	52	48	39.2	505	bk. s. g.
2089	Sept. 13	42 21 00	124 44 00	52	48	42.7	236	bk. s.
2090	Sept. 13	42 21 00	124 36 00	52	48	45.4	79	gn. m.
2091	Sept. 13	42 21 00	124 33 00	52	48	45.5	62	gn. m.
2092	Sept. 14	43 23 30	124 24 00	53	51	46.8	40	fne. gy. s.
2093	Sept. 14	43 25 00	124 27 00	53	51	46.2	59	fne. gy. s.
2094	Sept. 14	43 28 30	124 32 30	54	52	45.7	79	fne. gy. s.
2095	Sept. 14	43 32 00	124 37 30	55	53	44.2	157	gn. m.
2096	Sept. 14	43 35 30	124 42 30	56	56	41.2	277	gn. m.
2097	Oct. 12	42 25 00	124 32 30	58	57	51.8	39	fne. gy. s.
2098	Oct. 12	42 22 30	124 32 30	58	57	51.8	44	fne. gy. s.
2099	Oct. 12	42 13 30	124 27 30	61	59	52	51	bk. s.
2100	Oct. 12	42 14 00	124 34 00	61	59	47.7	94	fne. gy. s.
2101	Oct. 12	42 14 00	124 41 00	58	59	42	273	m.
2102	Oct. 12	42 05 30	124 37 30	60	59	.....	244	No bottom obtained.
2103	Oct. 12	42 04 30	124 31 00	60	59	49.5	65	bk. s. and m.
2104	Oct. 12	42 03 30	124 23 00	61	60	51.8	46	fne. gy. s. and m.
2105	Oct. 12	42 00 30	124 20 00	66	62	54.2	21	fne. dk. gy. s.
2106	Oct. 12	41 58 30	124 17 00	67	61	53.8	18	fne. dk. gy. s.
2107	Oct. 12	41 58 00	124 22 30	64	60	51.8	43	gn. m.
2108	Oct. 12	41 58 00	124 29 00	58	59	48.9	68	gn. m.
2109	Oct. 12	41 58 00	124 36 00	58	59	42.2	201	gn. m.
2110	Oct. 12	41 52 00	124 36 00	58	59	40.9	396	gn. m.
2111	Oct. 12	41 50 30	124 30 00	59	59	46.7	120	gn. m.
2112	Oct. 12	41 50 00	124 26 00	59	59	50.7	59	bk. s.
2113	Oct. 12	41 44 30	124 26 00	58	57	47.7	80	gn. m.
2114	Oct. 12	41 45 00	124 32 00	58	57	42.2	256	gn. m.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1889.	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	*Fms.*	
2115	Oct. 12	41 38 30	124 31 30	58	57	42.7	277	gn. m.
2116	Oct. 13	41 38 00	124 25 00	58	57	49.3	70	gn. m.
2117	Oct. 13	41 38 00	124 17 30	57	56	52.3	38	m.
2118	Oct. 13	41 38 00	124 12 30	57	56	54	25	m.
2119	Oct. 13	41 32 00	124 13 30	57	55	53.8	27	dk. gy. s.
2120	Oct. 13	41 32 00	124 19 00	57	55	51.9	42	m.
2121	Oct. 13	41 32 00	124 24 00	57	55	49.3	58	m.
2122	Oct. 13	41 32 00	124 30 00	56	55	47.9	94	m.
2123	Oct. 13	41 32 00	124 35 00	56	55	39.6	412	c.
2124	Oct. 13	41 26 15	124 33 30	56	55	39.1	488	gn. m.
2125	Oct. 13	41 26 15	124 27 00	56	56	48.7	80	gn. m.
2126	Oct. 13	41 26 15	124 20 00	56	56	50.7	49	gn. m.
2127	Oct. 13	41 26 15	124 13 30	56	56	51.8	38	gn. m.
2128	Oct. 13	41 26 30	124 07 00	56	56	54.3	18	fne. gy. s.
2129	Oct. 13	41 20 00	124 11 00	56	56	51.2	36	brk. sh. and p.
2130	Oct. 13	41 20 00	124 17 30	56	56	49.9	52	gn. m.
2131	Oct. 13	41 20 00	124 24 30	56	56	48.7	86	gn. m.
2132	Oct. 13	41 20 00	124 31 30	58	58	39.8	373	gn. m.
2133	Oct. 13	41 13 00	124 31 00	58	58	39.4	465	gn. m.
2134	Oct. 13	41 12 30	124 23 30	58	58	45.3	167	gn. m.
2135	Oct. 13	41 12 00	124 17 00	58	58	49.7	58	gn. m.
2136	Oct. 13	41 12 30	124 11 00	57	56	54.6	29	fne. gy. s. and p.
2137	Oct. 13	41 05 30	124 13 00	57	56	52.4	26	fne. dk. gy. s.
2138	Oct. 13	41 04 30	124 19 00	57	56	53.8	75	gn. m.
2139	Oct. 13	41 03 30	124 26 00	57	56	42.7	268	gn. m.
2140	Oct. 13	40 57 15	124 25 30	57	56	44.1	182	gn. m.
2141	Oct. 13	40 57 00	124 20 00	57	56	49	65	gn. m.
2142	Oct. 13	40 56 00	124 14 00	57	56	53.6	30	fne. gy. s.
2143	Oct. 13	40 50 15	124 15 00	57	52	50.2	36	gn. m.
2144	Oct. 13	40 50 00	124 22 00	56	52	48.2	70	gn. m.
2145	Oct. 13	40 50 00	124 28 00	55	52	42.1	254	m.
2146	Oct. 13	40 44 30	124 33 30	56	56	41.7	294	m.
2147	Oct. 13	40 43 00	124 27 00	56	56	49.2	50	m.
2148	Oct. 13	40 43 00	124 22 00	56	56	53.3	27	m.
2149	Oct. 13	40 37 30	124 25 00	56	55	.....	23	fne. dk. gy. s.
2150	Oct. 14	40 39 00	124 31 00	56	55	41.7	355	m.
2151	Oct. 14	40 32 00	124 34 00	56	55	48.9	65	bk. s. and m.
2152	Oct. 14	40 29 00	124 40 00	56	55	38.7	627	gn. m.
	1890.							
2153	Mar. 11	37 18 50	122 28 30	55	53	52.8	21	fne. bk. s.
2154	Mar. 11	37 16 00	122 25 50	60	53	.....	10	brk. sh. r.
2155	Mar. 12	37 05 00	122 19 00	55	54	.....	17	rky. sh.
2156	Mar. 12	36 55 00	122 17 00	56	55	47.8	122	bk. s. m.
2157	Mar. 15	36 58 00	122 21 00	57	55	47.6	97	crs. bk. s. m
2158	Mar. 22	37 47 55	123 10 00	53	53	52	17	sh.
2159	Mar. 22	37 47 50	123 10 50	53	53	51.3	19	rky.
2160	Mar. 22	37 47 45	123 11 10	53	53	50.8	45	sh. and rky.
2161	Mar. 22	37 47 35	123 11 00	53	53	51.4	29	rky.
2162	Mar. 22	37 47 30	123 19 00	52	53	42	324	r. and c.
2163	Mar. 22	37 48 30	123 30 20	52	53	36.8	900	gn. m.
2164	Mar. 24	38 00 00	123 22 20	51	51	49.7	60	s. sh.
2165	Mar. 24	38 01 00	123 24 18	51	51	51.2	39	r.
2166	Mar. 24	38 01 05	123 24 55	51	51	.....	35	rky.
2167	Mar. 24	38 01 10	123 25 40	52	52	51.3	37	rky.
2168	Mar. 24	38 01 15	123 26 15	52	52	51.3	30	rky. co.
2169	Mar. 24	38 01 35	123 26 50	52	52	.....	40	rky.
2170	Mar. 24	38 01 45	123 28 00	52	52	.....	55	crs. bk. s. brk. sh.
2171	Mar. 24	38 00 45	123 28 30	52	52	.....	65	gy. s. g. brk. sh.
2172	Mar. 24	37 59 40	123 28 55	52	52	.....	139	g. brk. sh.
2173	Mar. 24	37 59 20	123 27 45	55	55	.....	73	r.
2174	Mar. 24	37 58 55	123 26 35	55	55	.....	56	brk. sh.
2175	Mar. 24	37 58 50	123 26 10	55	55	.....	34	r. co.
2176	Mar. 24	38 00 40	123 25 55	54	55	.....	33	rky.
2177	Mar. 24	38 02 45	123 27 35	54	55	.....	44	r. co.
2178	Mar. 24	38 02 25	123 26 20	54	55	.....	42	r. co.
2179	Mar. 24	38 02 00	123 25 05	54	55	.....	47	rky.
2180	Mar. 24	38 01 40	123 23 50	54	55	.....	57	yl. s.
2181	Mar. 24	37 59 45	123 24 25	54	55	.....	41	yl. s.
2182	Mar. 24	37 58 45	123 25 00	57	55	.....	39	r. co. and s
2183	Mar. 24	37 57 45	123 25 15	57	55	.....	45	yl. s.
2184	Mar. 24	37 58 00	123 26 35	57	55	.....	67	r. yl. s.
2185	Mar. 24	37 58 20	123 27 45	57	55	.....	231	m.
2186	Mar. 24	38 00 10	123 27 00	54	55	.....	30	r. co.
2187	Mar. 24	38 02 15	123 27 30	52	55	.....	47	rky.
2188	Mar. 24	38 04 25	123 28 00	52	52	.....	84	g.
2189	Mar. 24	38 06 15	123 29 00	52	52	.....	180	fne. gy. s bk. sp.
2190	Mar. 24	38 17 00	123 30 00	51	52	42.5	269	gn. m.
2191	Mar. 24	38 15 40	123 31 30	51	52	42.9	246	gn. m.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1890.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
2192	Mar. 24	38 20 30	123 32 50	51	52	44.9	186	m.
2193	Mar. 24	38 25 10	123 34 25	50	52	47.9	134	m.
2194	Mar. 24	38 30 00	123 35 40	50	52	47.1	121	m.
2195	Mar. 24	38 34 50	123 37 00	50	52	46.7	88	m.
2196	Mar. 24	38 39 10	123 38 30	50	52	.....	78	m.
2197	Mar. 24	38 44 00	123 40 00	50	52	47.4	66	m.
2198	Mar. 25	38 48 30	123 42 00	50	52	47.9	58	gn. m.
2199	Mar. 25	38 52 50	123 46 00	49	52	47.9	51	rky.
2200	Mar. 25	38 57 10	123 48 30	49	52	48.9	55	bk. s.
2201	Mar. 25	38 55 50	123 52 00	49	51	47.9	67	bk. s.
2202	Mar. 25	38 53 30	123 57 35	49	51	44.9	189	br. m.
2203	Mar. 25	38 48 00	123 55 50	49	50	39.5	486	m.
2204	Mar. 25	38 49 30	123 52 20	49	51	47.3	91	bk. s.
2205	Mar. 25	38 51 00	123 49 00	49	51	49.4	69	m.
2206	Mar. 25	38 52 25	123 45 30	49	50	.....	49	hrd. m.
2207	Mar. 25	38 47 15	123 40 30	50	51	48.3	55	r. gn. m.
2208	Mar. 25	38 46 00	123 44 00	50	51	47.1	69	gn. m. sh.
2209	Mar. 25	38 44 30	123 47 10	50	51	46.7	90	bk. s.
2210	Mar. 25	38 44 00	123 49 00	50	51	45.4	143	m.
2211	Mar. 25	38 43 20	123 51 00	50	51	42.9	249	m.
2212	Mar. 25	38 38 40	123 46 30	51	51	.....	314	bk. s.
2213	Mar. 25	38 39 30	123 44 00	50	51	46.6	103	bk. s.
2214	Mar. 28	38 37 45	123 30 00	48	51	.....	58	gn. m.
2215	Mar. 28	38 35 45	123 34 15	48	50	.....	82	gn. m.
2216	Mar. 28	38 32 45	123 39 30	49	50	46	128	bk. s.
2217	Mar. 28	38 31 30	123 42 00	49	50	41.6	314	gn. m.
2218	Mar. 28	38 26 00	123 37 00	51	51	43	273	gn. m.
2219	Mar. 28	38 27 00	123 35 00	51	51	46.2	113	bk. s.
2220	Mar. 28	38 29 40	123 29 45	51	51	48.4	82	gy. s.
2221	Mar. 28	38 32 00	123 25 30	51	51	47.5	67	br. m.
2222	Mar. 28	38 32 50	123 24 30	51	51	48	60	br. m. r.
2223	Mar. 28	38 28 30	123 19 00	52	52	48.5	54	br. m.
2224	Mar. 28	38 25 40	123 24 00	52	52	48.5	74	bk. s.
2225	Mar. 28	38 23 00	123 29 00	52	52	47.5	107	m.
2226	Mar. 28	38 20 00	123 34 00	51	52	42.8	242	m.
2227	Mar. 28	38 14 00	123 36 00	52	52	39.3	518	gn. m.
2228	Mar. 28	38 18 15	123 25 50	52	52	45.6	124	gn. m.
2229	Apr. 2	36 56 30	122 24 40	51	52	43.6	208	gn. m.
2230	Apr. 3	36 51 40	122 24 00	51	52	36.9	921	br. m.
2231	Apr. 3	36 47 30	122 20 10	51	52	37	860	br. m.
2232	Apr. 3	36 43 20	122 16 25	51	52	38.1	620	br. m.
2233	Apr. 3	36 39 20	122 12 50	51	52	37.9	739	m.
2234	Apr. 3	36 34 00	122 07 30	51	52	37.4	958	gn. m.
2235	Apr. 3	36 33 30	122 04 00	51	52	39	575	gn. m.
2236	Apr. 3	36 32 35	122 02 00	51	52	39.9	450	m.
2237	Apr. 3	36 32 30	122 00 00	51	52	42.9	246	gn. m.
2238	Apr. 3	36 27 20	121 58 00	52	51	46.9	59	fne. gy. s.
2239	Apr. 3	36 19 00	122 00 00	53	52	46.5	62	crs. s.
2240	Apr. 3	36 19 20	122 05 00	53	52	47.2	99	g.
2241	Apr. 3	36 04 00	121 45 20	53	53	40.1	420	br. m.
2242	Apr. 3	35 59 00	121 40 20	52	53	40.1	426	br. m.
2243	Apr. 3	35 55 15	121 37 20	52	53	41.7	342	br. m.
2244	Apr. 3	35 50 50	121 33 00	52	54	43.5	240	br. m.
2245	Apr. 4	35 39 30	121 28 00	53	54	42.5	271	gn. m.
2246	Apr. 4	35 36 05	121 22 00	54	53	40.2	144	gy. s.
2247	Apr. 4	35 32 15	121 16 00	55	52	44.2	198	gn. m.
2248	Apr. 5	35 30 50	121 11 00	51	51	.....	113	m.
2249	Apr. 5	35 29 20	121 13 20	50	51	43.9	191	gn. m.
2250	Apr. 5	35 18 50	121 05 00	53	52	44.9	146	gn. m.
2251	Apr. 5	35 08 40	121 02 00	56	54	43	224	gn. m.
2252	Apr. 5	35 00 50	120 58 00	56	54	45	119	gn. m. rky.
2253	Apr. 5	35 04 00	120 57 30	55	54	45	143	gn. m.
2254	Apr. 5	34 58 30	120 58 00	54	53	44.7	182	gn. m.
2255	Apr. 5	34 51 40	120 54 30	54	53	45.9	142	gn. m.
2256	Apr. 5	34 45 30	120 55 00	54	54	46	133	gn. m.
2257	Apr. 5	34 46 00	120 49 50	54	54	47.9	62	r. m.
2258	Apr. 5	34 46 15	120 45 35	54	54	48.9	47	gn. m. r.
2259	Apr. 5	34 37 30	120 45 00	54	54	49	44	r. and m.
2260	Apr. 6	34 36 00	120 50 40	54	54	45.6	158	
2261	Apr. 6	34 34 50	120 50 05	54	54	42.3	274	m. and s.
2262	Apr. 6	34 29 25	120 50 00	54	54	41.9	312	gn. m.
2263	Apr. 6	34 30 00	120 47 25	54	54	42.2	242	gn. m.
2264	Apr. 6	34 30 40	120 44 55	54	54	46.4	139	m.
2265	Apr. 6	34 31 10	120 43 20	53	52	48	67	bk. s. m.
2266	Apr. 6	34 31 50	120 42 00	52	53	48.7	53	bk. s. m.
2267	Apr. 6	34 26 55	120 40 20	53	52	46	174	gn. m.
2268	Apr. 6	34 00 00	121 38 10	67	61	41.8	290	gn. m. r.
2269	Apr. 6	34 02 30	121 41 00	67	61	43.8	346	m.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1890.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
2270	Apr. 6	36 07 10	121 43 00	63	56	42.9	228	m. and g.
2271	Apr. 6	36 09 40	121 45 30	61	54	41.1	356	m.
2272	Apr. 6	36 11 00	121 47 00	61	54	44.7	183	s. m.
2273	Apr. 6	36 13 05	121 52 15	61	55	46.7	101	fne. gy. s.
2274	Apr. 6	36 15 00	121 57 50	60	54	49 3	36	rky.
2275	Apr. 11	36 42 50	122 04 10	55	53	38.1	881	rky.
2276	Apr. 11	36 45 45	122 04 40	54	52	39.3	519	gn. m.
2277	Apr. 11	36 45 40	121 53 05	54	53	47.7	66	bk. s. r.
		Bering Sea.						
2278	May 21	54 02 25	162 50 30	44	44	39	271	m. s. p.
2279	May 22	54 15 00	164 53 00	41	42	38.5	42	r. brk. sh.
2280	May 22	54 34 00	165 37 00	39	43	38.5	178	bk. s.
2281	May 22	54 55 40	166 06 00	38	42	38.2	80	yl. m.
2282	May 23	54 58 30	166 24 30	39	43	.....	81	
2283	May 23	55 00 50	166 41 30	38	41	.....	80	m.
2284	May 23	55 00 00	166 59 00	36	41	.....	88	sh.
2285	May 23	54 59 00	167 17 00	36	41	38	117	s. sh.
2286	May 23	54 49 20	167 10 00	38	43	38.6	186	gn. m.
2287	May 23	54 23 45	166 38 30	38	43	38.2	320	gn. m.
2288	May 23	54 09 20	166 28 00	38	42	37	593	gn. m.
2289	May 28	54 27 00	165 18 00	42	44	.....	99	bk. s.
2290	May 28	54 29 30	165 10 00	42	43	38	47	bk. s.
2291	May 28	54 28 20	165 08 00	42	45	39	45	gy. s.
2292	May 28	54 31 40	165 09 00	42	43	.....	32	bk. s. brk. sh.
2293	May 28	54 34 30	164 55 45	41	42	.....	24	bk. s.
2294	May 28	54 39 00	164 51 00	41	42	.....	30	bk. s.
2295	May 28	54 41 15	164 48 30	41	42	.....	28	crs. s. g.
2296	May 28	54 47 30	164 46 00	41	42	40	34	g.
2297	May 28	54 57 40	164 36 50	41	42	41	31	bk. p.
2298	May 28	54 57 30	164 31 20	40	44	41.5	18	fne. bk. s.
2299	May 29	54 54 45	164 19 30	45	44	.....	16	bk. s.
2300	May 29	54 59 00	164 05 35	44	44	39.3	12	rky.
2301	May 29	55 03 10	163 49 30	44	44	41	15	fne. g.
2302	May 29	55 03 50	163 37 30	44	44	41	16	fne. bk. s.
2303	May 29	55 04 15	163 30 45	44	44	41	11	fne. bk. s.
2304	May 29	55 10 00	163 13 45	42	44	.....	15	s.
2305	May 29	55 16 10	163 01 30	44	46	.....	14	fne. gy. s.
2306	May 29	55 22 00	162 53 30	44	46	.....	13	bk. g.
2307	May 29	55 27 40	162 44 15	44	45	.....	16	fne gy. s. bk. sp.
2308	May 29	55 32 30	162 38 00	44	45	.....	22	fne. gy. s.
2309	May 29	55 36 40	162 30 20	44	47	.....	23	rky. brk. sh.
2310	May 29	55 39 45	162 24 00	44	45	.....	22	g. brk. sh.
2311	May 29	55 42 45	162 18 00	44	45	.....	20	fne. bk. s.
2312	May 29	55 46 15	162 12 00	45	45	41	16	rky. sh.
2313	May 29	55 48 15	162 07 15	44	45	.....	17	p. bk. s.
2314	May 29	55 51 00	162 01 00	45	45	.....	15	g.
2315	May 29	55 52 00	161 58 00	45	45	.....	13	r.
2316	May 30	55 54 40	161 51 40	41	42	.....	16	bk. s. brk. sh.
2317	May 30	55 57 00	161 45 00	42	43	.....	16	g. brk. sh.
2318	May 30	55 59 40	161 35 45	41	42	.....	22	bk. s.
2319	May 30	56 01 00	161 26 00	41	42	.....	16	bk. s.
2320	May 30	56 01 30	161 16 45	43	43	.....	14	bk. s.
2321	May 30	56 01 40	161 12 30	43	43	.....	12	bk. s.
2322	May 30	56 02 45	161 03 30	43	43	.....	12	crs. bk. s.
2323	May 30	56 04 15	160 55 20	43	44	.....	13	fne br. s.
2324	May 30	56 04 15	160 46 00	43	44	.....	11	crs. s. and g.
2325	May 30	56 04 00	160 43 45	44	43	.....	12	fne g.
2326	May 30	56 09 15	160 30 30	44	45	.....	14	fne. gy. s.
2327	May 30	56 12 00	160 23 15	44	45	.....	13	fne. bk. s.
2328	May 30	56 14 15	160 21 15	48	46	.....	13	crs. bk. s.
2329	May 30	56 18 00	160 18 00	46	48	.....	11	bk. s. g.
2330	May 30	56 25 40	160 06 20	46	46	39	13	g.
2331	May 30	56 33 20	159 49 30	47	42	.....	16	bk. g.
2332	May 30	56 42 20	159 25 20	45	41	.....	18	bk. g.
2333	May 30	56 46 30	159 08 30	45	44	.....	14	bk. g.
2334	May 30	56 48 30	158 58 30	45	44	.....	12	gy. s.
2335	May 30	56 52 00	158 51 00	44	43	.....	9	fne. gy. s.
2336	May 30	56 54 00	158 48 30	44	43	.....	11	fne. bk. s.
2337	May 30	57 02 45	158 40 30	44	42	.....	10	fne gy. s. bk. sp.
2338	May 30	57 05 00	158 39 00	44	42	.....	12	fne. gy s. bk. sp.
2339	May 31	57 08 30	158 36 15	44	43	.....	13	fne. bk. s.
2340	May 31	57 13 30	158 32 00	44	43	.....	19	bk. s. g.
2341	May 31	57 19 00	158 25 30	44	43	.....	19	bk s. g.
2342	May 31	57 24 30	158 19 30	43	43	.....	16	bk. s. g.
2343	May 31	57 29 30	158 13 30	42	43	.....	15	fne. gv. s. g.
2344	May 31	57 32 00	158 09 30	43	43	.....	14	fne. gy. s. g.
2345	May 31	57 34 50	158 06 00	42	43	.....	13	fne. gy. s. g.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Bering Sea.						
	1890.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
2346	May 31	57 38 00	157 57 00	43	42	.....	10	gy. s.
2347	May 31	57 40 00	157 53 00	43	43	.....	7.5	gy. s.
2348	May 31	57 44 00	157 52 30	44	44	.....	10	gy. s.
2349	May 31	57 48 40	147 49 00	44	44	.....	8	crs. bk. s.
2350	May 31	57 52 40	157 46 30	44	44	.....	10	gy. s.
2351	May 31	57 57 00	157 43 00	46	45	.....	7	gy. s.
2352	May 31	58 00 40	157 41 00	45	44	.....	7	gy. s.
2353	May 31	58 03 40	157 40 00	46	45	.....	5.25	gy. s.
2354	May 31	58 07 00	157 41 30	46	45	.....	7	gy. s.
2355	May 31	58 08 40	157 42 00	45	44	.....	5	fne. gy. s.
2356	May 31	58 14 00	157 44 00	45	44	.....	4.5	g.
2357	May 31	58 22 20	157 42 00	45	44	.....	4.5	p.
2358	May 31	58 27 10	157 39 00	46	45	.....	5	p.
2359	May 31	58 32 00	157 33 00	46	45	.....	5.5	g.
2360	May 31	58 34 00	157 31 00	45	44	.....	6.25	bk. s.
2361	May 31	58 35 00	157 28 30	48	49	.....	4	s.
2362	May 31	58 39 00	157 19 30	48	49	.....	7.5	p.
2363	June 2	58 40 45	157 16 20	43	45	.....	4.25	bk. s.
2364	June 2	58 40 30	157 21 30	44	45	.....	4.5	fne. gy. s.
2365	June 2	58 40 30	157 22 30	44	45	.....	5 feet	fne. gy. s.
2366	June 2	58 39 00	157 24 00	45	45	.....	5.5	fne. gy s. bk. sp.
2367	June 2	58 37 45	157 26 30	45	45	.....	12	fne. gy. s. bk. sp.
2368	June 7	58 07 00	158 54 00	35	40	.....	22.25	fne. gy. s.
2369	June 8	58 12 00	159 06 15	38	41	.....	21.5	fne. gy. s. and r.
2370	June 8	58 18 40	159 17 30	40	41	.....	10.5	fne. gy. s.
2371	June 8	58 40 00	160 00 00	46	48	.....	8	
2372	June 8	58 42 15	160 04 00	43	45	.....	8.5	
2373	June 8	58 44 15	160 07 30	45	46	.....	11.5	
2374	June 9	58 28 30	161 53 00	39	38	35	12.5	g.
2375	June 9	58 35 30	162 11 00	39	38	37	25	g.
2376	June 13	58 18 30	162 50 00	38	39	35.5	16.5	fne. gy. s.
2377	June 14	58 00 00	163 24 30	38	39	.....	23	fne. gy. s.
2378	June 14	57 49 50	163 44 00	38	39	37	24	fne. gy. s.
2379	June 14	56 05 00	164 38 00	43	44	36	51	gn. m.
2380	June 15	55 52 30	164 47 00	42	43	35	46	bk. s. and m.
2381	June 15	55 37 30	164 51 00	42	43	39	58	bk. s. and m.
2382	June 24	54 40 30	165 41 00	43	44	38.5	148	m. and fne. s.
2383	June 24	54 37 40	164 58 00	42	44	40.8	30	bk. g.
2384	June 24	54 46 00	164 55 30	45	45	40.2	37	crs. s. g. and p.
2385	June 24	54 56 30	165 15 30	43	45	40	62	bk. m.
2386	June 24	54 54 00	164 36 00	43	45	41.3	40	bk. g.
2387	June 24	54 53 15	164 33 00	42	44	41.4	24	bk. g.
2388	June 24	54 59 00	164 13 00	43	44	41.2	25	crs. s. g.
2389	June 25	55 08 45	164 18 00	42	44	40	46	bk. g.
2390	June 25	55 18 30	184 23 15	42	44	39	56	bk. m. and g.
2391	June 25	55 25 00	164 05 20	42	45	38.8	53	bk. s. and g.
2392	June 25	55 14 00	163 21 30	44	46	42.6	26	bk. s.
2393	June 25	55 34 30	163 37 00	45	46	40	44	gy. s.
2394	June 25	55 38 00	163 20 45	49	48	39.5	42	gy. s.
2395	June 25	55 33 30	163 10 15	45	47	40	36	bk. s.
2396	June 25	55 23 40	163 07 30	42	45	42.6	20	bk. g.
2397	June 26	55 21 30	162 56 00	43	47	43.8	16	crs. bk. s. sh.
2398	June 27	55 36 15	163 00 00	43	45	39	35	fne. gy. s.
2399	June 27	55 37 45	162 40 30	42	46	41	26	fne. gy. s.
2400	June 27	55 51 10	162 30 30	42	44	.....	34	fne. gy. s.
2401	June 28	55 57 45	162 43 00	42	44	.....	46	fne. gy. s.
2402	June 28	56 05 15	162 31 00	42	45	37	41	fne. gy. s.
2403	June 28	55 58 30	162 18 00	42	45	37	40	fne. gy. s. bk. sp.
2404	June 28	56 06 15	161 58 00	42	44	40.6	34	bk. s.
2405	June 28	56 19 00	162 26 00	43	45	38	40	fne. gy. s. and g.
2406	June 28	56 33 45	162 26 00	44	45	39	41	fne. gy. s.
2407	June 28	56 20 30	161 54 45	42	45	38.2	48	fne. gy. s. bk. sp
2408	June 28	56 06 30	161 25 30	42	45	43	21	p.
2409	June 28	56 10 45	161 09 15	42	44	43.5	21	gy. s.
2410	June 29	56 17 20	161 22 00	43	46	41	30	bk. s. g.
2411	June 29	56 24 10	161 37 00	42	45	40	37	gy. s.
2412	June 29	56 38 30	161 38 00	44	45	38.8	46	fne. gy. s.
2413	June 29	56 21 15	161 03 00	42	44	41	35	fne. gy. s. bk. sp
2414	June 29	56 10 15	160 42 30	45	46	.....	15	fne. gy. s.
2415	July 16	56 04 30	160 39 30	50	54	.....	8.5	fne. gy. s.
2416	July 16	56 09 45	160 33 00	48	54	.....	14.75	crs. bk. s.
2417	July 16	56 14 15	160 26 45	48	49	.....	12	bk. g.
2418	July 16	56 22 00	160 37 30	47	48	44	28	fne. gy. s.
2419	July 16	56 29 30	160 49 00	45	47	.....	37	fne. gy. s.
2420	July 17	56 36 30	161 00 30	45	46	41	38	fne. gy. s.
2421	July 17	56 44 15	161 12 30	44	46	40.5	38	fne. gy. s.
2422	July 17	56 52 15	160 58 00	44	46	40	40	fne. gy. s.
2423	July 17	56 33 20	159 43 30	44	45	.....	15	bk. s. g.
2424	July 17	56 40 40	159 54 30	43	45	.....	30	fne. gy. s. g.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Bering Sea.						
	1890.	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	*Fms.*	
2425	July 17	56 48 00	160 05 30	42	42	.....	35	crs. bk. s.
2426	July 17	56 55 30	160 17 30	42	43	38	36	gy. s.
2427	July 17	57 03 20	160 29 00	41	43	.....	39	bk. s.
2428	July 17	57 10 30	160 15 00	41	43	38	38	bk. s.
2429	July 17	57 04 20	160 00 00	41	43	38.5	34	fne. gy. s. bk. sp.
2430	July 18	56 57 45	159 46 00	40	42	.....	34	gy. s.
2431	July 18	56 57 00	159 31 00	40	43	41	30	bk. g.
2432	July 18	57 06 20	159 23 00	42	46	40	31	gy. s. g.
2433	July 18	57 21 30	159 46 30	43	44	40	32	bk. s. g.
2434	July 18	57 23 15	159 17 00	43	44	40	31	fne. gy. s.
2435	July 18	57 10 15	158 49 00	41	43	41.6	25	gy. s.
2436	July 18	57 07 30	158 42 30	41	43	.....	20	s.
2437	July 18	57 05 45	158 39 00	41	44	.....	17	s.
2438	July 19	57 05 30	158 37 30	41	44	.....	12½	bk. s.
2439	July 19	57 48 30	158 48 00	45	48	43.5	24	gy. s.
2440	July 19	57 45 15	157 56 00	46	50	.....	13	fne. gy. s.
2441	July 20	57 56 45	158 17 00	47	50	40.4	20	gy. s. bk. sp.
2442	July 20	58 00 30	159 13 30	51	55	44.2	21	bk. s.
2443	July 20	58 01 00	159 33 15	49	55	45	23	gy. s.
2444	July 20	58 24 00	160 17 30	49	53	.....	6½	gy. s. g.
2445	July 21	57 59 00	160 24 45	49	50	40.1	26	fne. gy. s.
2446	July 21	57 32 40	160 00 00	48	47	41	29	fne. gy. s.
2447	July 21	57 39 00	160 39 30	50	52	39.5	31	fne. gy. s.
2448	July 21	57 50 40	160 57 00	50	52	39.8	27	fne. gy. s.
2449	July 21	58 10 20	161 24 30	47	49	40.6	23	fne. bk. s.
2450	July 21	58 14 20	161 30 30	47	49	40.2	22	fne. gy. s. g.
2451	July 22	58 05 00	161 52 15	46	49	41	31	fne. gy. s.
2452	July 22	57 38 15	161 28 30	47	50	41.2	30	fne. gy. s.
2453	July 22	57 31 20	161 23 00	47	51	.....	32	gy. s.
2454	July 22	57 11 15	161 05 00	45	50	41.8	29	dk. s.
2455	July 22	56 57 30	160 52 30	45	48	41	38	fne. gy. s.
2456	July 22	56 31 15	160 23 30	45	49	.....	32	gy. s. g.
2457	July 22	56 27 45	160 25 30	46	49	.....	30	fne. gy. s.
2458	July 22	56 25 20	160 23 30	46	50	.....	22	g.
2459	July 22	56 22 45	160 21 30	46	50	.....	20	fne. gy. s.
2460	July 29	56 05 30	161 02 00	53	51	.....	18	g.
2461	July 29	55 55 15	161 15 00	49	51	.....	14	g.
2462	Aug. 2	54 02 45	166 33 00	47	50	.....	61	bk. s. g.
2463	Aug. 2	54 03 00	166 52 30	48	48	43	305	gn. m.
2464	Aug. 2	54 01 40	167 09 00	48	48	36.2	802	gn. m.
2465	Aug. 2	53 58 40	167 35 00	48	50	35.8	885	m.
2466	Aug. 2	53 54 10	167 52 00	48	51	36.7	643	bk. s. g.
2467	Aug. 2	55 53 00	167 56 00	48	51	37	578	fne. bk. s.
2468	Aug. 3	54 43 00	171 16 00	50	52	35	1,745	gn. oz.
2469	Aug. 3	55 31 00	171 42 00	48	51	35	1,818	gn. oz.
2470	Aug. 4	56 51 00	172 28 00	46	50	38.5	69	gn. m.
2471	Aug. 4	57 00 30	173 25 00	46	50	38.2	314	gn. m.
2472	Aug. 4	57 19 30	174 07 00	45	50	37.5	445	gn. m.
2473	Aug. 5	57 46 00	174 35 00	47	50	35	1,740	gn. oz.
2474	Aug. 5	58 14 00	174 35 00	47	50	35.8	977	fne. dk. s.
2475	Aug. 5	58 43 00	174 33 00	47	50	38	144	fne. dk. s.
2476	Aug. 6	56 50 00	175 15 00	46	50	35	1,887	gn. oz.
2477	Aug. 6	56 02 10	175 35 00	48	50	34.9	1,998	gn. oz.
2478	Aug. 7	55 17 00	175 32 00	46	50	35	2,030	gn. oz.
2479	Aug. 7	54 30 30	175 32 00	48	49	35	2,147	gn. oz.
2480	Aug. 7	53 42 00	175 33 00	49	50	35	2,053	bn. oz.
2481	Aug. 15	53 56 02	166 27 05	50	54	.....	25	fne. gy. s.
2482	Aug. 15	53 57 32	166 30 20	50	54	41	79	fne. s. sh. m.
2483	Aug. 15	53 58 06	166 31 26	50	54	40.8	95	fne. s. m.
2484	Aug. 15	53 58 50	166 33 10	50	54	41.6	118	fne. s. bn. m.
2485	Aug. 15	53 59 18	166 34 27	50	54	42.3	53	fne. dk. s.
2486	Aug. 15	53 59 42	166 35 29	56	54	45.8	22	rd. and bk. g.
2487	Aug. 15	53 59 47	166 33 48	56	52	41.3	71	fne. s. m.
2488	Aug. 15	53 59 42	166 31 44	56	52	40.6	99	fne. s. m.
2489	Aug. 15	53 59 26	166 28 00	56	56	41.3	66	fne. s. m.
2490	Aug. 15	54 00 08	166 24 14	57	55	44.3	37	g. sh. p.
2491	Aug. 15	54 01 23	166 23 37	60	55	44.5	40	fne. g.
2492	Aug. 15	54 01 29	166 25 08	60	55	42.5	57	fne. s. g.
2493	Aug. 15	54 01 59	166 29 32	55	55	40.9	103	fne. bk. s.
2494	Aug. 15	54 02 13	166 30 50	55	55	40.9	97	bk. s.
2495	Aug. 15	54 02 24	166 35 19	56	55	40	77	bk. s. sh.
2496	Aug. 15	54 02 50	166 37 00	56	55	42.1	58	bk. s. g. sh.
2497	Aug. 15	54 04 30	166 40 00	56	55	38.3	322	bk. s.
2498	Aug. 15	54 02 00	166 42 00	53	54	.....	148	bk. s.
2499	Aug. 15	54 00 45	166 40 30	53	54	44.5	37	bk. s.
2500	Aug. 16	54 00 25	166 46 00	62	53	44	52	bk. s. g.
2501	Aug. 16	54 00 25	166 48 00	59	54	39	179	bk. s.
2502	Aug. 16	53 59 30	166 48 30	60	54	43.5	50	bk. s.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Bering Sea.						
	1890.	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	*Fms.*	
2503	Aug. 16	53 58 50	166 51 30	60	54	44.1	22	sh.
2504	Aug. 16	54 00 00	166 58 00	60	52	38.2	316	gn. m.
2505	Aug. 16	53 56 30	167 03 00	60	54	46	36	fne. rd. and bk. s.
2506	Aug. 16	53 55 40	167 06 20	60	54	40.9	97	bk. s. sh. g.
2507	Aug. 16	53 52 35	167 09 00	60	54	46	22	gy. s.
2508	Aug. 16	53 52 00	167 12 15	54	53	44	40	r. g.
2509	Aug. 16	53 52 00	167 14 00	59	52	39	166	bk. m.
2510	Aug. 16	53 50 25	167 13 00	59	52	43	55	bk. g.
2511	Aug. 16	53 50 15	167 15 00	59	52	42	59	bk. g.
2512	Aug. 16	53 50 05	167 16 15	59	52	38.8	106	bk. s. g.
2513	Aug. 16	53 50 05	167 07 20	54	52	44.1	47	bk. s. g.
2514	Aug. 18	53 43 50	167 00 00	50	52	-------	103	bk. m.
2515	Aug. 18	53 43 05	167 02 30	49	50	40.3	109	dk. gn. m.
2516	Aug. 18	53 43 00	167 09 00	49	50	-------	62	bk. s. m.
2517	Aug. 18	53 41 45	167 16 00	49	48	43	54	s. g.
2518	Aug. 18	53 42 00	167 21 30	49	48	-------	58	bk. s. m.
2519	Aug. 18	53 41 45	167 27 20	49	50	40	69	bk. s.
2520	Aug. 18	53 41 00	167 33 25	51	52	38	394	gn. m.
2521	Aug. 18	53 36 30	167 23 25	50	50	42.4	43	crs. bk. s.
2522	Aug. 18	53 30 40	167 11 40	51	50	43.9	32	bk. s.
2523	Aug. 18	53 30 25	167 17 30	51	50	42.9	37	bk. s.
2524	Aug. 18	53 30 55	167 31 10	50	50	41.5	44	bk. s.
2525	Aug. 18	53 32 55	167 36 50	48	47	39 5	136	bk. s. m.
2526	Aug. 18	53 37 00	167 41 50	47	47	37	524	gn. m.
2527	Aug. 19	53 37 30	167 43 50	45	45	38.5	247	gn. m.
2528	Aug. 19	53 30 55	167 36 20	45	46	41.5	49	bk. s. m.
2529	Aug. 19	53 28 25	167 33 40	45	45	41.8	43	bk. s.
2530	Aug. 19	53 24 30	167 34 05	46	46	42	42	bk. s. sh.
2531	Aug. 19	53 23 15	167 32 50	48	50	44.4	15	bk. s. g.
2532	Aug. 20	53 24 20	167 37 05	48	48	42	60	bk. s. g.
2533	Aug. 20	53 23 30	167 39 25	48	48	42.3	47	g. sh.
2534	Aug. 20	53 23 30	167 42 40	48	48	42.1	39	bk. g. sh.
2535	Aug. 20	53 24 00	167 46 10	47	48	42.9	30	bk. s.
2536	Aug. 20	53 25 20	167 48 20	47	48	42.1	37	bk. s.
2537	Aug. 20	53 28 15	167 45 50	47	48	42.2	35	bk. s. g.
2538	Aug. 20	53 31 45	167 43 45	47	48	41.5	43	bk. s.
2539	Aug. 20	53 48 00	167 24 00	48	47	38	624	bn. m.
2540	Aug. 22	53 53 45	166 30 05	46	48	-------	19	m.
2541	Aug. 22	53 54 00	166 29 30	46	48	-------	17	gn. m.
2542	Aug. 22	53 55 35	166 27 45	46	48	-------	19	s. m.
2543	Aug. 22	53 56 00	166 28 30	47	48	43.3	35	fne. gy. s.
2544	Aug. 22	53 56 45	166 30 15	47	48	41.8	63	fne. s. m.
2545	Aug. 22	53 57 30	166 32 15	47	47	41.1	65	fne. s. m.
2546	Aug. 22	53 58 45	166 34 25	47	48	-------	23	bk. g.
2547	Aug. 22	53 58 20	166 34 45	50	50	-------	17	bk. s.
2548	Aug. 22	53 58 05	166 34 10	50	50	41.8	54	fne. bk. s.
2549	Aug. 22	53 55 55	166 33 55	50	52	42.4	45	fne. bk. s.
2550	Aug. 22	53 55 05	166 34 35	54	54	43.3	47	bn. m.
2551	Aug. 22	53 54 15	166 35 35	54	54	42.1	58	bn. m.
2552	Aug. 22	53 53 20	166 36 20	54	54	-------	13	crs. bk. s.
2553	Aug. 26	54 02 15	166 11 20	46	47	34.3	41	r.
2554	Aug. 26	54 00 25	166 05 40	46	47	45.7	26	sh. r.
		North Pacific off Alaska.						
2555	Aug. 26	53 59 00	165 57 20	54	46	44.9	48	g.
2556	Aug. 27	53 58 00	162 37 00	60	55	37.8	619	gn. m.
2557	Aug. 27	54 01 00	161 42 30	59	53	38.1	542	r.
2558	Aug. 27	54 11 00	160 37 00	52	52	36.6	756	gn. m.
2559	Aug. 29	55 41 00	154 48 00	54	51	37.9	494	gn. m. s.
2560	Aug. 29	56 00 00	153 30 00	53	52	39.5	207	m.
2561	Aug. 29	56 00 00	152 56 00	54	52	35.5	1,152	gn. m.
2562	Aug. 30	56 00 30	152 26 00	55	54	34.9	2,197	bl. m.
2563	Aug. 30	56 01 00	152 26 00	55	54	34.5	2,620	gn. m.
2564	Aug. 30	56 01 00	151 00 00	54	53	35.1	2,935	bn. m. s. oz.
2565	Aug. 30	56 02 00	150 38 00	54	54	35.3	2,925	gy. oz.
2566	Aug. 30	55 59 30	149 44 00	54	54	34.9	2,776	gy. oz.
2567	Aug. 31	55 54 00	147 57 00	54	54	35.1	2,414	bn. m.
2568	Aug. 31	55 49 00	144 57 00	55	54	35.1	2,132	gy. oz.
2569	Sept. 1	54 53 00	141 06 00	57	56	35.1	1,963	gy. oz. bk. s.
2570	Sept. 2	54 22 00	137 24 00	56	56	35.3	1,655	lt. bn. oz.
2571	Sept. 3	53 06 30	133 53 30	57	57	35.3	1,566	oz. bn. m. s.
		Off west coast of United States.						
2572	Sept. 24	40 26 00	124 29 45	53	51	50.4	26	bk. g. p.
2573	Sept. 24	40 27 40	124 33 00	53	52	49.6	52	dk. m. s.
2574	Sept. 24	40 27 45	124 36 55	53	52	44.8	226	bk. s. m.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off west coast of United States.						
	1890.	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	*Fms.*	
2575	Sept. 24	40 24 35	124 37 40	53	52	39.8	489	gn. m.
2576	Sept 24	40 23 50	124 33 30	55	54	42.6	337	gn. m. s.
2577	Sept. 24	40 13 30	124 25 45	58	52	49.6	55	r. g. sh.
2578	Sept. 24	40 00 30	124 06 30	56	52	52.7	23	fne. gy. s.
2579	Sept. 24	39 55 45	124 10 45	55	52	.....	184	gn. m.
2580	Sept. 24	39 51 25	124 07 50	55	53	47.6	159	fne. gy. s.
2581	Sept. 24	39 52 05	124 06 00	55	53	48	80	crs. g.
2582	Sept. 24	39 47 30	124 03 00	55	54	47.6	110	bk. s. m.
2583	Sept. 24	39 46 25	124 05 50	55	54	43.6	263	gn. m.
2584	Sept. 24	39 42 00	124 03 00	54	54	43.4	270	gn. m.
2585	Sept. 24	39 43 25	123 59 10	55	53	.....	93	gn. m.
2586	Sept. 24	39 44 00	123 57 40	55	53	.....	81	gn. m.
2587	Sept. 24	39 38 05	123 58 30	55	53	47.6	102	gn. m.
2588	Sept. 24	39 37 15	124 00 55	55	53	44.1	246	gn. m.
2589	Sept. 24	39 32 15	123 59 00	55	53	44.6	226	gn. m.
2590	Sept. 25	39 32 05	123 56 50	55	53	46.4	140	s. m.
2591	Sept. 25	39 27 00	123 57 25	54	53	48	82	fne. s. bk. g.
2592	Sept. 25	39 27 00	123 58 30	54	53	46.4	157	m.
2593	Sept. 25	39 27 00	124 00 00	54	53	44.3	234	m.
2594	Sept. 25	39 22 00	124 00 00	54	53	43.7	238	m.
2595	Sept. 25	39 22 00	123 58 00	54	53	47	132	fne. s. m.
2596	Sept. 25	39 22 00	123 56 05	54	53	48.4	77	m.
2597	Sept. 25	39 17 15	123 55 55	54	53	48.5	77	fne. s. m.
2598	Sept. 25	39 16 50	123 57 45	54	53	47.6	80	m.
2599	Sept. 25	39 16 10	123 58 35	54	55	47.6	161	gn. m.
2600	Sept. 25	39 11 05	123 59 00	54	55	46.4	183	gn m.
2601	Sept. 25	39 12 20	123 56 00	54	54	47.6	77	gn. m.
2602	Sept. 25	39 13 10	123 54 00	54	54	48.1	69	gn. m.
2603	Sept. 25	39 13 50	123 52 30	54	54	44.6	64	gn. m.
2604	Sept. 25	39 12 10	123 50 50	53	54	49.4	60	gn. m.
2605	Sept. 25	39 09 30	123 49 00	53	54	49.6	54	gn. m.
2606	Sept. 25	39 08 10	123 52 30	53	54	46.1	59	gn. m.
2607	Sept. 25	39 07 50	123 56 00	53	54	48.6	71	gn. m.
2608	Sept. 25	39 06 30	123 59 30	53	54	45.5	199	gn. m.
		Off west coast of South America and Mexico.						
	1891.							
2609	Feb. 23	7 12 30	80 56 00	79	81	57.7	127	g. s. sh.
2610	Feb. 28	5 29 30	86 49 30	81	82	37.2	1,009	glob. oz.
2611	Feb. 28	5 35 10	86 57 10	84	83.6	58.2	82	r.
2612	Mar. 1	5 28 20	86 55 30	78	82	57.2	94	fne. wh. s.
2613	Mar. 5	3 50 09	81 44 20	77	77	36.5	1,181	bn. glob oz.
2614	Mar. 8	7 34 35	79 18 20	76	74	49.8	226	s. sh.
2615	Mar. 8	7 36 20	79 18 10	76	74	53.8	191	crs. gy. s.
2616	Mar. 8	7 38 10	79 18 00	77	74	50.3	151	gy. s.
2617	Mar. 11	7 26 40	78 52 40	72	70	36	1,681	r.
2618	Mar. 11	7 27 10	78 46 40	71	69	36	1,708	gn. glob. oz.
2619	Mar. 11	7 31 00	78 42 30	72	68	36.5	1,100	gn. glob. oz.
2620	Mar. 11	7 29 00	78 43 30	76	70	36	1,482	gn. glob. oz.
2621	Mar. 11	7 30 00	78 40 30	77	70	36.5	1,104	gn. m.
2622	Mar. 23	1 27 10	80 02 10	78	79	40.1	809	sft. m.
2623	Mar. 23	1 21 30	80 01 40	78	78	39.2	750	gn. oz.
2624	Mar. 23	1 18 00	80 01 00	77	80	39	724	gn. oz.
2625	Mar. 23	1 11 00	79 59 30	78	80	41.2	536	gn. m.
2626	Mar. 23	1 07 00	79 59 00	79	80	57.3	90	gn. m. s.
2627	Mar. 25	0 36 00	82 45 00	80	81	36	1,832	gn. glob. oz.
		South.						
2628	Mar. 26	0 13 00	84 52 00	81	81	.....	.....	
2629	Mar. 26	0 20 00	85 08 00	85	83	36	1,488	glob. oz.
		North.						
2630	Apr. 4	1 24 30	91 38 00	82	83	36.2	1,270	glob. oz.
2631	Apr. 11	16 20 00	99 41 30	77	80	35.8	1,823	yl. s. bk. sp.
2632	Apr. 12	16 42 00	100 11 00	79	80	38.5	838	gn. m.
2633	Apr. 12	16 45 00	100 06 00	82	82	37	912	dk. gn. m.
2634	Apr. 12	16 46 30	100 02 30	81	82	40	602	dk. gn. m
2635	Apr. 18	20 47 15	106 15 30	72	74	36	2,022	dk. gn. m.
2636	Apr. 18	21 03 00	106 21 30	73	74	35.8	2,102	gn. oz. bk. sp.
2637	Apr. 22	27 20 00	110 54 00	72	71	38	773	bn. m. bk. sp.
2638	Apr. 23	27 38 00	111 04 00	72	72	39.2	622	bn. m. bk. sp.
		Off Alaska.						
2639	Aug. 3	57 07 00	170 27 00	49	46	.....	31	bk. p. sh.
2640	Aug. 3	57 15 00	170 40 00	47	46	.....	42	rky.
2641	Aug. 11	53 59 00	166 38 30	50	48	.....	24	bk. g. brk. sh

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		West coast United States.						
	1891.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
2642	Aug. 28	48 24 30	124 37 30	63	52	.....	78	p.
2643	Aug. 28	48 26 00	124 37 20	63	52	.....	144	br. m.
2644	Aug 28	48 28 05	124 36 55	63	52	.....	137	gy. s. g.
2645	Aug. 29	48 24 25	124 37 45	59	54	.....	59	g. s.
2646	Aug 29	48 27 10	124 39 50	61	56	.....	140	g.
2647	Sept. 1	48 25 30	124 42 15	57	52	.....	74	r.
2648	Sept. 2	48 23 55	124 13 30	60	55	.....	93	s. p.
2649	Sept. 2	48 24 50	124 11 40	60	55	.....	73	gy. s.
2650	Sept. 2	48 25 30	124 08 00	61	56	.....	44	gy. s.
2651	Sept. 3	48 13 30	123 58 00	58	53	.....	64	sp.
2652	Sept. 3	48 18 00	123 49 40	59	53	.....	95	rky.
2653	Sept. 4	48 19 00	123 18 20	62	58	.....	55	gy. s. g. sh.
2654	Sept. 4	48 18 00	123 14 00	62	58	.....	19	rky.
		Cable Survey, California to Hawaiian Islands a						
2655	Oct. 11	36 48 10	121 47 50	50	55	49	52	fne. bk. s.
2656	Oct. 11	36 48 14	121 47 38	50	55	.....	24.5	gn. m.
2657	Oct. 11	36 48 15	121 47 34	50	55	.....	20.25	gn. m.
2658	Oct. 11	36 48 16	121 47 30	50	55	.....	15.25	gn. m.
2659	Oct. 11	36 48 17	121 47 28	50	55	.....	12	gn. m.
2660	Oct. 11	36 48 18	121 47 26	50	55	.....	10	gn. m.
2661	Oct. 11	36 48 14	121 47 26	50	55	.....	9.75	gn. m.
2662	Oct. 11	36 48 10	121 47 25	50	55	.....	4.5	gn. m.
2663	Oct. 11	36 48 06	121 47 27	50	55	.....	7.5	gn. m.
2664	Oct. 11	36 48 03	121 47 28	50	55	.....	9	gn. m.
2665	Oct. 11	36 48 04	121 47 30	50	55	.....	15	gn. m.
2666	Oct. 11	36 48 05	121 47 34	50	55	.....	18.5	gn. m.
2667	Oct. 11	36 48 06	121 47 38	50	55	.....	23.5	gn. m.
2668	Oct. 11	36 48 10	121 47 50	52	55	.....	54	bk. m.
2669	Oct. 11	36 47 53	121 49 06	53	56	.....	75	gn. m.
2670	Oct. 11	36 47 34	121 50 20	53	57	47.5	124	gn. m.
2671	Oct. 11	36 47 16	121 51 20	53	56	.....	165	gn. m.
2672	Oct. 11	36 47 04	121 52 45	53	56	46.1	213	gn. m.
2673	Oct. 11	36 46 50	121 53 50	53	56	.....	266	br. m.
2674	Oct. 11	36 46 40	121 55 10	54	53	53.5	352	br. m. s.
2675	Oct. 11	36 46 25	121 56 30	54	53	.....	388	br. m. s.
2676	Oct. 11	36 46 15	121 57 30	54	53	39.5	442	fne. gy. s.
2677	Oct. 11	36 45 45	122 00 00	55	56	.....	377	gy. s.
2678	Oct. 11	36 45 25	122 02 30	55	55	39	618	br. m. s.
2679	Oct. 11	36 45 00	122 05 30	55	55	40	548	br. m. s.
2680	Oct. 11	36 44 40	122 09 30	55	55	37	868	br. m. s.
2681	Oct. 11	36 44 00	122 13 00	55	55	.....	486	gy. s.
2682	Oct. 11	36 43 00	122 17 00	55	55	38	663	br. m. s.
2683	Oct. 11	36 42 30	122 22 00	54	55	.....	770	br. m. s.
2684	Oct. 11	36 41 30	122 28 00	54	54	35.5	1,122	br. m. s.
2685	Oct. 11	36 39 30	122 41 00	55	55	35.1	1,424	br. m.
2686	Oct. 11	36 37 00	122 54 00	55	55	35	1,597	br. m.
2687	Oct. 12	36 35 00	123 06 00	55	55	35	1,661	br. m.
2688	Oct. 12	36 32 30	123 19 00	56	54	35	1,907	br. m. s.
2689	Oct. 12	36 30 30	123 32 00	55	55	35	1,983.	(Lost cup.)
2690	Oct. 12	36 28 00	123 44 00	55	54	35	2,061	gy. oz.
2691	Oct. 12	36 25 30	124 02 50	57	56	34.8	2,112	gy. oz.
2692	Oct. 12	36 20 00	124 20 30	55	55	35	2,333	gy. oz.
2693	Oct. 12	36 14 30	124 37 30	59	56	35	2,330	gy. oz.
2694	Oct. 12	36 09 00	124 55 30	58	59	35	2,434	br. and gy. oz.
2695	Oct. 12	36 03 00	125 13 00	58	57	35	2,430	br. oz.
2696	Oct. 13	35 58 00	125 31 00	58	57	35	2,547	br. and gy. oz.
2697	Oct. 13	35 52 30	125 48 00	58	57	35	2,570	br. and gy. oz
2698	Oct. 13	35 47 30	126 05 00	62	62	35	2,566	br. oz.
2699	Oct. 13	35 41 50	126 22 20	61	62	34.9	2,574	br. oz.
2700	Oct. 13	35 37 00	126 41 00	62	62	34.9	2,569	br. oz.
2701	Oct. 13	35 33 00	126 59 30	62	62	35	2,654	br. oz.
2702	Oct. 13	35 28 30	127 17 00	61	62	35	2,577	br. oz.
2703	Oct. 13	35 24 00	127 36 00	61	62	.....	2,533	bn. oz.
2704	Oct. 14	35 20 00	127 54 00	63	64	35	2,600	bn. oz.
2705	Oct. 14	35 15 30	128 12 00	63	64	.....	2,701	bn. oz.
2706	Oct. 14	35 11 30	128 29 00	65	65	35	2,606	bn. oz.
2707	Oct. 14	35 07 00	128 48 30	65	65	35	2,720	bn. oz.
2708	Oct. 14	35 03 30	129 05 00	67	66	35	2,645	bn. oz.
2709	Oct. 14	34 58 30	129 20 00	66	65	35	2,689	bn. oz.
2710	Oct. 14	34 49 00	129 37 00	65	65	.....	2,607	(Lost cup.)
2711	Oct. 14	34 42 00	129 52 30	64	65	.....	2,701	br. oz.
2712	Oct. 15	34 35 00	130 08 00	64	64	35.1	2,751	br. oz.
2713	Oct. 15	34 28 00	130 24 00	63	64	.....	2,768	br. oz.
2714	Oct. 15	34 21 00	130 40 00	66	65	.....	2,789	br. oz.

a Stations 2655 to 3202, Hawaiian Islands Cable Survey, numbered in Navy report 1 to 556.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Cable Survey, California to Hawaiian Islands.						
	1891.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
2715	Oct. 15	34 14 00	130 56 00	67	65	35.4	2,869	br. oz.
2716	Oct. 15	34 07 30	131 12 00	66	65	.....	2,895	br. oz.
2717	Oct. 15	34 01 00	131 28 00	66	65	.....	2,791	br. oz.
2718	Oct. 15	33 54 30	131 45 00	66	65	35.4	2,772	br. oz.
2719	Oct. 15	33 48 30	132 01 00	66	66	.....	2,806	br. oz.
2720	Oct. 16	33 41 30	134 17 00	66	66	.....	2,793	br. oz.
2721	Oct. 16	33 35 00	132 33 30	65	66	35.3	2,833	br. oz.
2722	Oct. 16	33 28 30	132 50 00	65	67	.....	2,700	br. oz.
2723	Oct. 16	33 24 00	133 01 00	67	67	35.5	2,731	br. oz.
2724	Oct. 16	33 20 00	133 12 00	68	67	.....	2,661	br. oz.
2725	Oct. 16	33 15 30	133 24 00	68	67	.....	2,662	br. oz.
2726	Oct. 16	33 12 00	133 34 30	68	67	35.5	2,685	br. m.
2727	Oct. 16	33 08 00	133 46 00	67	66	.....	2,678	br. m.
2728	Oct. 16	33 04 30	133 56 30	67	67	.....	2,670	br. m. lava.
2729	Oct. 16	33 01 00	134 08 00	67	67	35.1	2,641	br. m. bk. sp.
2730	Oct. 16	32 57 30	134 18 30	67	66	.....	2,667	br. m.
2731	Oct. 17	32 54 00	134 30 00	67	68	.....	2,796	br. m.
2732	Oct. 17	32 50 00	134 40 30	67	68	35.2	2,834	br. m.
2733	Oct. 17	32 46 30	134 52 00	67	68	.....	2,461	br. m.
2734	Oct. 17	32 46 00	134 54 00	69	68	35.3	2,322	br. m. lava.
2735	Oct. 17	32 44 40	134 58 00	69	68	.....	2,014	lava.
2736	Oct. 17	32 44 00	135 00 00	69	68	.....	2,406	br. m. lava.
2737	Oct. 17	33 42 00	135 05 00	69	68	35.3	2,529	br. m.
2738	Oct. 17	32 41 30	135 07 20	69	68	.....	2,463	br. m.
2739	Oct. 17	32 39 30	135 12 00	70	69	.....	2,493	br. m.
2740	Oct. 17	32 35 30	135 22 00	70	69	35.2	2,375	br. oz.
2741	Oct. 17	32 31 00	135 33 00	69	69	35	2,739	br. oz.
2742	Oct. 17	32 27 00	135 43 30	69	69	.....	2,506	br. oz.
2743	Oct. 17	32 22 30	135 54 00	69	69	.....	2,442	br. oz.
2744	Oct. 17	32 18 00	136 04 30	69	69	34.9	2,276	br. oz.
2745	Oct. 18	32 14 00	136 15 00	68	69	.....	2,557	br. oz.
2746	Oct. 18	32 10 00	136 26 00	69	69	.....	2,492	(Lost cup.)
2747	Oct. 18	32 05 30	136 36 30	69	69	35	2,421	br. oz.
2748	Oct. 18	32 01 30	136 47 30	69	69	.....	2,417	br. oz.
2749	Oct. 18	31 57 00	136 58 30	62	69	.....	2,601	br. oz.
2750	Oct. 18	31 52 30	137 09 00	61	68	34.9	2,547	br. oz.
2751	Oct. 18	31 48 00	137 19 30	63	69	.....	2,654	br. oz.
2752	Oct. 18	31 43 00	137 30 30	65	69	.....	2,670	br. oz.
2753	Oct. 23	36 47 45	121 50 54	68	60	.....	136	gn. m.
2754	Oct. 23	36 47 40	121 52 10	68	60	.....	173	gn. m.
2755	Oct. 23	36 47 32	121 53 20	68	60	.....	223	gn. m.
2756	Oct. 23	36 47 25	121 54 35	68	60	.....	202	gn. m. s.
2757						Void.		
2758	Oct. 23	36 47 20	121 55 45	68	60	.....	277	gn. m.
2759	Oct. 23	36 47 10	121 57 05	63	60	.....	302	gn. m.
2760	Oct. 23	36 47 10	121 58 15	64	60	.....	255	gn. m.
2761	Oct. 23	36 47 10	121 59 30	63	60	.....	418	gn. m.
2762	Oct. 23	36 47 10	122 00 50	63	60	.....	502	gn. m.
2763	Oct. 23	36 47 10	122 02 05	60	59	39.4	495	gn. m.
2764	Oct. 23	36 47 10	122 03 20	60	59	.....	122	gy. s.
2765	Oct. 23	36 47 10	122 04·35	60	59	.....	441	gn. m. s.
2766	Oct. 23	36 47 10	122 05 50	60	58	.....	196	gn. m. s.
2767	Oct. 23	36 47 10	122 07 05	60	58	44.8	202	gn. m. s.
2768	Oct. 23	36 47 10	122 08 20	60	58	.....	373	gn. m. s.
2769	Oct. 23	36 47 10	122 09 35	59	58	.....	440	gn. m.
2770	Oct. 23	36 47 10	122 10 50	59	58	.....	271	fne. gy. s.
2771	Oct. 23	36 47 10	122 12 05	59	57	42	201	gn. m. s.
2772	Oct. 23	36 47 10	122 13 20	59	58	.....	343	gn. m. s.
2773	Oct. 23	36 47 10	122 14 35	59	57	.....	395	gn. m. s.
2774	Oct. 23	36 47 10	122 15 50	59	56	.....	469	gn. m. s.
2775	Oct. 23	36 47 10	122 17 05	58	56	37.7	607	gn. m. s.
2776	Oct. 23	36 46 10	122 18 20	58	57	.....	621	gn. m. s.
2777	Oct. 23	36 47 10	122 19 35	58	56	.....	979	gn. m. s.
2778	Nov. 7	33 07 00	133 46 15	66	68	.....	2,239	bn. m. lava.
2779	Nov. 8	33 02 30	133 57 00	66	67	35.1	2,520	bn. m.
2780	Nov. 8	32 58 30	134 08 30	64	67	.....	2,648	bn. oz.
2781	Nov. 8	32 54 00	134 18 30	64	67	.....	2,512	bn. oz.
2782	Nov. 8	32 49 30	134 29 30	66	68	35.1	2,721	bn. oz.
2783	Nov. 8	32 45 00	134 40 00	66	68	.....	2,425	br. oz. bk. sp.
2784	Nov. 8	32 43 40	134 42 30	68	68	35.1	2,442	br. m. lava.
2785	Nov. 8	32 41 00	134 49 30	68	68	.....	2,415	br. m. lava.
2786	Nov. 8	32 40 00	134 51 30	69	68	35.1	2,482	br. m.
2787	Nov. 8	32 37 30	134 57 00	69	68	.....	2,504	br. oz.
2788	Nov. 8	32 35 00	135 03 00	69	68	.....	2,470	br. oz.
2789	Nov. 8	32 33 00	135 09 00	66	68	35.0	2,378	br. m. lava. sp.
2790	Nov. 8	32 30 30	135 15 00	64	67	.....	2,441	br. m.
2791	Nov. 9	32 26 00	135 26 30	64	67	.....	2,474	br. m.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Cable Survey, California to Hawaiian Islands.						
	1891.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
2792	Nov. 9	32 21 30	135 38 00	64	67	.....	2,600	br. m.
2793	Nov. 9	32 17 00	135 49 00	65	67	35.1	2,413	br. m.
2794	Nov. 9	32 12 30	136 00 30	67	68	.....	2,619	br. oz.
2795	Nov. 9	32 08 00	136 11 30	68	68	.....	2,606	br. oz.
2796	Nov. 9	32 04 00	136 22 30	64	67	.....	2,484	(Lost cup.)
2797	Nov. 9	31 59 30	136 33 00	64	67	35.1	2,879	br. oz.
2798	Nov. 9	31 54 30	136 44 00	65	67	.....	3,186	(Lost cup.)
2799	Nov. 9	31 50 00	136 54 30	65	67	.....	2,504	br. oz.
2800	Nov. 9	31 45 30	137 05 00	68	68	35.1	2,591	br. oz.
2801	Nov. 10	31 41 00	137 15 30	68	69	.....	2,550	br. oz.
2802	Nov. 10	31 36 00	137 26 00	67	69	.....	2,629	br. oz.
2803	Nov. 10	31 31 30	137 36 30	67	69	.....	2,614	br. oz.
2804	Nov. 10	31 27 00	137 47 00	67	68	35.1	2,719	br. oz.
2805	Nov. 10	31 23 00	137 58 00	66	67	.....	2,700	br. oz.
2806	Nov. 10	31 18 30	138 08 30	70	69	.....	2,702	br. oz.
2807	Nov. 10	31 14 30	138 19 00	70	69	.....	2,587	br. oz.
2808	Nov. 10	31 10 00	138 29 30	70	70	35.1	2,546	br. oz.
2809	Nov. 10	31 05 00	138 40 00	68	70	.....	2,500	br. oz.
2810	Nov. 10	31 01 30	138 50 00	68	69	.....	2,412	br. oz.
2811	Nov. 10	30 57 30	139 00 30	68	69	35.1	2,072	br. oz. s.
2812	Nov. 11	30 56 30	139 02 30	69	69	.....	2,199	br. oz.
2813	Nov. 11	30 52 00	139 12 30	68	69	.....	2,749	br. oz.
2814	Nov. 11	30 48 00	139 23 00	68	69	35.1	2,567	br. oz.
2815	Nov. 11	30 44 00	139 34 00	68	69	.....	2,752	br. oz.
2816	Nov. 11	30 40 00	139 44 30	69	69	.....	2,646	br. oz. lava.
2817	Nov. 11	30 36 00	139 55 00	70	69	.....	2,723	br. oz. s.
2818	Nov. 11	30 31 30	140 05 30	71	69	.....	2,637	br. oz.
2819	Nov. 11	30 27 00	140 16 00	72	70	35.2	2,591	br. oz.
2820	Nov. 11	30 23 00	140 26 30	69	69	.....	2,650	br. oz.
2821	Nov. 11	30 18 00	140 38 30	69	69	.....	2,655	br. oz.
2822	Nov. 11	30 13 00	140 50 30	68	69	35	2,671	br. oz.
2823	Nov. 12	30 08 00	141 03 00	67	69	.....	2,691	br. oz.
2824	Nov. 12	30 03 00	141 15 00	68	69	.....	2,747	br. oz.
2825	Nov. 12	29 58 30	141 27 30	68	67	35.2	2,720	br. oz.
2826	Nov. 12	29 53 30	141 40 00	69	70	.....	2,723	br. oz.
2827	Nov. 12	29 48 30	141 52 00	69	70	35.2	2,738	br. oz.
2828	Nov. 12	29 43 00	142 04 30	72	70	.....	2,741	br. oz.
2829	Nov. 12	29 38 00	142 17 00	72	70	.....	2,791	br. oz.
2830	Nov. 12	29 31 30	142 32 00	71	70	35.4	2,820	br. oz.
2831	Nov. 12	29 25 00	142 47 00	71	70	.....	2,785	br. oz.
2832	Nov. 12	29 18 00	143 02 00	70	70	.....	2,827	br. oz.
2833	Nov. 13	29 11 30	143 17 30	71	72	.....	2,085	br. oz.
2834	Nov. 13	29 10 30	143 20 00	71	72	35.1	2,280	br. oz.
2835	Nov. 13	29 13 00	143 15 00	70	70	.....	2,379	br. oz.
2836	Nov. 13	29 15 00	143 09 30	70	70	.....	2,727	br. oz. lava
2837	Nov. 13	29 08 30	143 25 00	70	70	35.3	2,733	br. oz.
2838	Nov. 13	29 03 30	143 36 00	73	72	.....	2,744	br. oz.
2839	Nov. 13	28 58 00	143 48 00	72	72	.....	2,698	br. oz.
2840	Nov. 13	28 52 00	144 00 00	72	72	35.3	2,784	br. oz.
2841	Nov. 13	28 46 00	144 12 00	72	71	.....	2,510	br. oz.
2842	Nov. 13	28 45 00	144 14 00	72	71	.....	2,530	br. oz.
2843	Nov 13	28 39 30	144 25 30	71	71	35.2	2,719	br. oz.
2844	Nov. 13	28 33 30	144 37 00	70	71	.....	2,821	br. oz.
2845	Nov. 14	28 27 30	144 48 30	69	71	35.1	2,570	br. oz. lava.
2846	Nov. 14	28 26 30	143 50 30	69	71	.....	2,770	br. oz.
2847	Nov. 14	28 20 00	145 03 30	72	72	.....	2,801	br. oz.
2848	Nov. 14	28 12 20	145 13 00	72	72	.....	2,728	br. oz.
2849	Nov. 14	28 06 30	145 24 00	74	72	.....	2,707	br. oz.
2850	Nov. 14	28 00 30	145 35 00	73	73	.....	2,635	br. oz.
2851	Nov. 14	27 54 00	145 45 30	72	72	35.2	2,782	br. oz.
2852	Nov. 14	27 48 00	145 56 30	72	72	.....	2,848	br. oz.
2853	Nov. 15	27 42 00	146 07 30	72	73	.....	2,860	br. oz.
2854	Nov. 15	27 36 00	146 19 00	72	73	35.4	2,910	br. oz.
2855	Nov. 15	27 30 00	146 30 00	72	73	.....	2,914	br. oz.
2856	Nov. 15	27 24 00	146 41 00	72	73	.....	2,837	br. oz.
2857	Nov. 15	27 18 00	146 51 30	73	73	35.2	2,629	br. oz.
2858	Nov. 15	27 12 00	147 02 40	75	74	.....	2,795	br. oz.
2859	Nov. 15	27 06 00	147 14 00	75	74	.....	2,929	br. oz.
2860	Nov. 15	27 00 00	147 25 30	75	74	35.3	2,815	br. oz.
2861	Nov. 15	26 54 00	147 36 30	72	74	.....	2,808	br. oz.
2862	Nov. 15	26 48 00	147 47 30	72	74	.....	2,896	br. oz.
2863	Nov. 15	26 42 00	147 59 00	71	74	35.3	2,925	br. oz.
2864	Nov. 16	26 35 30	148 10 00	71	74	.....	2,894	br. oz.
2865	Nov. 16	26 29 00	148 21 30	71	74	.....	2,942	br. oz.
2866	Nov. 16	26 23 00	148 33 00	72	74	35.3	2,985	br. oz.
2867	Nov. 16	26 17 00	148 44 00	73	75	.....	3,003	br. oz.
2868	Nov. 16	26 10 15	148 55 00	73	75	.....	2,864	br. oz.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Cable Survey, California to Hawaiian Islands.						
	1891.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
2869	Nov. 16	26 04 30	149 06 30	75	75	35.3	2,992	br. oz.
2870	Nov. 16	25 58 00	149 18 30	74	75	.....	3,039	br. oz.
2871	Nov. 16	25 52 00	149 30 00	74	75	.....	3,008	br. oz.
2872	Nov. 16	25 46 00	149 41 30	74	75	35.3	2,982	br. oz.
2873	Nov. 17	25 39 30	149 53 00	74	74	.....	3,037	br. oz.
2874	Nov. 17	25 33 00	150 05 00	73	74	.....	2,993	br. oz.
2875	Nov. 17	25 26 30	150 16 30	73	74	35.4	3,027	br. oz.
2876	Nov. 17	25 20 00	150 28 00	73	74	.....	3,073	(Lost cup.)
2877	Nov. 17	25 14 00	150 39 00	73	74	.....	2,952	br. oz.
2878	Nov. 17	25 08 00	150 50 00	75	75	35.3	2,910	br. oz.
2879	Nov. 17	25 02 00	151 01 00	75	75	.....	2,978	br. oz.
2880	Nov. 17	24 56 00	151 13 00	75	75	.....	2,910	br. oz.
2881	Nov. 17	24 50 00	151 24 30	74	75	35.4	2,985	br. oz.
2882	Nov. 17	24 43 30	151 36 00	74	75	.....	2,936	br. oz.
2883	Nov. 18	24 37 00	151 47 30	75	75	.....	3,023	br. oz. lava.
2884	Nov. 18	24 31 00	151 59 30	75	76	35.3	2,947	br. oz.
2885	Nov. 18	24 24 30	152 11 30	76	76	.....	2,959	br. oz.
2886	Nov. 18	24 18 00	152 22 30	76	76	.....	2,950	(No specimen; defective cup.)
2887	Nov. 18	24 11 30	152 34 00	76	76	35.4	2,953	br. oz.
2888				Void.				
2889	Nov. 18	24 06 00	152 46 00	76	76	.....	2,907	br. oz. s.
2890	Nov. 18	24 00 30	152 57 00	76	76	.....	2,864	br. oz. s.
2891	Nov. 18	23 55 00	153 08 30	76	76	35.4	2,811	br. oz.
2892	Nov. 18	23 49 00	153 20 00	75	74	.....	2,801	(No specimen: defective cup.)
2893	Nov. 18	23 43 00	153 31 30	75	74	.....	2,748	br. oz.
2894	Nov. 19	23 37 30	153 43 00	75	75	35.3	2,627	(No specimen; defective cup.)
2895	Nov. 19	23 32 00	153 54 00	75	76	.....	2,610	br. oz.
2896	Nov. 19	23 26 00	154 06 00	76	76	35.3	2,600	br. oz.
2897	Nov. 19	23 20 00	154 17 30	76	76	.....	2,453	br. oz.
2898	Nov. 19	23 14 30	154 28 30	76	76	.....	1,265	br. oz.
2899	Nov. 19	23 13 30	154 30 00	76	76	35.4	1,531	br. oz.
2900	Nov. 19	23 15 30	154 27 00	77	76	.....	1,663	br. oz.
2901	Nov. 19	23 17 30	154 23 30	78	77	.....	2,502	br. oz.
2902	Nov 19	23 11 00	154 34 00	78	77	35.5	1,783	gy. oz.
2903	Nov. 19	23 05 00	154 42 30	78	77	.....	2,411	(No specimer; defective cup.)
2904	Nov. 19	23 00 30	154 51 00	77	77	.....	2,484	br. oz.
2905	Nov. 19	22 55 30	154 59 00	77	77	35.3	2,308	br. oz. lava.
2906	Nov. 20	22 49 30	155 09 00	76	76	.....	2,420	br. oz.
2907	Nov. 20	22 43 30	155 18 30	75	76	.....	2,272	br. oz.
2908	Nov. 20	22 42 30	155 20 30	76	76	35.5	2,341	br. oz.
2909	Nov. 20	22 36 30	155 30 30	75	76	.....	2,408	br. oz.
2910	Nov. 20	22 30 00	155 40 00	75	76	.....	2,426	br. oz.
2911	Nov. 20	22 24 30	155 49 00	75	76	32.4	2,408	br. oz.
2912	Nov. 20	22 18 00	155 58 30	77	77	.....	2,542	br. m.
2913	Nov. 20	22 11 00	156 09 00	77	77	35.4	2,640	br. m.
2914	Nov. 20	22 03 30	156 19 00	78	77	.....	2,766	br. m.
2915	Nov. 20	21 55 30	156 29 30	78	77	.....	2,868	br. m.
2916	Nov. 20	21 47 30	156 39 00	77	77	35.3	2,878	br. m.
2917	Nov. 21	21 39 00	156 48 30	76	77	.....	2,615	br. m. fne. s.
2918	Nov. 21	21 37 30	156 50 00	76	77	.....	2,576	br. m. fne. s.
2919	Nov. 21	21 29 30	156 59 30	75	77	35.5	2,056	br. m. fne. s.
2920	Nov. 21	21 21 00	157 09 00	76	77	.....	570	br. m. fne. s.
2921	Nov. 21	21 19 00	157 13 30	76	77	.....	347	br. m. fne. s.
2922	Nov. 21	21 18 30	157 19 00	76	77	44.8	208	gy. s.
2923	Nov. 21	21 18 00	157 24 30	77	78	.....	392	gy. s.
2924	Nov. 21	21 16 48	157 30 00	77	78	.....	301	gy. s. co.
2925	Nov. 21	21 15 24	157 35 05	77	78	.....	105	gy. s. co.
2926	Nov. 21	21 13 38	157 39 32	78	78	43.8	304	fne. wh. s.
2927	Nov. 21	21 12 50	157 44 32	78	78	.....	293	m.
2928	Nov. 21	21 13 00	157 50 20	78	78	.....	295	fne. wh. s.
2929	Dec. 2	21 15 13	157 50 58	79	78	.....	10	(No specimen.)
2930	Dec. 2	21 15 30	157 40 58	76	75	.....	22	wh. s. co.
2931	Dec. 2	21 15 20	157 40 28	76	75	.....	47	s. brk. sh.
2932	Dec. 2	21 14 59	157 40 10	76	75	.....	189	fne. wh. s.
2933	Dec. 2	21 14 38	157 39 53	76	75	.....	276	wh. s.
2934	Dec. 2	21 14 16	157 39 40	76	75	.....	285	fne. wh. s.
2935	Dec. 2	21 14 02	157 39 28	76	75	.....	303	s. co.
2936	Dec. 2	21 13 55	157 41 28	76	75	.....	255	fne. wh. s. lava.
2937	Dec. 2	21 14 06	157 42 42	76	75	.....	47	wh. s. co.
2938	Dec. 2	21 14 30	157 43 24	76	75	.....	142	fne. wh. s.
2939	Dec. 2	21 14 56	157 44 05	76	75	.....	21	wh. s. sh. co.
2940	Dec. 2	21 15 32	157 44 32	76	75	.....	10	wh. s.
2941	Dec. 2	21 15 49	157 44 27	76	75	.....	7	wh. s.
2942	Dec. 3	21 15 54	157 44 22	74	77	.....	7½	wh. s.
2943	Dec. 3	21 15 57	157 44 20	74	77	.....	7½	wh. s.
2944	Dec. 3	21 16 01	157 44 17	74	77	.....	6½	wh. s.
2945	Dec. 3	21 16 05	157 44 14	74	77	.....	6	wh. s.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Cable Survey, California to Hawaiian Islands						
	1891.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
2946	Dec. 3	21 16 08	157 44 10	74	77	.....	4.25	wh. s.
2947	Dec. 3	21 16 11	157 44 00	74	77	.....	4	wh. s.
2948	Dec. 3	21 16 14	157 44 01	74	77	.....	5	wh. s.
2949	Dec. 3	21 16 18	157 43 56	74	77	.....	2.75	wh. s.
2950	Dec. 3	21 15 40	157 43 47	75	77	.....	7.5	wh. s. sh. co.
2951	Dec. 3	21 15 48	157 43 49	76	77	.....	7.5	wh. s.
2952	Dec. 3	21 15 56	157 43 50	76	77	.....	6	wh. s.
2953	Dec. 3	21 16 04	157 43 51	76	77	.....	5.25	wh. s.
2954	Dec. 3	21 16 12	157 43 52	76	77	.....	3.25	wh. s.
2955	Dec. 3	21 16 19	157 43 55	76	77	.....	2.25	wh. s.
2956	Dec. 3	21 15 08	157 43 46	75	76	.....	13	wh. s. co.
2957	Dec. 3	21 14 37	157 43 45	75	76	.....	53	wh. s. co.
2958	Dec. 3	21 14 06	157 43 43	75	76	.....	222	fne. wh. s.
2959	Dec. 3	21 13 30	157 43 40	75	76	45.3	275	fne. wh. s.
2960	Dec. 3	21 15 49	157 41 23	76	76	.....	10.5	rky.
2961	Dec. 3	21 15 52	157 41 28	76	76	.....	7.25	bk. s.
2962	Dec. 3	21 15 54	157 41 32	76	76	.....	6	bk. s.
2963	Dec. 3	21 15 57	157 41 37	76	76	.....	3.75	rky.
2964	Dec. 3	21 15 58	157 41 40	76	76	.....	2.25	wh. s. p.
2965	Dec. 3	21 15 40	157 43 47	76	76	.....	7	wh. s. co.
2966	Dec. 3	21 15 08	157 51 01	76	75	.....	12.5	wh. s. co.
2967	Dec. 3	21 15 13	157 50 58	76	75	.....	10.25	wh. s.
2968	Dec. 3	21 15 17	157 50 46	76	75	.....	8.75	wh. s.
2969	Dec. 3	21 15 18	157 50 30	76	75	.....	7	wh. s.
2970	Dec. 3	21 15 21	157 50 31	76	75	.....	2.75	wh. s.
2971	Dec. 3	21 15 24	157 50 27	76	75	.....	2	wh. s. co.
2972	Dec. 3	21 15 27	157 50 22	76	75	.....	2	wh. s. co.
2973	Dec. 3	21 15 22	157 51 48	75	76	.....	7.25	co.
2974	Dec. 3	21 15 23	157 50 43	75	76	.....	5	wh. s.
2975	Dec. 3	21 15 24	157 50 30	75	76	.....	3	wh. s.
2976	Dec. 3	21 15 25	157 50 32	75	76	.....	2	wh. s.
2977	Dec. 3	21 16 09	157 50 38	75	75	.....	0.75	wh. s.
2978	Dec. 3	21 15 59	157 50 42	75	75	.....	2.75	wh. s.
2979	Dec. 3	21 15 52	157 50 44	75	75	.....	3.75	wh. s.
2980	Dec. 3	21 15 46	157 50 46	75	75	.....	5	wh. s.
2981	Dec. 3	21 15 40	157 50 49	75	75	.....	4.25	wh. s.
2982	Dec. 3	21 15 35	157 50 51	75	75	.....	5.75	wh. s.
2983	Dec. 3	21 15 30	157 50 54	76	76	.....	7.25	co.
2984	Dec. 3	21 14 53	157 51 10	77	76	.....	50	wh. s. bk. sp.
2985	Dec. 3	21 14 27	157 51 22	77	76	.....	206	fne. wh. s.
2986	Dec. 3	21 13 57	157 51 29	77	76	.....	271	fne. wh. s.
2987	Dec. 3	21 13 17	157 48 29	77	76	48.1	224	fne. wh. s.
2988	Dec. 3	21 13 32	157 48 52	77	76	.....	133	wh. s. sh. co.
2989	Dec. 3	21 13 48	157 49 20	77	76	.....	164	wh. s. co.
2990	Dec. 3	21 14 00	157 49 58	77	76	50.4	201	fne. wh. s.
2991	Dec. 4	21 14 26	157 50 49	77	76	.....	252	fne. wh. s.
2992	Dec. 4	21 14 40	157 51 17	77	76	.....	153	fne. wh. s.
2993	Dec. 5	21 14 30	157 34 30	76	76	.....	153	fne. wh. s. co.
2994	Dec. 5	21 15 00	157 33 00	76	76	44.3	305	fne. wh. s.
2995	Dec. 5	21 18 00	157 29 00	76	76	.....	308	fne. wh. s.
2996	Dec. 5	21 20 30	157 25 00	76	76	.....	407	fne. gy. s.
2997	Dec. 5	21 23 30	157 21 00	77	76	50.7	372	gy. s. co.
2998	Dec. 5	21 26 00	157 17 00	77	76	.....	508	fne. gy. s.
2999	Dec. 5	21 27 00	157 15 00	77	76	.....	540	fne. gy. s.
3000	Dec. 5	21 29 30	157 12 00	77	76	.....	1,557	gy. m. fne. s.
3001	Dec. 5	21 32 30	157 08 00	76	74	35.1	1,792	gy. m. fne. s.
3002	Dec. 5	21 35 00	157 04 00	75	75	.....	2,156	br. m. fne. s.
3003	Dec. 5	21 40 30	156 56 00	75	75	.....	1,951	br. m. lava.
3004	Dec. 5	21 41 20	156 54 00	75	75	35.1	2,325	fne. s. lava.
3005	Dec. 5	21 47 00	156 46 00	75	75	.....	2,012	br. m. s.
3006	Dec. 12	21 18 00	157 23 00	68	74	42.5	329	wh. and gy. s.
3007	Dec. 12	21 20 00	157 19 00	68	74	.....	323	fne. gy. s.
3008	Dec. 12	21 23 00	157 14 30	72	74	.....	547	gy. m. fne. s.
3009	Dec. 12	21 24 00	157 12 00	72	74	.....	603	gy. m. fne. s.
3010	Dec. 12	21 25 00	157 10 00	72	74	36.1	1,116	gy. m. fne. s.
3011	Dec. 12	21 26 17	157 08 30	72	74	.....	1,781	(No specimen.)
3012	Dec. 12	21 28 30	157 04 00	70	73	.....	2,067	br. m. fne. s.
3013	Dec. 12	21 32 30	156 54 00	70	73	35.3	1,807	br. m. s.
3014	Dec. 12	21 36 30	156 44 00	71	74	.....	2,767	br. m. fne. s.
3015	Dec. 12	21 41 00	156 32 30	68	73	.....	2,906	br. m. fne. s.
3016	Dec. 12	21 46 00	156 21 00	69	73	35.3	3,017	br. m. fne. s.
3017	Dec. 13	21 51 00	156 09 00	70	73	.....	3,027	(No specimen.)
3018	Dec. 13	21 56 00	155 57 30	69	74	.....	2,915	br. oz.
3019	Dec. 13	22 00 30	155 46 00	73	75	35.2	2,782	br. oz.
3020	Dec. 13	22 05 30	155 34 30	74	74	.....	2,054	br. oz.
3021	Dec. 13	22 10 00	155 23 30	74	75	.....	2,545	br. oz.
3022	Dec. 13	22 15 00	155 12 30	72	75	35.2	2,475	br. oz.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Cable Survey, California to Hawaiian Islands.						
	1891.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
3023	Dec. 13	22 20 00	155 01 00	72	75	.....	2,463	br. oz.
3024	Dec. 13	22 25 00	154 49 30	71	74	.....	2,477	br. oz.
3025	Dec. 14	22 30 00	154 38 30	71	75	35.3	2,485	br. oz.
3026	Dec. 14	22 35 00	154 27 00	69	74	.....	2,453	br. oz.
3027	Dec. 14	22 40 00	154 16 00	69	74	.....	2,500	br. oz.
3028	Dec. 14	22 45 00	154 04 30	73	74	35.7	2,587	br. oz.
3029	Dec. 14	22 50 00	153 53 00	74	74	.....	2,555	br. oz.
3030	Dec. 14	22 55 30	153 42 00	74	74	.....	2,602	br. oz.
3031	Dec. 14	23 01 00	153 31 00	73	74	35.2	2,649	br. oz.
3032	Dec. 14	23 06 00	153 20 30	72	74	.....	2,696	br. oz.
3033	Dec. 14	23 11 00	153 09 30	72	74	.....	2,822	br. oz.
3034	Dec. 14	23 16 00	152 59 00	72	74	35.2	2,827	br. oz.
3035	Dec. 15	23 21 30	152 48 00	70	73	.....	2,910	br. oz.
3036	Dec. 15	23 27 00	152 37 00	70	73	.....	2,894	br. oz. s.
3037	Dec. 15	23 32 30	152 26 00	70	74	35.2	2,927	br. oz. s.
3038	Dec. 15	23 38 00	152 15 00	71	74	.....	3,006	br. oz.
3039	Dec. 15	23 43 30	152 05 00	69	74	.....	2,976	br. oz.
3040	Dec. 15	23 49 00	151 55 00	70	74	41.1	2,985	br. oz.
3041	Dec. 15	23 56 00	151 42 00	69	74	38.9	3,030	br. oz.
3042	Dec. 16	24 03 00	151 29 30	69	73	.....	3,016	(No specimen.)
3043	Dec. 16	24 10 00	151 17 00	70	76	.....	3,038	br. oz.
3044	Dec. 16	24 17 00	151 04 00	70	73	.....	2,979	br. oz.
3045	Dec. 16	24 24 00	150 51 30	71	73	35.3	2,907	br. oz.
3046	Dec. 16	24 31 00	150 37 00	74	74	.....	2,747	br. oz.
3047	Dec. 16	24 37 00	150 23 00	72	73	.....	2,916	br. oz.
3048	Dec. 16	24 43 00	150 09 00	71	72	37.6	2,980	br. oz.
3049	Dec. 16	24 49 00	149 55 00	72	73	.....	2,912	br. oz.
3050	Dec. 17	24 55 00	149 41 00	70	73	.....	2,984	br. oz.
3051	Dec. 17	25 01 00	149 27 00	71	73	35.4	3,034	br. oz.
3052	Dec. 17	25 07 30	149 13 00	71	73	.....	2,957	br. oz.
3053	Dec. 17	25 13 30	148 59 00	72	73	.....	2,930	br. oz.
3054	Dec. 17	25 20 00	148 44 30	71	73	.....	2,938	(No specimen.)
3055	Dec. 17	25 26 30	148 30 00	69	73	35	2,881	br. oz.
3056	Dec. 17	25 33 00	148 16 00	69	73	.....	2,642	(No specimen.)
3057	Dec. 17	25 39 30	148 01 30	69	73	.....	2,903	br. oz.
3058	Dec. 18	25 46 00	147 47 00	69	72	35.1	2,893	br. oz.
3059	Dec. 18	25 53 00	147 32 30	69	72	.....	2,923	br. oz.
3060	Dec. 18	26 00 00	147 18 00	72	72	.....	2,787	(No specimen.)
3061	Dec. 18	26 06 36	147 03 16	72	72	35.2	2,884	br. oz.
3062	Dec. 18	26 15 00	146 49 00	74	73	.....	2,838	br. oz.
3063	Dec. 18	26 19 30	146 34 30	71	72	.....	2,777	br. oz.
3064	Dec. 18	26 26 00	146 20 00	69	72	35.1	2,829	br. oz.
3065	Dec. 19	26 32 30	146 05 30	68	71	.....	2,779	br. oz.
3066	Dec. 19	26 39 00	145 51 00	68	72	.....	2,854	br. oz.
3067	Dec. 19	26 45 00	145 36 30	68	72	35.1	2,346	br. oz.
3068	Dec. 19	26 44 00	145 38 30	69	72	.....	2,682	br. oz.
3069	Dec. 19	26 46 00	145 33 30	70	72	.....	2,677	br. oz.
3070	Dec. 19	26 50 30	145 24 00	69	72	.....	2,825	br. oz.
3071	Dec. 19	26 57 00	145 09 30	69	72	35.1	2,739	br. oz.
3072	Dec. 19	27 03 30	144 54 30	68	71	.....	2,714	br. oz.
3073	Dec. 20	27 10 00	144 39 30	66	71	.....	2,697	br. oz.
3074	Dec. 20	27 16 30	144 24 30	68	70	35.2	2,750	br. oz.
3075	Dec. 20	27 23 00	144 10 00	68	70	.....	2,506	br oz.
3076	Dec. 20	27 33 00	143 55 30	67	70	.....	2,716	br. oz.
3077	Dec. 20	27 42 30	143 41 30	67	70	35	2,375	br. oz.
3078	Dec. 21	27 52 00	143 27 00	67	70	.....	2,827	br. oz.
3079	Dec. 21	28 02 00	143 12 30	69	70	.....	2,736	br. oz.
3080	Dec. 21	28 08 00	142 57 00	69	71	.....	2,731	br. oz.
3081	Dec. 21	28 14 00	142 40 00	65	69	35.1	2,560	br. oz.
3082	Dec. 22	28 20 00	142 22 30	67	69	.....	2,684	br. oz.
3083	Dec. 22	28 26 00	142 05 00	67	69	.....	2,711	br. oz.
3084	Dec. 22	28 31 30	141 47 30	69	69	35.1	2,668	br. oz. lava.
3085	Dec. 22	28 37 30	141 33 00	69	69	.....	2,678	br. oz. lava.
3086	Dec. 22	28 43 00	141 19 00	68	69	.....	2,700	br. oz.
3087	Dec. 23	28 48 30	141 04 30	68	69	35.1	2,702	br. oz.
3088	Dec. 23	28 54 30	140 49 30	66	69	.....	2,735	(No specimen.)
3089	Dec. 23	29 00 30	140 35 00	66	68	.....	2,664	br. oz.
3090	Dec. 23	29 06 24	140 28 48	68	69	35.1	2,741	br. oz.
3091	Dec. 23	29 12 00	140 06 30	65	68	.....	2,720	br. oz.
3092	Dec. 23	29 17 30	139 52 00	65	68	.....	2,687	br. oz.
3093	Dec. 24	29 23 00	139 38 00	64	68	35.1	2,631	br. oz.
3094	Dec. 24	29 28 30	139 23 30	64	68	.....	2,608	br. oz.
3095	Dec. 24	29 34 00	139 09 00	63	68	.....	2,668	br. oz.
3096	Dec. 24	29 40 00	138 55 00	64	67	35.1	2,620	br. oz.
3097	Dec. 24	29 46 00	138 40 00	66	68	.....	2,572	br. oz.
3098	Dec. 24	29 52 30	138 24 00	63	67	.....	2,653	br. oz.
3099	Dec. 24	29 59 00	138 08 00	63	67	35.1	2,556	br. oz. lava.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Cable Survey, California to Hawaiian Islands.						
	1891.	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	*Fms.*	
3100	Dec. 24	30 05 30	137 52 00	62	67	.....	2,404	br. oz. lava.
3101	Dec. 25	30 12 00	137 36 30	63	66	.....	2,672	br. oz. lava.
3102	Dec. 25	30 18 30	137 21 00	61	65	35.1	2,626	br. oz.
3103	Dec. 25	30 23 30	137 09 00	61	66	.....	2,201	br. oz. lava.
3104	Dec. 25	30 24 00	137 07 00	62	66	35	1,924	No specimen.
3105	Dec. 25	30 25 00	137 05 00	62	66	.....	2,023	gy. oz. fne. s.
3106	Dec. 25	30 26 00	137 03 00	63	66	.....	2,248	No specimen.
3107	Dec. 25	30 27 00	137 00 30	63	66	35.2	2,604	br. oz. s. lava.
3108	Dec. 25	30 30 01	137 05 06	64	67	.....	2,521	br. oz.
3109	Dec. 25	30 29 30	137 10 30	64	67	33.2	2,422	br. oz.
3110	Dec. 25	30 25 00	137 15 00	64	67	.....	1,779	gy. oz. fne. s.
3111	Dec. 25	30 19 30	137 15 00	64	67	.....	2,298	br. oz. lava.
3112	Dec. 25	30 15 00	137 10 30	65	66	35.1	2,309	No specimen.
3113	Dec. 25	30 15 30	137 04 30	63	66	.....	2,551	br. oz.
3114	Dec. 25	30 19 30	137 00 30	62	60	.....	2,573	br. oz lava.
3115	Dec. 25	30 28 00	136 53 00	62	66	35	2,291	br. oz. lava.
3116	Dec. 25	30 29 00	136 51 00	62	66	.....	1,932	br. oz.
3117	Dec. 26	30 30 00	136 40 00	62	66	.....	1,858	br. oz.
3118	Dec. 26	30 31 00	136 47 00	62	66	.....	2,131	br. oz.
3119	Dec. 26	30 33 00	136 42 30	62	66	.....	2,220	br. oz.
3120	Dec. 26	30 38 00	136 33 00	62	66	42.3	2,612	br. oz.
3121	Dec. 26	30 43 00	136 23 00	62	66	.....	2,502	br. oz.
3122	Dec. 26	30 49 30	136 08 30	63	66	.....	2,411	No specimen.
3123	Dec. 26	30 50 30	136 06 30	59	66	.....	2,473	br. oz.
3124	Dec. 26	30 54 45	135 56 35	62	65	.....	2,505	br. oz.
3125	Dec. 26	30 59 00	135 47 00	66	66	35.2	2,581	br. oz.
3126	Dec. 26	31 04 00	135 37 00	66	66	.....	2,565	br. oz.
3127	Dec. 26	31 08 00	135 26 30	63	66	.....	2,480	No specimen.
3128	Dec. 26	31 12 00	135 17 00	63	65	35	2,413	br. oz. lava.
3129	Dec. 26	31 16 00	135 07 00	64	65	.....	2,572	br. oz.
3130	Dec. 27	31 20 00	134 57 00	64	65	.....	2,574	br. oz.
3131	Dec. 27	31 24 00	134 47 00	64	65	35.2	2,602	br. oz.
3132	Dec. 27	31 28 00	134 36 30	64	65	.....	2,482	br. oz. lava.
3133	Dec. 27	31 32 30	134 26 30	63	65	.....	2,611	br. oz.
3134	Dec. 27	31 37 00	134 16 00	65	65	35	2,596	br. oz.
3135	Dec. 27	31 41 00	134 06 00	68	66	.....	2,598	br. oz.
3136	Dec. 27	31 45 14	133 56 00	69	66	.....	2,589	br. oz.
	1892.							
3137	Jan. 10	31 49 23	133 45 32	61	63	35.1	2,550	br. oz.
3138	Jan. 10	31 53 30	133 36 00	61	63	.....	2,516	br. oz.
3139	Jan. 10	31 57 30	133 26 00	61	63	.....	2,619	br. oz.
3140	Jan. 10	32 01 30	133 16 00	60	62	35.2	2,611	br. oz.
3141	Jan. 10	32 06 00	133 06 00	59	63	.....	2,619	br. oz.
3142	Jan. 10	32 10 00	132 56 00	60	63	.....	2,686	br. oz.
3143	Jan. 11	32 14 00	132 46 00	59	62	35.2	2,637	br. oz.
3144	Jan. 11	32 18 00	132 36 00	58	62	.....	2,527	br. oz.
3145	Jan. 11	32 22 00	132 26 00	59	62	.....	2,656	br. oz.
3146	Jan. 11	32 26 00	132 16 00	59	62	35.1	2,341	br. oz.
3147	Jan. 11	32 27 00	132 14 00	59	62	.....	2,223	br. oz.
3148	Jan. 11	32 28 00	132 12 00	59	63	.....	2,560	br. oz.
3149	Jan. 11	32 29 30	132 06 30	59	62	35.1	2,175	br. oz. lava.
3150	Jan. 11	32 30 00	132 04 30	59	62	.....	2,548	br. oz. bk. sp.
3151	Jan. 11	32 32 30	131 59 30	60	62	.....	2,458	br. oz.
3152	Jan. 11	32 36 00	131 49 30	59	62	35.3	2,583	br. oz.
3153	Jan. 11	32 39 00	131 40 00	59	62	.....	2,525	br. oz.
3154	Jan. 11	32 43 30	131 30 00	58	62	.....	2,379	br. oz.
3155	Jan. 11	32 47 00	131 20 00	58	61	35.3	2,519	br. oz.
3156	Jan. 11	32 51 00	131 10 00	58	61	.....	2,535	br. oz.
3157	Jan. 12	32 55 00	131 00 00	58	61	.....	2,572	br. oz. lava.
3158	Jan. 12	32 58 30	130 50 00	58	61	35.2	2,361	br. oz. lava.
3159	Jan. 12	32 59 30	130 48 00	58	61	.....	2,531	br. oz.
3160	Jan. 12	33 03 30	130 38 00	58	60	.....	2,483	br. oz.
3161	Jan. 12	33 07 00	130 28 00	58	60	35.1	2,541	br. oz.
3162	Jan. 12	33 10 30	130 18 00	59	62	.....	2,542	No specimen.
3163	Jan. 12	33 14 00	130 08 30	60	62	.....	2,551	br. oz.
3164	Jan. 12	33 18 00	129 58 00	59	61	35.1	2,584	br. oz. lava.
3165	Jan. 12	33 23 00	129 45 00	58	61	35.1	2,773	br. oz.
3166	Jan. 12	33 28 00	129 32 00	58	61	.....	2,701	br. oz.
3167	Jan. 12	33 33 00	129 18 30	58	61	.....	2,572	br. oz.
3168	Jan. 12	33 38 00	129 05 30	58	61	35.2	2,572	br. oz.
3169	Jan. 13	33 43 00	128 52 00	58	60	.....	2,612	br. oz.
3170	Jan. 13	33 48 00	128 39 30	57	61	.....	2,619	No specimen.
3171	Jan. 13	33 53 00	128 26 00	56	59	35.1	2,637	br. oz.
3172	Jan. 13	33 58 00	128 13 00	56	58	.....	2,568	br. oz.
3173	Jan. 13	34 03 00	128 00 00	58	58	.....	2,632	br. oz.
3174	Jan. 13	34 08 10	127 46 41	60	59	35.1	2,605	br. oz.
3175	Jan. 13	34 14 30	127 34 30	64	60	.....	2,588	br. oz.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Cable survey, California to Hawaiian Islands.						
	1892.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
3176	Jan. 13	34 20 30	127 22 30	58	59	.....	2,057	br. oz.
3177	Jan. 13	34 20 30	127 10 30	58	58	35.1	2,080	br. oz.
3178	Jan. 13	34 32 30	126 58 00	57	58	.....	2,049	br. oz.
3179	Jan. 13	34 38 30	126 46 00	59	58	.....	2,037	br. oz.
3180	Jan. 14	34 44 30	126 34 00	57	58	35.1	2,026	br. oz.
3181	Jan. 14	34 50 30	126 22 00	56	57	.....	2,006	br. oz.
3182	Jan. 14	34 56 00	126 09 30	57	57	.....	2,586	br. oz.
3183	Jan. 14	35 02 00	125 57 30	57	58	35.1	2,585	br. and gy. oz.
3184	Jan. 14	35 08 00	125 45 30	58	57	.....	2,572	br. oz.
3185	Jan. 14	35 14 07	125 33 18	59	57	.....	2,560	br. and gy. oz.
3186	Jan. 14	35 19 30	125 21 30	62	58	35	2,529	gy. and yl. oz.
3187	Jan. 14	35 25 30	125 09 30	50	57	34.9	2,496	br. and gy. oz.
3188	Jan. 14	35 31 00	124 57 30	57	56	.....	2,445	br. and gy. oz.
3189	Jan. 14	35 36 30	124 45 30	56	56	.....	2,413	br. and gy. oz.
3190	Jan. 14	35 42 00	124 33 30	53	59	34.9	2,312	br. and gy. oz.
3191	Jan. 15	35 47 30	124 21 30	54	54	.....	2,223	br. and gy. oz.
3192	Jan. 15	35 53 00	124 09 30	54	54	.....	2,149	br. and gy. oz.
3193	Jan. 15	35 58 30	123 57 30	54	54	34.9	2,169	gy. oz.
3194	Jan. 15	36 04 00	123 46 00	54	55	.....	2,107	gy. oz.
3195	Jan. 15	36 09 30	123 34 00	54	54	.....	1,974	gy. oz.
3196	Jan. 15	36 15 00	123 22 00	54	52	35	1,895	gy. oz.
3197	Jan. 15	36 21 00	123 10 00	59	52	.....	1,797	gy. oz.
3198	Jan. 15	36 25 00	123 00 00	59	52	.....	1,725	gy. oz.
3199	Jan. 15	36 29 30	122 50 30	53	52	35	1,666	gy. oz.
3200	Jan. 15	36 34 00	122 41 00	53	52	.....	1,513	gn. m.
3201	Jan. 15	36 38 00	122 31 00	51	52	.....	1,417	gn. m.
3202	Jan. 15	36 40 00	122 26 00	52	52	36.1	1,053	gn. m. fne. s.
		Off Alaska.						
3203	Apr. 7	58 22 00	150 09 00	34	38	.....	29	brk. sh.
3204	Apr. 7	58 25 00	150 18 00	34	38	.....	30	sh.
3205	Apr. 7	58 28 00	150 26 00	33	37	.....	38	sh.
3206	Apr. 7	58 31 00	150 34 00	33	37	.....	47	crs. s. sh.
3207	Apr. 7	58 34 00	150 42 00	33	38	.....	49	bk. s. brk. sh.
3208	Apr. 7	58 37 00	150 50 00	33	38	.....	85	gy. s. bk. sp.
3209	Apr. 7	58 39 00	150 58 00	33	38	.....	103	m. bk. s.
3210	Apr. 8	58 40 00	151 01 00	33	38	.....	107	m. s.
3211	Apr. 8	58 43 00	151 09 00	33	38	.....	118	bl. m. bk. sp.
3212	Apr. 8	58 46 00	151 17 00	33	38	.....	102	bl. m. bk. sp.
3213	Apr. 8	58 49 00	151 25 00	33	38	.....	93	bl. m. bk. sp.
3214	Apr. 11	59 32 00	151 55 00	37	36	.....	20	gy. s.
3215	Apr. 18	59 56 00	145 56 00	40	41	.....	55	s. m.
3215a	Apr. 18	59 34 45	144 58 00	43	42	.....	81	gn. m.
3216	Apr. 18	59 33 00	144 52 00	43	43	.....	97	p. m.
3217	Apr. 18	59 31 00	144 43 00	43	43	.....	377	g. m.
3218	Apr. 18	59 35 00	143 21 00	38	40	.....	156	p.
3219	Apr. 19	59 35 00	143 18 00	38	41	.....	140	m. p.
3220	Apr. 19	59 36 00	142 57 00	38	41	.....	225	bl. m.
3221	Apr. 19	59 37 00	142 45 00	39	41	.....	281	bl. m. g.
3222	Apr. 19	59 19 00	142 10 00	40	42	37.4	504	gn. m.
3223	Apr. 19	59 21 00	141 50 00	40	42	.....	114	p.
3224	Apr. 19	59 14 00	141 35 00	41	42	.....	116	s. g.
3225	Apr. 19	58 56 00	140 56 00	41	42	37.9	471	gn. m.
		Off Brit. Columbia.						
3226	Apr. 24	50 25 00	129 15 00	46	46	35.3	1,141	gn. m.
3227	Apr. 25	49 42 00	127 53 00	49	48	37.5	848	gn. m.
3228	Apr. 26	48 35 00	126 42 00	48	48	37	746	gn. m.
3229	Apr. 27	48 29 30	124 50 30	52	51	.....	51	p. rky.
3230	Apr. 27	48 29 00	124 55 00	52	51	.....	53	p. rky.
		Western Bering Sea.						
			Long. E.					
3231	May 29	53 13 00	172 38 00	41	40	.....	1,447	yl. m. fne. s.
3232	May 30	53 38 00	171 28 00	38	39	.....	1,818	No specimen.
3233	May 30	54 02 00	170 17 00	42	40	.....	1,853	fne. bk. s.
3234	May 30	54 19 00	169 03 00	40	40	35.6	1,996	yl. m. s.
3235	May 31	54 30 00	168 07 00	40	40	.....	47	fne. gy. s.
3236	May 31	55 09 00	165 51 00	40	40	.....	25	rky.
3237	May 31	55 10 00	165 47 00	39	40	.....	33	rky. m.
3238	May 31	55 08 00	165 48 00	39	39	.....	36	gy. s.
3239	May 31	55 10 30	165 45 00	39	39	.....	32	gy. s.
		Western coast of United States.						
	1893.		Long. W.					
3240	Apr. 26	36 48 15	121 59 05	58	54	.....	266	None obtained.
3241	Apr. 27	37 29 00	123 01 20	54	53	.....	301	stf. gy. m.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off Alaska.						
	1893.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
3242	June 5	57 40 00	143 18 00	48	47	35	2,064	gy. oz.
3243	June 6	57 44 00	150 45 00	46	45	.....	59	gy. s. sh.
3244	June 8	56 48 00	152 30 00	47	45	.....	87	stf. m.
3245	June 15	54 42 00	160 47 00	47	44	.....	60	bl. m.
3246	June 17	54 56 15	159 01 00	46	43	.....	48	gy. s. p.
3247	June 17	54 56 30	159 05 20	46	43	.....	41	gy. s. rky.
3248	June 17	54 56 45	159 09 00	46	43	.....	36	gy. s.
3249	June 17	54 57 45	159 11 00	45	43	.....	38	gy. s.
3250	June 17	54 58 45	159 13 45	46	43	.....	33	s. brk. sh.
3251	June 17	55 01 30	159 16 30	46	43	.....	27	gy. s.
3252	June 17	55 02 15	159 19 00	46	43	.....	17	fne. gy. s.
3253	June 27	54 04 00	162 55 00	48	46	.....	48	s. g.
3254	July 1	51 32 00	175 52 00	43	48	36.6	697	bk. s.
3255	July 1	51 35 40	176 41 00	47	48	.....	62	crs. gy. s. sh.
3256	July 1	51 35 40	176 46 15	48	48	.....	46	crs. gy. s.
3257	July 5	51 33 30	176 50 00	50	47	.....	57	sh.
3258	July 5	51 32 00	176 49 00	50	47	.....	78	gy. s. sh.
3259	July 5	51 28 00	176 49 00	50	47	39.4	172	gy. s. p.
3260	July 5	51 24 00	176 50 00	52	44	38.6	428	gy. s. sh.
3261	July 6	51 19 00	176 39 00	48	44	38.5	1,622	bk. s. brk. sh.
3262	July 6	51 11 00	176 25 00	52	44	36.9	2,350	gy. oz. fne. s.
3263	July 6	51 00 00	176 04 00	52	44	37.3	2,039	gy. m. s.
3264	July 6	50 41 00	175 30 00	49	48	39.6	3,323	gy. m. s.
3265	July 6	50 28 00	175 10 00	50	49	34.6	4,002	br. oz.
3266	July 7	50 16 00	174 51 00	50	48	.....	3,191	None obtained.
3267	July 7	50 03 00	174 30 00	50	49	35	2,802	gy. oz.
3268	July 7	50 31 00	173 54 00	53	49	.....	3,667	hard.
3269	July 7	50 57 00	173 06 00	49	48	.....	3,794	br. oz. s.
3270	July 8	51 23 00	172 18 00	50	49	.....	2,320	br. oz. s.
3271	July 8	51 50 00	171 38 00	49	48	.....	1,330	fne. bk. s.
3272	July 8	52 24 00	171 40 00	48	44	.....	250	rky.
3273	July 8	52 31 00	171 42 00	47	41	.....	320	fne. g.
3274	July 8	52 44 00	171 35 00	46	41	.....	97	dk. s. p.
3275	July 8	52 54 00	171 29 00	45	40	.....	360	fne. bk. s. g.
3276	July 9	55 04 00	170 11 00	49	46	.....	1,554	gn. m. s.
3277	July 9	55 36 00	170 02 00	48	47	.....	1,626	gn. m.
3278	July 9	56 06 00	169 58 00	48	47	.....	68	gy. s. sh.
3279	July 9	56 16 00	169 57 00	48	47	.....	72	gy. s. bk. sp.
3280	July 9	56 35 00	169 55 00	48	47	.....	52	s. rky.
3281	July 12	57 18 00	169 38 00	42	42	.....	35	gy. s. sh.
3282	July 12	57 18 00	172 20 00	43	44	38	62	gn. m.
3283	July 12	57 18 00	172 27 00	43	44	36.6	62	gn. m. s.
3284	July 12	57 18 00	172 43 00	42	44	38	62	co.
3285	July 12	57 18 00	172 51 00	43	44	37	64	gn. m.
3286	July 12	57 18 00	173 00 00	43	44	37	65	gn. m.
3287	July 13	57 18 00	173 09 00	42	44	37	66	gn. m.
3288	July 13	57 18 00	173 18 00	42	44	37	67	rky.
3289	July 13	57 19 00	173 27 00	42	43	37.8	69	rky.
3290	July 13	57 19 00	173 36 00	42	43	38	71	gn. m.
3291	July 13	57 19 00	173 45 00	42	42	37.8	82	rky.
3292	July 13	57 15 00	173 46 00	43	43	37.9	78	gn. m. fne. s.
3293	July 13	57 11 00	173 42 00	43	43	37.7	77	gy. s.
3294	July 13	57 06 00	173 42 00	43	43	38	81	gy. s.
3295	July 13	56 51 00	173 37 00	47	45	37	516	gn. m. s.
3296	July 13	56 42 00	173 18 00	46	46	37.7	80	fne. gy. s. rky.
3297	July 13	56 37 00	173 21 00	46	46	37.7	80	fne. gy. s. bk. sp.
3298	July 13	56 32 00	173 24 00	46	46	36.2	797	yl. m. g.
3299	July 13	56 29 00	173 10 00	47	46	35.5	1,188	None obtained.
3300	July 13	56 30 00	172 56 00	46	45	38	74	gy. s.
3301	July 14	56 30 00	172 25 00	46	44	38	100	fne. gy. s. bk. sp.
3302	July 17	56 07 00	169 33 00	49	46	38.3	260	fne. gy. s.
3303	July 17	55 24 00	168 34 00	48	45	.....	843	fne. gy. s.
3304	July 18	55 09 00	168 11 00	51	45	.....	809	fne. gy. s.
3305	July 18	54 56 00	167 44 00	50	46	.....	756	gn. m. vol. s.
3306	July 18	54 42 00	167 39 00	50	48	.....	442	gn. m.
3307	July 28	57 03 00	169 54 00	50	44	41.9	35	fne. gy. s.
3308	July 28	57 03 00	168 52 00	50	45	37.6	43	gy. s. sh.
3309	July 28	57 15 00	167 42 00	45	43	36	41	fne. gy. s.
3310	July 29	57 21 00	167 05 00	45	42	35	33	fne. bk. s.
3311	July 29	57 27 00	166 30 00	45	42	34.8	38	fne. s. bk. m.
3312	July 29	57 38 00	165 20 00	45	42	35.5	35	fne. s. dk. m.
3313	July 29	58 13 00	164 47 00	44	42	41.4	26	fne. gy. s.
3314	July 29	58 42 00	165 30 00	43	41	41.8	22	gy. s.
3315	July 30	58 51 00	166 11 00	42	41	41.0	21	fne. gy. s.
3316	July 30	58 36 00	166 38 00	42	41	40.1	25	fne. gy. s.
3317	July 30	58 22 00	167 04 00	44	42	37.0	29	crs. gy. s.
3318	July 30	58 07 00	167 29 00	45	42	35.5	36	gn. m. fne. s.
3319	July 30	57 52 00	167 54 00	46	43	37.5	38	dk. m. fne. s.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off Alaska.						
	1893.	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	*Fms.*	
3320	July 30	57 38 00	168 19 00	46	43	36.1	36	fne. gy. s.
3321	July 31	57 24 00	168 42 00	46	44	36.8	41	gy. s. rky.
3322	July 31	57 10 00	169 05 00	46	44	37.3	42	fne. gy. s. bk. sp.
3323	Aug. 1	58 08 30	169 14 00	47	45	31.8	38	dk. m. fne. s.
3324	Aug. 1	58 45 30	168 48 00	44	43	33.9	30	fne. gy. s. m.
3325	Aug. 2	59 04 00	168 34 00	43	42	39.8	24	fne. gy. s. bk. sp.
3326	Aug. 2	59 41 00	168 06 00	42	41	41.1	22	fne. gy. s. sh.
3327	Aug. 2	59 55 00	167 55 00	42	42	.....	14	gy. s.
3328	Aug. 2	59 56 00	167 54 00	42	42	.....	16	gy. s. sh.
3329	Aug. 2	59 58 00	167 53 00	42	42	.....	14	fne. gy. s.
3330	Aug. 2	60 00 00	167 53 00	42	42	.....	14	fne. gy. s.
3331	Aug. 2	60 01 30	167 54 00	42	42	.....	14	fne. gy. s.
3332	Aug. 2	60 03 00	167 55 00	42	42	.....	14	fne. gy. s.
3333	Aug. 2	60 05 00	167 56 00	42	42	.....	15	fne. gy. s.
3334	Aug. 2	60 06 30	167 57 00	42	42	.....	16	fne. gy. s.
3335	Aug. 2	60 08 00	167 58 00	42	42	.....	15	fne. gy. s.
3336	Aug. 2	60 09 30	167 59 00	42	42	.....	15	fne. gy. s. bk. sh.
3337	Aug. 2	60 11 00	168 00 00	42	42	.....	16	fne. gy. s.
3338	Aug. 2	60 13 00	168 01 00	42	42	.....	16	fne. gy. s. bk. sh.
3339	Aug. 2	60 14 30	168 02 00	42	42	.....	16	fne. gy. s.
3340	Aug. 2	60 16 00	168 03 00	42	43	.....	16	fne. gy. s.
3341	Aug. 2	60 17 30	168 04 00	43	43	.....	16	fne. gy. s.
3342	Aug. 2	60 19 00	168 05 00	43	43	.....	16	fne. gy. s.
3343	Aug. 2	60 21 00	168 05 00	43	43	.....	17	fne. gy. s. bk. sh.
3344	Aug. 2	60 22 00	168 06 00	43	43	.....	16	fne. gy. s.
3345	Aug. 2	60 24 00	168 07 00	43	43	.....	19	fne. gy. s. bk. sh.
3346	Aug. 2	60 26 00	168 08 00	43	43	.....	19	fne. gy. s.
3347	Aug. 2	60 26 00	169 54 00	41	41	35.3	27	gn. m. fne. s.
3348	Aug. 3	60 24 00	170 48 00	42	42	32.0	35	bk. m.
3349	Aug. 3	59 47 00	171 08 00	43	43	31.8	38	dk. m.
3350	Aug. 3	58 52 00	170 38 00	45	44	30.8	40	bk. m.
3351	Aug. 4	58 33 00	170 28 00	46	43	.....	42	None obtained.
3352	Aug. 4	58 15 00	170 18 00	46	44	35.4	40	gn. m. fne. s.
3353	Aug. 5	57 24 00	170 24 00	47	43	40.3	37	fne. gy. s. sh.
3354	Aug. 5	58 04 00	171 41 00	48	45	37.4	55	gn. m.
3355	Aug. 5	58 52 00	172 45 00	46	44	35.3	57	gn. m.
3356	Aug. 6	59 09 00	173 09 00	45	43	34.2	57	gn. m.
3357	Aug. 6	59 24 00	173 31 00	45	43	35.7	57	gn. m.
3358	Aug. 6	59 33 00	175 00 00	51	46	36.7	70	gn. m.
3359	Aug. 7	58 43 00	176 10 00	44	44	.....	71	gn. m.
3360	Aug. 7	58 11 00	176 38 00	45	44	35.5	1,744	gn. m. fne. s.
3361	Aug. 7	58 01 00	175 41 00	48	46	35.2	1,367	gn. m. fne. s.
3362	Aug. 7	57 41 00	174 05 00	49	47	38.0	77	gn. m.
3363	Aug. 7	57 25 00	172 50 00	47	45	37.8	69	dk. gn. m. fne. s.
3364	Aug. 8	57 08 00	171 38 00	47	45	37.8	60	gn. m.
3365	Aug. 9	56 49 00	169 42 00	46	44	40.9	37	fne. s. sh.
3366	Aug. 9	56 37 00	167 55 00	49	46	38.0	59	gn. m. s.
3367	Aug. 9	56 31 00	166 43 00	48	46	37.5	55	dk. gn. m. fne. s.
3368	Aug. 10	56 23 00	165 28 00	48	45	36.5	48	gn. m. fne. s.
3369	Aug. 10	56 18 00	164 48 00	48	45	36.4	49	fne. gy. s.
3370	Aug. 10	54 53 15	164 25 40	53	47	.....	20	dk. gy. s. lava.
3371	Aug. 10	54 52 00	164 26 20	53	47	.....	17	dk. gy. s. lava.
3372	Aug. 10	54 51 30	164 26 40	53	47	.....	15	dk. gy. s.
3373	Aug. 10	54 51 00	164 27 00	53	47	.....	14	dk. gy. s.
3374	Aug. 10	54 50 30	164 27 20	53	47	.....	9	dk. gy. s.
3375	Aug. 17	53 25 00	167 33 00	47	46	41.8	43	bk. s.
3376	Aug. 17	53 35 00	167 53 00	47	44	40.3	89	g.
3377	Aug. 17	53 38 00	167 59 00	48	44	37.9	407	fne. gy. s. bk. sp.
3378	Aug. 17	53 45 00	168 01 30	48	44	36.2	755	gn. m. fne. s.
3379	Aug. 17	53 52 00	168 01 30	48	47	36.5	717	dk. s. fne. g.
3380	Aug. 17	53 56 00	168 07 00	48	47	36.6	781	bk. vol. s.
3381	Aug. 17	54 04 00	168 14 00	49	48	35.8	1,263	gy. s.
3382	Aug. 17	54 30 00	168 35 00	49	47	36.4	822	hard.
3383	Aug. 17	54 56 00	168 56 00	48	46	35.9	1,205	gy. s.
3384	Aug. 18	55 22 00	169 17 00	48	47	35.9	1,187	gn. m. s.
3385	Aug. 18	55 50 00	169 24 00	48	47	36.0	1,036	gn. m. s.
3386	Aug. 18	55 59 00	169 27 00	49	47	38.3	341	gn. m. crs. bk. s.
3387	Aug. 18	56 09 00	169 29 00	49	48	38.7	202	dk. m.
3388	Aug. 18	56 19 00	169 32 00	49	48	.....	74	gy. s. g.
3389	Aug. 18	56 47 00	170 34 00	46	48	.....	57	dk. m.
3390	Aug. 19	56 45 00	171 10 00	46	45	.....	63	fne. gy. s. bk. sp.
3391	Aug. 19	56 42 00	171 45 00	46	45	.....	65	fne. gy. s. bk. sp.
3392	Aug. 19	56 39 00	172 21 00	47	45	38.9	76	gy. s. m.
3393	Aug. 19	56 36 00	172 56 00	46	46	38.1	346	gn. m.
3394	Aug. 19	56 32 00	173 32 00	47	46	35.4	1,631	bl. m. fne. s. g.
3395	Aug. 19	56 29 00	174 26 00	48	47	35.4	1,787	crs. bk. s.
3396	Aug. 19	56 25 00	175 35 00	47	47	35.4	2,000	gn. m. fne. s. bk. sp.
3397	Aug. 20	56 21 00	176 45 00	48	47	35.0	2,049	gn. m.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off Alaska.						
	1893.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
3398	Aug. 20	55 25 00	176 13 00	48	47	35.1	2,055	gn. m. fne. s.
3399	Aug. 20	54 38 00	175 27 00	56	49	35.1	2,041	gn. m. s.
3400	Aug. 20	55 00 00	174 32 00	48	47	35.3	1,900	gn. m. fne. s.
3401	Aug. 21	55 23 00	173 38 00	48	47	35.5	1,928	gn. m. fne. s.
3402	Aug. 21	55 46 00	172 44 00	51	48	35.1	1,833	gn. m. fne. s.
3403	Aug. 21	56 26 00	171 04 00	50	46	.....	171	gn. m. fne. s.
3404	Aug. 22	56 18 00	170 34 00	49	46	39.0	69	gn. m. fne. s.
3405	Aug. 22	56 01 00	170 50 00	48	47	36.0	924	gn. m. crs. s.
3406	Aug. 22	55 43 00	171 07 00	49	48	35.4	1,647	gn. m. fne. s.
3407	Aug. 22	54 59 00	171 49 00	49	48	35.1	1,867	gn. m.
3408	Aug. 22	54 17 00	172 30 00	48	47	35.0	1,932	gn. m. fne. s.
3409	Aug. 23	53 48 00	173 11 00	50	48	35.1	1,948	br. m. dk. s.
3410	Aug. 23	53 20 00	171 51 00	50	48	35.2	1,429	gn. m. bk. s.
3411	Aug. 23	53 09 00	170 31 00	50	48	35.8	1,027	bk. s.
3412	Aug. 24	53 38 00	170 39 00	48	47	.....	1,171	bk. s. c.
3413	Aug. 24	54 08 00	170 47 00	49	48	.....	1,053	gn. m. fne. s.
3414	Aug. 31	54 13 00	165 58 00	51	46	44.6	42	dk. gy. s.
3415	Aug. 31	54 10 00	165 54 00	51	46	45.0	42	dk. gy. s.
3416	Aug. 31	54 07 00	165 51 00	54	47	45.0	38	bk. m. fne. s.
3417	Aug. 31	54 18 00	165 41 00	51	46	45.9	45	g. brk. sh.
3418	Aug. 31	54 20 00	165 28 00	50	46	41.5	84	g. crs. bk. s.
3419	Aug. 31	54 14 00	165 33 00	55	47	.....	23	fne. gy. s.
3420	Aug. 31	54 13 45	165 33 30	55	47	.....	23	fne. gy. s.
3421	Aug. 31	54 13 30	165 34 00	55	47	.....	28	fne. gy. s.
3422	Aug. 31	54 13 15	165 34 30	55	47	.....	25	fne. gy. s. bk. sp.
3423	Aug. 31	54 13 00	165 35 00	55	47	.....	26	fne. gy. s. sh.
3424	Sept. 1	54 36 00	165 27 00	50	46	39.0	113	bk. s. g.
3425	Sept. 1	55 12 00	166 36 00	53	49	39.9	81	g. m.
3426	Sept. 1	55 47 00	167 53 00	49	47	38.8	78	fne. bk. s.
3427	Sept. 1	55 59 00	168 19 00	49	46	39.0	79	fne. gy. s.
3428	Sept. 2	56 11 00	168 45 00	48	46	39.0	97	fne. dk. s.
3429	Sept. 2	56 22 00	169 09 00	49	47	40.0	77	crs. s. g.
3429*a*	Sept. 2	56 28 00	170 04 00	49	47	39.3	61	gn. m. fne. s.
3430	Sept. 2	56 55 00	170 18 00	49	46	40.6	47	gn. m. fne. s.
3431	Sept. 3	56 48 00	169 26 00	47	45	39.0	43	gn. m.
3432	Sept. 8	54 01 30	166 23 00	51	47	44.7	42	bk. s. g.
3433	Sept. 8	54 05 00	166 18 00	52	47	43.2	40	rky.
3434	Sept. 8	54 09 00	166 15 00	52	45	42.5	54	g. brk. sh.
3435	Sept. 8	54 12 00	166 09 00	51	45	42.1	57	dk. g.
3436	Sept. 8	54 16 40	165 50 00	51	45	44.0	49	dk. gy. s.
3437	Sept. 8	54 18 00	165 40 00	57	46	43.0	50	gy. s. brk. sh.
3438	Sept. 8	54 15 30	165 32 00	57	46	42.9	51	crs. dk. s. brk. sh.
3439	Sept. 9	54 27 00	163 55 00	52	48	46.5	52	fne. gy. s. bk. sp.
3440	Sept. 9	54 32 00	163 31 00	55	48	44.0	54	bk. s. g.
3441	Sept. 9	54 33 00	163 19 00	55	48	42.8	61	bk. g.
3442	Sept. 9	54 39 00	163 05 00	53	47	45.6	35	fne. g. brk. sh.
3443	Sept. 9	54 40 00	163 03 00	53	47	.....	37	g. brk. sh.
3444	Sept. 9	54 44 00	162 56 00	53	47	.....	41	rky.
3445	Sept. 9	54 46 00	162 52 00	51	48	.....	30	crs. dk. s.
3446	Sept. 9	54 48 00	162 50 00	51	48	.....	33	bk. s.
3447	Sept. 9	54 51 00	162 43 00	51	49	.....	23	rky.
3448	Sept. 9	54 52 00	162 41 00	51	49	.....	15	brk. sh.
3449	Sept. 9	54 53 00	162 39 00	51	49	.....	18	g. brk. sh.
3450	Sept. 9	54 53 30	162 38 00	51	49	.....	15	g. brk. sh.
3451	Sept. 9	54 54 00	162 37 00	51	49	.....	10	bk. s. brk. sh.
3452	Sept. 11	55 12 30	161 53 00	52	48	.....	22	bk. s. r.
3453	Sept. 11	55 18 00	161 18 00	53	49	.....	32	dk. s.
3454	Sept. 11	55 19 00	161 03 00	52	49	.....	28	crs. s. g. brk. sh.
3455	Sept. 11	55 23 30	160 54 00	52	49	.....	31	gy. s. bk. sp.
3456	Sept. 11	55 24 30	160 49 30	52	49	.....	32	bk. s.
3457	Sept. 11	55 25 00	160 46 00	53	49	.....	42	fne. bk. s.
3458	Sept. 11	55 26 00	160 41 00	53	49	.....	36	brk. sh.
3459	Sept. 11	55 28 00	160 37 00	53	49	.....	21	brk. sh.
3460	Sept. 11	55 29 00	160 35 00	52	48	.....	19	g. brk. sh.
3461	Sept. 11	55 30 00	160 34 30	52	48	.....	13	bk. s. sh.
3462	Sept. 11	55 31 00	160 35 00	52	48	.....	27	fne. bk. s. sh.
3463	Sept. 11	55 32 00	160 35 00	52	48	.....	31	fne. bk. s.
3464	Sept. 11	55 33 00	160 35 00	52	48	.....	38	bk. s.
3465	Sept. 11	55 34 00	160 35 00	52	48	.....	38	gy. s. sh.
3466	Sept. 11	55 35 00	160 35 00	52	49	.....	42	bk. s.
3467	Sept. 11	55 35 30	160 35 00	52	49	.....	31	bk. s. sh.
3468	Sept. 11	55 36 00	160 35 00	52	49	.....	26	bk. s.
3469	Sept. 14	57 14 00	151 52 00	48	47	.....	46	gy. s. brk. sh.
3470	Sept. 14	57 24 00	149 33 00	48	47	36.1	938	rky.
3471	Sept. 14	57 21 00	149 11 00	49	47	35.1	1,427	bl. m. s.
3472	Sept. 14	57 18 00	148 38 00	50	48	35.1	1,901	br. m. fne. s.
3473	Sept. 15	57 14 00	148 06 00	50	47	35	2,741	br. m.
3474	Sept. 15	57 08 00	147 22 00	53	51	35	2,587	br. m.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Off Alaska.						
	1893.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
3475	Sept. 15	57 11 00	146 41 00	57	51	35	2,320	gy. oz.
3476	Sept. 15	57 15 00	145 52 00	56	51	34.6	2,150	gy. oz.
3477	Sept. 15	57 18 00	145 05 00	59	52	35.1	2,149	gy. oz.
3478	Sept. 15	57 20 00	144 17 00	53	51	35.1	2,119	gy. oz.
3479	Sept. 16	57 20 00	143 27 00	53	51	35.1	2,099	gy. oz.
3480	Sept. 16	57 17 00	142 28 00	53	51	35.1	2,034	gy. oz.
3481	Sept. 16	57 12 00	141 31 00	55	52	35.1	1,946	lt. br. oz.
3482	Sept. 16	57 09 30	140 37 00	58	54	35.1	1,826	lt. br. oz.
3483	Sept. 16	57 09 00	139 38 00	59	55	35.	1,868	br. oz.
3484	Sept. 16	57 07 00	138 40 00	54	53	35.1	1,724	br. and gy. oz.
3485	Sept. 17	57 04 00	137 43 00	53	51	35.1	1,553	gy. oz.
3486	Sept. 17	57 01 00	136 46 00	53	52	35.1	1,270	br. m.
3487	Sept. 17	57 00 00	136 12 30	55	53	38.9	756	gn. m. s.
3488	Sept. 17	56 58 40	135 47 30	55	54	45	55	rky.
		Western Aleutian islands.						
	1894.		Long. E.					
3489								
3490	June 6	52 46 30	175 27 00	44	40	.....	2,237	No specimen.
3491	June 7	52 41 30	176 24 00	40	39	35	2,107	br. m. fne. s.
		Eastern Bering Sea.						
			Long. W.					
3492	June 29	57 59 00	166 04 00	44	38	33	32	gy. s.
3493	June 29	58 06 00	165 22 00	45	38	35.7	26	fne. gy. s.
3494	June 29	58 24 00	163 38 00	40	37	34.5	21	fne. gy. s.
3495	June 30	57 28 00	163 14 00	38	38	34	27	fne. gy. s.
3496	June 30	56 59 00	163 02 00	42	40	32	34	fne. gy. s.
3497	June 30	56 59 00	163 48 00	42	40	34.3	37	fne. gy. s.
3498	June 30	56 58 00	165 15 00	41	38	34	44	gn. m.
3499	July 1	56 57 00	166 33 00	39	39	34	40	gn. m.
3500	July 1	56 54 00	167 51 00	39	39	.....	44	gy. s.
3501	July 1	57 52 00	167 19 00	42	43	37	37	gn. m.
3502	July 13	56 35 00	168 18 00	43	41	.....	59	s. m.
		South of Unimak Id. and north of Sannak islands.						
3503	July 15	54 24 00	163 51 00	43	41	.....	43	crs. bk. s.
3504	July 15	54 26 00	163 44 00	43	41	37.3	54	fne. bk. s.
3505	July 15	54 29 00	163 37 00	43	41	37	57	crs. bk. s. p.
3506	July 15	54 30 30	163 29 00	43	40	37	59	bk. s. p.
3507	July 15	54 32 30	163 21 00	43	40	39	60	bk. s.
3508	July 15	54 34 30	163 14 00	43	39	38	41	bk. g.
3509	July 15	54 36 00	163 06 00	43	39	41	46	gy. s.
3510	July 15	54 37 00	163 02 00	43	39	40	25	gy. s.
3511	July 15	54 37 30	163 01 00	43	39	39	30	gy. s.
3512	July 15	54 38 00	162 59 00	43	39	40	38	rky.
3513	July 15	54 40 30	163 00 00	43	39	38	30	bk. s. g.
3514	July 15	54 46 30	163 08 00	43	39	38	46	gn. m.
3515	July 22	54 40 00	163 01 00	48	41	40.1	23	rky.
3516	July 22	54 38 00	162 58 30	47	40	.....	50	bk. s. p.
3517	July 22	54 35 00	162 55 40	48	41	.....	38	rky.
3518	July 22	54 32 30	162 53 00	49	42	41	33	sh.
3519	July 22	54 28 15	162 49 00	49	42	41.2	33	rky.
		Northern portion of Bering Sea.						
3520	Aug. 3	58 18 00	175 57 00	49	43	35	1,363	gy. oz. fne. s.
3521	Aug. 3	58 27 00	176 51 00	50	43	35.6	1,279	gy. oz. fne. s.
3522	Aug. 3	58 37 00	177 45 00	49	43	36.4	717	gn. m. s.
3523	Aug. 3	58 40 00	178 03 00	50	43	38	349	r. fne. gy. s.
3524	Aug. 3	58 42 00	178 12 00	49	43	38	369	fne. gy. s.
3525	Aug. 4	58 45 00	178 30 00	48	43	35	1,231	fne. gy. s.
3526	Aug. 4	58 48 00	178 49 00	46	42	35	1,830	gn. m. fne. s.
3527	Aug. 4	58 52 00	179 07 00	46	42	35.1	1,812	gy. oz.
3528	Aug. 4	58 56 00	179 25 00	46	42	35	1,838	gy. oz.
3529	Aug. 4	59 25 00	179 13 00	55	44	35	1,765	gy. oz. fne. s.
3530	Aug. 4	59 55 00	179 01 00	47	44	36.3	713	gy. oz. fne. s.
3531	Aug. 4	60 25 00	178 49 00	48	44	38	183	gn. m. fne. s.
3532	Aug. 7	58 00 00	172 58 00	51	45	36	61	fne. dk. s.
		South of Alaska Peninsula.						
	1895.							
3533	June 13	55 31 00	159 23 00	46	42	.....	100	fne. bk. g.
		Bering Sea, south of St. Paul Island.						
3534	June 24	56 59 30	170 24 30	36	37	.....	20	fne. bk. s.
3535	June 24	57 01 00	170 26 20	36	37	.....	38	fne. bk. s. brk. sh.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Bering Sea, south of St. Paul Isd.						
	1895.	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	*Fms.*	
3536	June 24	57 04 00	170 30 45	36	37	.....	33	rky.
3537	June 24	57 04 45	170 29 15	36	37	.....	36	fne. bk. g.
3538	June 24	57 05 30	170 27 45	40	35	.....	25	fne. gy. s. p.
3539	June 24	57 06 00	170 26 30	40	35	.....	29	fne. gy. s. sh.
3540	June 24	57 06 40	170 25 00	40	35	.....	32	bk. p.
3541	June 24	57 07 30	170 23 20	42	34	.....	19	fne. gy. s.
		Bering Sea betw. Pribilof and Commander islands.						
3542	June 26	56 53 00	172 15 00	37	39	38.9	66	fne. s. m.
3543	June 27	56 00 00	177 30 00	40	40	35.1	2,058	No specimen.
3544	June 28	56 02 00	178 50 00	40	40	35.1	2,083	No specimen.
3545	June 29	55 45 00	179 57 00	40	39	35.1	2,086	br. m. oz.
			Long. E.					
3546	June 30	55 59 00	178 43 00	43	41	35.1	2,105	br. m. oz.
3547	June 30	55 55 00	177 12 00	40	41	35.6	2,113	br. m. oz.
3548	July 1	55 52 00	177 25 00	38	40	35.1	2,120	br. m. oz.
3549	July 1	55 53 00	173 53 00	45	43	35.2	2,111	br. m. oz.
3550	July 2	55 59 00	171 57 00	42	44	35.1	2,086	br. m. oz.
3551	July 2	56 00 00	169 46 00	45	44	35.1	2,154	br. m. oz.
3552	July 2	56 00 00	168 16 00	43	43	35.1	2,153	br. m.
3553	July 2	55 58 00	166 43 00	42	43	35.1	2,119	gy. s. m.
3554	July 3	55 43 00	166 15 00	42	43	35.1	2,090	gy. s. m.
3555	July 3	55 25 00	165 46 00	41	43	34.3	70	gy. s. m.
3556	July 3	55 16 00	165 32 30	42	43	.....	20	crs. s. rky.
3557	July 3	55 12 00	165 38 00	42	43	.....	35	gy. s.
3558	July 3	55 11 00	165 40 00	42	43	.....	37	gy. s.
3559	July 3	55 11 20	165 46 20	42	43	.....	15	rky.
3560	July 5	55 25 30	165 48 00	45	44	35.1	144	fne. gy. s.
3561	July 5	55 27 00	165 49 00	45	44	34.6	66	rky.
3562	July 5	55 28 30	165 51 30	45	44	38.1	341	gy. s. m.
3563	July 5	55 32 00	165 56 30	45	45	35.1	1,087	g.
3564	July 6	56 25 00	167 52 00	43	45	35	2,137	gn. oz.
3565	July 6	56 56 00	169 06 00	43	44	35	1,866	bl. m. oz.
3566	July 6	57 16 00	169 41 00	45	44	36	972	bl. m. oz.
3567	July 6	57 20 00	170 00 00	46	44	.....	410	gy. s. m.
3568	July 6	57 35 00	170 24 00	45	43	38.1	537	br. oz. g.
3569	July 6	57 41 00	170 39 00	45	42	38	609	br. oz. s.
3570	July 6	57 47 00	170 54 00	44	42	37	540	gn. oz. g.
3571	July 6	57 53 00	171 09 00	43	42	36.5	696	gn. m. oz.
3572	July 7	58 13 00	171 51 00	42	42	35	1,469	gn. m. oz.
3573	July 7	58 30 00	172 47 00	42	41	35	1,898	hrd.
3574	July 7	58 23 00	174 17 00	45	42	38.7	1,978	bl. m. oz.
3575	July 7	58 12 00	175 49 00	48	43	35	2,041	br. m. oz.
3576	July 7	58 01 00	177 21 00	44	42	19	2,068	br. m. oz.
3577	July 7	57 49 00	178 50 00	42	42	35	2,080	br. m. oz.
			Long. W.					
3578	July 7	57 38 00	179 42 00	44	42	.....	2,084	br. m. oz.
3579	July 7	57 34 00	179 16 00	43	41	35	2,076	gn. m.
3580	July 7	57 30 00	178 50 00	43	41	35	2,059	gn. m.
3581	July 7	57 23 00	178 17 00	41	41	35.2	2,059	gn. m.
3582	July 8	57 13 00	177 07 00	41	41	35.1	1,994	gn. m.
3583	July 8	57 03 00	176 00 00	41	41	35	1,803	gn. m. fne. s.
3584	July 8	56 54 00	174 50 00	42	42	35	1,825	No specimen.
3585	July 8	.....	.....	.....	.....	.....	.....	
		Bering Sea betw. Pribilof and Aleutian islands.						
3586	Aug. 4	53 59 00	166 29 00	46	46	39.2	76	gn. m. s.
3587	Aug. 4	54 01 30	166 30 30	46	43	38.8	98	fne. gy. s. bk. sp.
3588	Aug. 4	54 03 30	166 31 30	46	45	.....	93	gy. s. g.
3589	Aug. 4	54 00 30	169 20 30	45	45	35.5	1,003	gn. m. bk. s.
3590	Aug. 5	54 30 00	169 31 00	44	45	35.5	1,491	gn. m.
3591	Aug. 5	54 59 00	169 41 00	46	45	35	1,676	gn. m. fne. s.
3592	Aug. 5	55 12 00	168 47 00	46	44	35.2	1,035	br. oz.
3593	Aug. 6	55 34 00	169 22 00	46	45	34.7	1,315	br. oz.
3594	Aug. 7	55 10 00	170 56 00	45	44	34.7	1,664	br. oz.
3595	Aug. 8	55 12 00	171 48 00	44	45	35.2	1,819	br. oz.
3596	Aug. 8	55 32 00	172 17 00	43	43	35.5	1,901	br. oz.
3597	Aug. 10	56 15 00	172 35 00	46	45	36	1,267	gn. m. s.
3598	Aug. 10	56 28 00	172 39 00	45	44	38.1	206	gn. m. s.
3599	Aug. 10	56 29 00	172 39 00	45	45	38.1	200	gn. m. s.
3600	Aug. 10	56 30 00	172 40 00	45	45	37.1	156	gn. m. s.
3601	Aug. 10	56 31 00	172 40 00	45	44	37.1	110	gn. m. s.
3602	Aug. 11	55 53 00	171 42 00	45	44	35.1	1,496	gn. m. s.
3603	Aug. 12	54 39 00	170 19 00	46	44	35.3	1,025	gn. oz.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. W.	Air.	Surface.	Bottom.		
		Bering Sea betw. Pribilof and Aleutian isls.						
	1895.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
3604	Aug. 12	54 46 00	169 29 00	45	45	35.2	1,355	gn. oz.
3605	Aug 12	55 01 00	168 33 00	44	45	35.1	1,162	gn. m. s.
3606	Aug. 13	54 54 00	168 13 00	44	44	35.5	1,132	gn. m. s.
3607	Aug. 13	54 41 00	168 01 00	44	45	37.1	823	gn. m. s.
3608	Aug. 13	54 41 00	168 25 00	44	45	35.3	1,122	gn. m. s.
3609	Aug. 13	55 09 00	167 40 00	45	45	37.5	189	gn. m. s.
3610	Aug. 13	55 32 00	167 50 00	46	44	38.1	110	fne. gy. s.
3611	Aug. 13	55 32 00	168 11 00	45	45	38.9	83	fne. gy. s. bk. sp.
3612	Aug. 13	55 42 00	168 32 00	45	45	38.3	76	bn. m. fne. s.
3613	Aug. 18	54 14 00	166 54 30	52	46	36.3	778	gn. m. bk. s.
3614	Aug. 18	54 25 00	167 13 00	50	46	38.1	334	gn. m. s.
3615	Aug. 18	54 25 00	167 38 00	45	46	37.1	486	gn. m. s.
3616	Aug. 19	54 11 30	167 50 00	44	42	35.2	1,048	gn. m. s.
3617	Aug. 19	54 24 00	168 02 00	44	42	37.1	538	gn. m. s.
3618	Aug. 19	54 10 00	168 14 00	44	42	35.5	1,075	gn. m. bk. s.
3619	Aug. 19	54 06 00	168 37 00	45	43	35.3	1,231	gn. m. s.
3620	Aug. 19	54 17 00	168 53 30	45	43	35.6	1,014	gn. m. bk. s.
3621	Aug. 19	54 39 00	168 52 30	47	44	35.5	975	gn. m. s.
3622	Aug. 19	54 53 00	169 19 00	46	45	35.1	1,471	gn. m. s.
3623	Aug. 20	55 11 00	168 30 30	47	45	35.9	944	gn. m.
3624	Aug. 20	55 32 00	168 36 00	48	47	38.1	273	gn. m. s.
3625	Aug. 20	55 19 30	168 09 00	46	45	38.1	229	gn. m. fne. s.
3626	Aug. 20	55 19 30	168 10 00	46	45	38.1	244	gy. s.
3627	Aug. 20	55 17 00	168 01 00	46	45	38	219	fne. gy. s.
3628	Aug. 20	55 23 00	167 48 00	47	47	37.8	90	fne. gy. s. bk. sp.
3629	Aug. 20	55 11 00	167 56 00	46	45	37.8	367	gn. m. s.
3630	Aug. 21	55 04 00	167 24 00	47	45	37.6	99	bk. s.
3631	Aug. 21	55 19 00	167 27 00	47	47	36.5	78	fne. bk. s.
3632	Aug. 21	55 30 00	167 51 00	46	46	37.6	74	gn. m. s.
3633	Aug. 21	55 41 00	168 34 00	46	46	37.8	77	gn. m. s.
3634	Aug. 21	55 43 00	168 42 00	46	45	38.4	89	gy. s. m.
3635	Aug. 21	55 44 00	168 47 00	46	45	37.8	141	gy. s.
3636	Aug. 21	55 43 00	168 44 00	47	45	38	108	fne. gy. s.
3637	Aug. 21	55 27 00	168 01 30	47	46	36.8	104	fne. gy. s.
3638	Aug. 22	55 42 00	168 09 00	47	46	37.5	68	gn. m.
3639	Aug. 22	56 31 00	166 59 00	48	47	35.3	57	gn. m. s.
3640	Aug. 24	56 02 00	169 06 30	47	45	37.9	77	gn. m. s.
3641	Aug. 24	54 57 30	167 14 00	48	47	37.7	137	gn. m. s.
3642	Aug. 24	54 56 00	167 02 30	47	46	37.3	116	gn. m. s.
3643	Aug. 24	54 55 30	166 57 30	46	46	37.3	113	gn. m. s.
3644	Aug. 24	54 57 00	166 53 00	46	46	37.8	93	gn. m. s.
3645	Aug. 24	54 52 00	166 43 30	46	46	37.5	113	gn. m.
3646	Aug. 24	54 54 00	166 35 30	47	46	37.5	90	gn. m. s.
3647	Aug. 24	54 49 30	166 26 30	46	46	37.3	106	gn. m. s.
3648	Aug. 24	54 50 30	166 21 30	47	46	37.8	95	gn. m. s.
3649	Aug. 25	54 41 00	166 15 30	47	45	37.7	171	rky.
3650	Aug. 25	54 32 00	166 09 00	47	45	37.8	264	rky.
3651								
		Off Southern California, west of Cortez and Tanner banks.						
3652	Apr. 13	33 06 00	119 17 00	58	56	39.1	892	fne. s. m.
3653	Apr. 13	32 38 00	119 36 00	55	55	45.4	180	fne. gy. s
3654	Apr. 13	32 30 00	119 43 00	55	55	38.6	659	crs. gy. s.
		Eastern portion of Bering Sea south of Pribilof Islands.						
	1896.							
b 3655	July 7	54 51 00	167 46 00	43	43	36.4	671	gn. m. bk. vol. s.
		From Bering Isl. to Kamchatka coast. a						
			Long. E.					
c 3660	Aug. 9	55 11 30	165 39 00	52	48	.....	41	fne. gy. s. bk. sh.
3661	Aug. 9	55 08 30	165 28 00	49	49	35	2,250	fne. gy. s. bk. p. c.
3662	Aug. 9	54 49 42	164 36 00	52	49	35	2,665	m. fne. dk. s. p.
3663	Aug. 10	54 51 00	163 46 00	54	49	35.2	3,117	bn. m. fne. dk. s.

a Except station Hy. 3660, geographical positions on this line are independent of shore features.
b No records for Nos. 3656 to 3659, inclusive.
c Accepting position of Ari Kamen, Bering Island, as plotted on Stejneger's map, it bore NE. by E. ½ E. (mag.), distant 3 miles from Hy. 3660.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. E.	Air.	Surface.	Bottom.		
		From Bering Isd. to Kamchatka coast.						
	1896.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
a 3664	Aug. 10	54 42 30	162 55 00	57	50	35	2,077	bn. m. dk. s. p.
b 3665	Aug. 10	54 35 00	162 11 30	53	44	38	473	bn. m. dk. s. p.
c 3666	Aug. 10	54 32 30	161 58 30	53	44	37.4	586	bn. m. fne. s. p.
d 3667	Aug. 10	54 29 00	161 50 00	54	45	37	453	bn. m. dk. s. p.
		Southeast coast of Kamchatka. e						
3668	Aug. 20	51 17 00	158 10 00	53	49	82.7	127	gn. m. co. dk. s. p.
		Along Kuril Chain. f						
3669	Aug. 21	48 43 00	154 31 00	44	41	36.7	425	crs. dk. s.
3670	Aug. 22	48 33 00	154 53 00	42	37	35.7	114	hrd.
3671	Aug. 22	48 32 00	154 55 00	41	37	-------	106	brk. sh.
3672	Aug. 22	48 36 00	153 59 00	45	42	36.7	304	crs. g.
3673	Aug. 22	48 26 00	153 33 00	47	45	34.7	1,102	crs. dk. s. p
3674	Aug. 23	48 19 00	153 23 00	48	44	35.7	1,001	bk. s. p.
3675	Aug. 23	48 13 00	153 20 00	48	40	36.3	624	bk. s.
g 3676 (*h*)	Aug. 24	47 35 00	152 48 30	45	38	35.7	90	rky.
		Sea of Okhotsk from Lower Ushishir Island to Robben Island. i						
j 3679	Aug. 26	47 31 30	152 45 48	45	39	38.7	37	p.
k 3680	Aug. 26	47 31 30	152 39 00	45	40	35.7	686	p.
l 3681	Aug. 26	47 31 42	152 32 00	44	39	35.2	1,164	fne. gy. s.
m 3682	Aug. 26	47 32 00	152 21 00	44	39	34.7	1,500	bn. m. fne. gy. s.
n 3683	Aug. 26	47 33 00	152 07 00	47	39	35.2	1,712	fne. gy. s.
3684	Aug. 26	47 36 00	151 46 00	53	53	-------	1,830	bn. m. dk. s.
3685	Aug. 26	47 40 30	151 05 00	49	50	35.7	1,836	bn. m. fne. s.
3686	Aug. 27	47 45 00	150 23 30	43	47	35.9	1,836	bn. m. fne. s.
3687	Aug. 27	47 50 00	149 42 00	48	50	36	1,843	bn. and yl. m. fne. s.
3688	Aug. 27	47 55 30	148 56 00	55	55	35.8	1,562	bn. m. fne. s.
3689	Aug. 27	48 01 30	148 16 30	55	55	36	1,426	bn. m. fne. s.
3690	Aug. 27	48 08 00	147 34 00	56	56	36	904	lt. bn. m. qtz. s.
3691	Aug. 28	48 15 00	146 51 00	57	59	36	796	lt. bn. m. qtz. s.
3692	Aug. 28	48 21 00	146 08 00	58	56	36.2	698	bn. m. fne. s.
3693	Aug. 28	48 27 45	145 20 30	58	56	33	155	bn. m. crs. vol. s.
3694	Aug. 28	48 31 48	144 54 51	57	48	35	27	fne. g. r. sh.
3695	Aug. 28	48 29 00	144 42 30	58	51	-------	16	rky.
		Sea of Okhotsk from Robben Island to Iturup Island. o						
3696	Sept. 2	48 22 00	144 41 00	55	47	40	20	fne. s. p.
3697	Sept. 2	48 05 00	145 01 00	54	55	31	71	bl. m.
3698	Sept. 3	47 43 00	145 28 00	54	54	37	631	gn. m. s.
3699	Sept. 3	47 20 30	145 54 00	53	56	35.9	1,584	gn. m. fne. s.

a Serial temperatures to 1,000 fathoms.

b 97° 33′ Ext. Rt. Pt. to Cape Kosloff. 95° 08′ first Pt. left of Ext. Rt. Pt. to Kosloff. 77° 02′ Ext. Rt. Pt. to Mt. Kronotski.

c 102° 43′ Ext. Rt. Pt. to Kosloff. 91° 03′ Ext. Rt. Pt. to Kronotski. 5° 07′ Kosloff to detached rock. Ext. Right Point, N. 16° E. (mag.). Mt. Kronotski, N. 74° W. (mag.). Cape Kosloff, N. 86° 15′ W. (mag.).

d 78° 56′ Ext. Rt. Pt. to Kosloff. 1° 12′ Kosloff to detached rock. Cape Kosloff, N. 46° 30′ W. (mag.).

e Geographical positions, approximate, without relation to shore features.

f Geographical positions, approximate, without relation to shore features, except station Hy. 3676.

g Position referred to obs. spot at Old Village, Lower Ushishir Island, as in lat. 47° 30′ 56.8″ N., long. 152° 47′ 55″ E., determined by this vessel.

h Nos. 3677 and 3678 missing.

i Geographical positions on this line referred to obs. spot at Old Village, Lower Ushishir Island, as in lat. 47° 30′ 56.8″ N., long. 152° 47′ 55″ E. Robben Island is assumed to be in lat. 48° 31′ 30″ N., long. 144° 48′ 38″ E.

j Babuskin Rock, south (true) ¼ mile.

k SW. end Lower Ushishir, S. 68° E., true; S. end Ketoy, S. 48° W., true.

l SW. end Lower Ushishir, S. 80° E., true; S. end Ketoy, S. 28° W., true.

m SW. end Lower Ushishir, S. 92° E., true; S. end Ketoy, S. 14° E., true.

n Right end Ketoy, S. 44° E., true; North Ushishir Peak, S. 86° E., true.

The five preceding bearings are all independent of geographical positions of the stations and have not been adjusted.

o Positions on this line are geographical, without relation to shore features. Position given on B. A. chart No. 2405, of Shana Village, Iturup Island, is accepted. Lat. 45° 15′ N., long. 147° 56′ E.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Serial No.	Date.	Position.		Temperature.			Depth.	Character of bottom.
		Lat. N.	Long. E.	Air.	Surface.	Bottom.		
		Sea of Okhotsk from Robben Island to Iturup Island.						
	1896.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.	
3700	Sept. 3	46 58 00	146 20 00	57	58	35.9	1,818	gn. m. fne. s.
3701	Sept. 3	46 35 00	146 49 00	62	55	36	1,820	lt. bn. m. s.
3702	Sept. 3	46 15 00	147 07 00	55	55	35.8	1,817	bn. m. fne. s.
3703	Sept. 4	45 48 00	147 22 00	53	54	36	1,825	gn. m. fne. s.
3704	Sept. 4	45 40 00	147 28 00	53	53	35.9	1,761	gn. m. fne. s.
3705	Sept. 4	45 31 30	147 32 30	53	54	36	1,078	bn. m. fne. s.
3706	Sept. 4	45 23 00	147 39 30	54	54	36	1,107	bn. m. fne. s.
3707	Sept. 4	45 18 00	147 42 00	54	54	36.5	668	bn. m. crs. s.
		*Sea of Okhotsk from Iturup Island toward La Perouse Straits.**						
3708	Sept. 6	45 16 00	147 52 00	64	58	50	27	dk. gy. s.
3709	Sept. 6	45 16 30	147 45 00	64	58	35.7	312	gn. m. fne. s.
3710	Sept. 6	45 18 00	147 31 00	60	55	36	810	gn. m. s.
3711	Sept. 6	45 19 00	147 09 00	60	54	36	1,641	gn. m. fne. s.
3712	Sept. 6	45 21 00	146 27 00	60	58	35.8	1,744	gn. m. fne. s.
3713	Sept. 7	45 23 00	145 46 00	61	58	36	1,700	gn. m. s.
3714	Sept. 7	45 25 00	145 02 00	60	57	35.9	1,649	gn. m. s.
3715	Sept. 7	45 27 00	144 21 00	62	54	36.5	468	gn. m. crs. s. p.
3716	Sept. 7	45 31 00	143 38 00	62	56	33	122	gy. s.
3717	Sept. 7	45 34 00	143 12 00	61	57	34	68	gn. m.
3718	Sept. 7	45 36 30	142 58 00	60	59	32	62	gn. m.
		Santa Catalina Island, California.						
	1897.	Lat. N.	Long. W.					
	Apr. 6	Entrance to Isthmus Cove.		60	56	.....	12–15	gy. s. sh. rky.
	Apr. 7	1¼′ E. by N. of Avalon, Dakins Cove.		66	59	.....	48	fne. gy. s.
3719	Apr. 7	.....do.....		66	59	.....	48	fne. gy. s.
3720	Apr. 7	1¼′ E. by N. of Avalon, Dakins Cove.		66	59	.....	47	fne. gy. s.
	Apr. 7	Off east end Santa Catalina Island.		66	59	.....	52	fne. gy. s.
	Apr. 7	South of east end Santa Catalina Island.		66	59	.....	44	fne. gy. s.
	Apr. 7	.....do.....		66	59	.....	38	fne. gy. s. hk. sh.
	Apr. 8	Off east end Santa Catalina Island.		66	58	51.7	50	fne. gy. s.
	Apr. 8	.....do.....		66	58	52	50	fne. gy. s.
	Apr. 8	Rocks, east entrance Dakins Cove.		72	59	.....	(?)	rky.
3721	Apr. 9	33 17 20	118 24 40	69	60	.....	77–132	rky.
3721*a*	Apr. 9	Near preceding position.		72	60	.....	77–132	rky.
		Monterey Bay and vicinity, Cal.						
	Apr. 12	Anchorage, Santa Cruz.		62	55	.....	6	gy. s. m.
3722	Apr. 13	36 44 30	121 52 00	57	55	49	45	gy. s. m.
	Apr. 13	Anchorage, Monterey Harbor.		64	58	.....	6	s. m.
	Apr. 14	.....do.....		58	55	.....	6	s. m.
	Apr. 17	.....do.....		58	56	.....	7	s. m.
	Apr. 18	.....do.....		61	54	.....	7	s. m.
3723	Apr. 22	36 56 30	122 09 00	52	51	.....	26	gy. s.
3724	Apr. 24	37 37 30	123 02 00	60	51	49	68	gy. s. co. r.
3725	Apr. 24	37 41 00	123 03 00	60	51	49	45	rky.
3726	Apr. 24	37 41 00	123 04 00	60	51	49	50	rky.
†3727	Apr. 24	37 41 00	123 00 00	60	51	49	30–40	rky.

*Positions geographical, without relation to shore features. Position given on B. A. chart No. 2405, of Shana Village, Iturup Island, is accepted. Lat. 45° 15′ N., long. 147° 56 E.

†Numbers 3728 to 3777, inclusive, missing from the records.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Nos.		Date.	Position.		Temp.		Depth.	Character of bottom.
Ser.	A.A.		Lat. N.	Long. W.	Surf.	Bot.		
			California to Marquesas Islands.					
		1899.	° ′ ″	° ′ ″	° F.	° F.	Fms.	
3778	1	Aug. 26	31 10 00	125 00 00	64	.....	1,955	No specimen.
3779	4	Aug. 29	24 45 00	130 16 00	68	34.6	2,628	lt. br. vol. oz.
3780	5	Aug. 30	22 42 00	131 54 00	70	34.6	2,740	br. vol. oz.
3781	6	Aug. 31	20 26 00	133 28 00	75	.....	2,810	dk. br. vol. oz.
3782	7	Sept. 1	18 19 00	134 57 00	76	.....	2,881	dk. br. vol. oz.
3783	8	Sept. 2	17 13 00	136 09 00	76	.....	2,766	No specimen.
3784	9	Sept. 2	16 52 00	136 12 00	76	.....	3,003	No specimen.
3785	11	Sept. 3	14 38 00	136 44 00	79	.....	2,646	lt. br. vol. oz.
3786	12	Sept. 4	12 07 00	137 18 00	81	.....	2,883	lt. br. rad. oz.
3787	14	Sept. 7	6 41 00	137 00 00	82	.....	2,776	lt. gy. glob. oz.
3788	15	Sept. 8	4 35 00	136 54 00	80	.....	2,583	lt. gy. oz. glob. rad.
3789	16	Sept. 9	2 38 00 Lat. S.	137 22 00	80	35.2	2,440	lt. gy. glob. oz.
3790	18	Sept. 13	6 25 00	138 59 00	80	35	2,475	lt. gy glob. oz.
3791	19	Sept. 13	7 58 00	139 09 00	79	.....	2,287	gy. yl. oz. crs. glob.
3792	20	Sept. 14	8 13 00	139 10 00	79	35.1	2,267	gy. yl. oz. crs. glob.
3793	21	Sept. 14	8 28 00	139 12 00	79	.....	2,183	gy. yl. oz. crs. glob.
3794	22	Sept. 14	8 31 00	139 26 00	79	.....	1,939	gy. yl. oz. crs. glob.
3795	23	Sept. 14	8 33 00	139 36 00	80	35.5	1,802	gy. yl. oz. crs. glob.
3796	24	Sept. 14	Haunanu Point, Ua Huku Island, Marquesas, S. 43° E., 15½ m.		80	.....	1,040	gn. oz. lav.
3797	25	Sept. 14	Haunanu Point, Ua Huka Island, E., dist. 17 m.		80	.....	1,173	gy. vol. oz.
3798	27	Sept. 15	Cape Martin, Nukuhiva Isl., N. 30° E., dist. 6½ m.		80	39.5	687	drab vol. oz. glob.
3799	28	Sept. 17	Chichikoff Point, Nukuhiva Isl., N. 13° E., 8 m.		80	.....	1,284	vol. r.
3800	29	Sept. 17	9 16 00	140 25 00	80	34.9	1,932	lt. gy. vol. oz. glob.
3801	30	Sept. 18	10 29 00	141 52 00	81	35	2,456	lt. gy. vol. oz. glob.
			Paumotu Islands.					
3802	32	Sept. 20	13 37 00	145 42 00	80	35	2,451	red c. foram.
3803	33	Sept. 20	Ent. Ahii Lagoon, S. 28° W., 22 m.		81	.....	2,527	red c.
3804	34	Sept. 20	Ent. Ahii Lagoon, SE., 2.5 m.		81	.....	1,208	lt. gy. oz. glob.
3805	35	Sept. 21	14 42 00	147 08 00	80	.....	1,462	lt. gy. oz. glob. frag.
3806	36	Sept. 21	Ent. Avatoru Pass, Rahiroa Atoll, S. 44° W., 16 m.		80	.....	706	vol. r.
3807	37	Sept. 24	Ent. Avatoru Pass, Rahiroa Atoll, S., ½ m.		80	.....	112	wh. co. s.
3808	38	Sept. 24	Ent. Avatoru Pass, Rahiroa Atoll, S., 1.5 m.		80	.....	604	brk. sh.
3809	39	Sept. 24	Ent. Avatoru Pass, Rahiroa Atoll, S., 2.5 m.		80	.....	645	fne. wh. co. s.
3810	40	Sept. 24	Ent. Avatoru Pass, Rahiroa Atoll, S., 3.5 m.		80	.....	661	wh. co. s. glob. oz. min. frag.
3811	41	Sept. 24	Ent. Avatoru Pass, Rahiroa Atoll, S., 5.5 m.		81	.....	684	wh. co. s. glob. oz. min. frag.
3812	42	Sept. 24	Ent. Avatoru Pass, Rahiroa Atoll, S., 7.5 m.		81	.....	819	wh. co. s. glob. oz. vol. part.
3813	43	Sept. 24	15 13 10	147 53 10	82	.....	341	wh. co. s. glob. pter.
3814	44	Sept. 24	15 14 10	147 51 5	82	.....	391	wh. co. s. sh. glob.
3815	45	Sept. 25	15 15 00	147 51 35	82	.....	524	wh. co. s. brk. sh.
3816	46	Sept. 24	15 16 50	147 52 30	80	.....	450	pter. oz. vol. part.
3817	47	Sept. 24	15 19 35	147 53 40	82	.....	764	wh. co. s. vol. part.
3818	48	Sept. 24	15 24 10	147 56 00	80	.....	897	glob. pter. vol. part.
3819	49	Sept. 25	15 25 00	148 08 00	80	.....	1,123	wh. co. s. glob. vol. part.
3820	50	Sept. 25	15 25 50	148 24 25	80	.....	1,486	glob. oz. vol. part.
3821	51	Sept. 25	15 02 00	148 24 00	80	.....	488	wh. co. s.
3822	52	Sept. 25	15 01 40	148 25 00	80	.....	670	wh. co. s.
3823	53	Sept. 25	15 01 00	148 27 00	81	.....	782	wh. pter. oz. vol. part.
3824	54	Sept. 25	15 00 20	148 30 00	81	.....	850	wh. pter. glob. oz.
3825	55	Sept. 25	14 58 35	148 35 00	81	.....	844	wh. glob. oz. mang. vol. part.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Nos.		Date.	Position.		Temp.		Depth.	Character of bottom.
Ser.	A.A.		Lat. S.	Long. W.	Surf.	Bot.		
			Paumotu Islands.					
		1899.	° ′ ″	° ′ ″	° F.	° F.	Fms.	
3826	56	Sept. 25	14 56 00	148 44 00	81	.....	711	wh. pter. oz.
3827	57	Sept. 25	14 53 20	148 42 30	80	.....	486	crs. wh. co. s. vol. part.
3828	58	Sept. 25	14 51 20	148 51 20	80	.....	624	wh. co. s.
3829	59	Sept. 25	14 56 00	148 48 00	80	.....	860	wh. co. s. glob. vol. part.
3830	60	Sept. 25	15 00 30	148 47 00	80	.....	1,257	wh. co. s. glob. vol. part.
3831	61	Sept. 25	15 16 00	148 46 00	79	.....	1,762	lt. gy. oz. glob.
3832	62	Sept. 26	15 33 00	148 45 00	80	.....	2,267	lt. gy. oz. glob.
3833	63	Sept. 26	15 42 00	148 44 00	80	.....	2,243	vol. m. glob.
3834	64	Sept. 26	West coast Makatea Id., E. 1.3 m.		80	.....	581	crs. wh. co. s.
3835	65	Sept. 26	South coast Makatea Id., N. 5 m.		80	.....	1,363	wh. co. s. mang. nods.
3836	66	Sept. 26	16 10 00	148 26 00	80	.....	2,238	vol. m. glob. mang. nods.
3837	67	Sept. 27	16 32 00	148 40 00	80	.....	2,363	vol. m. glob.
3838	68	Sept. 27	16 57 00	148 58 00	79	.....	2,224	vol. m. glob.
3839	69	Sept. 27	17 14 00	149 10 00	80	.....	1,930	no spec.
3840	70	Sept. 27	17 21 00	149 15 00	80	.....	1,585	vol. m.
3841	71	Sept. 27	Point Venus, Tahiti Id., S. 32°, W. 4.2 m.		80	.....	775	crs. vol. s. mang. nods.
3842	72	Sept. 27	Point Venus, Tahiti Id., S. 54°, E. 4 m.		79	.....	867	co. vol. s.
3843	73	Oct. 5	Point Venus, Tahiti Id., S. 55°, E. 3.8 m.		79	.....	807	fne. vol. s. m.
3844	75	Oct. 5	North shore, center Tetiaroa Atoll, S. 45°, W. 6 m.		80	.....	1,592	gy. vol. m. glob. oz.
3845	76	Oct. 6	15 56 20	147 40 00	80	35.0	2,269	lt. br. vol. m.
3846	77	Oct. 7	16 03 00	147 11 00	78	36.0	1,321	glob. oz. vol. part.
3847	78	Oct. 7	16 08 00	146 42 00	79	39.0	609	glob. oz.
3848	79	Oct. 7	Village west side Niau Atoll, E. ¼ m.		79	.....	252	co. s. glob. oz.
3849	80	Oct. 7	Village west side Niau Atoll, NE. 1.75 m.		80	.....	491	co. s. pter. oz.
3850	81	Oct. 7	Niau Atoll, S. 3°, E. 14 m.		80	.....	677	co. s. glob. oz.
3851	82	Oct. 7	Apataki, south end, N. 9 m.		80	.....	675	pter. oz.
3852	83	Oct. 7	Pakaka entrance Apataki Lagoon, NE. ¼ m.		80	.....	333	co. s.
3853	84	Oct. 8	Pakaka entrance Apataki Lagoon, N. 50°, E. 2 m.		80	39.4	613	co. vol.
3854	85	Oct. 8	Pakaka entrance Apataki Lagoon, N. 55°, E. 1 m.		80	.....	520	co. s.
3855	86	Oct. 8	Northwest point Apataki, SE. 1 m.		80	38.8	654	crs. co. s.
3856	87	Oct. 8	Northeast point Apataki, SW. 7 m.		80	.....	1,364	crs. co. s.
3857	88	Oct. 9	Center Tikei, Id., E. ¼ m.		80	.....	360	crs. co. s.
3858	89	Oct. 14	Ngaruae Pass, Fakarava Atoll, S. 28°, E. 1 m.		80	.....	599	crs. co. s
3959	90	Oct. 14	Ngaruae Pass, Fakarava Atoll, S. 35°, E. 3.5 m.		80	.....	666	pter. oz. vol. part.
3860	91	Oct. 14	Southwest end Fakarava, NE. 2 m.		80	.....	662	co. s. pter. oz.
3861	92	Oct. 14	16 44 00	145 35 00	80	.....	839	fne. co. s. mang.
3862	93	Oct. 14	16 51 00	143 42 00	80	.....	1,300	yl. glob. oz.
3863	94	Oct. 14	16 57 00	145 49 00	79	.....	1,531	fne. vol. m. glob.
3864	95	Oct. 15	17 09 00	146 00 00	78	36.1	1,079	lt. yl. glob. oz.
3865	96	Oct. 15	17 14 30	145 49 00	77	39.7	527	co. s. mang.
3866	97	Oct. 15	17 17 00	145 45 30	79	.....	804	glob. oz. mang.
3867	98	Oct. 15	Northwest point Anaa Atoll, E. 5 m.		79	.....	642	pter. oz. mang. nods.
3868	99	Oct. 15	Northwest face Anaa Atoll, S. 1.3 m.		79	39	508	crs. co. s. mang. globs.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Nos.		Date.	Position.		Temp.		Depth.	Character of bottom.
Ser.	A.A.		Lat. S.	Long. W.	Surf.	Bot.		
			Paumotu Islands.					
		1899.	° ′ ″	° ′ ″	° *F.*	° *F.*	*Fms.*	
3869	100	Oct. 15	North entrance Anaa Lagoon, S. ¼ m.		80	.....	225	wh. co. s.
3870	101	Oct. 15	Village, point Anaa Atoll, S. 50°, W. 5 m.		80	36.0	1,110	fne. co. s. pter. oz. glob.
3871	102	Oct. 15	17 10 00	145 19 00	82	36.0	1,079	lt. gy. glob. oz.
3872	103	Oct. 15	17 03 00	145 08 30	82	35.1	1,733	glob. oz.
3873	104	Oct. 15	Southwest point Tahanae, N. 68°, E. 4 m.		81	.....	966	glob. oz. mang.
3874	105	Oct. 15	Southwest point Tahanae, E. 2 m.		80	38.6	654	co. s. mang.
3875	106	Oct. 16	Southwest point Tahanae, about ¼ mile off-shore, NE. 3 m.		80	.....	269	crs. co. s.
3876	107	Oct. 16	Northwest entrance Makemo Lagoon, SE. 1 m.		80	.....	467	wh. co. s.
3877	108	Oct. 16	Northwest point Makemo Atoll, S. 4 m.		80	.....	856	crs. co. s. pter. glob. oz.
3878	109	Oct. 16	16 13 00	143 48 00	80	.....	987	glob. pter. vol. parts.
3879	110	Oct. 17	16 03 00	143 32 30	80	36.3	1,084	gy. yl. glob. oz.
3880	111	Oct. 17	15 53 00	143 26 00	80	35.2	1,805	gy. yl. glob. oz.
3881	112	Oct. 17	15 54 00	143 06 00	80	35.4	1,568	glob. oz. mang.
3882	113	Oct. 17	15 55 00	142 39 00	80	.....	1,503	lt. br. glob. oz.
3883	114	Oct. 17	Northwest Pass Raroia, SE. 5 m.		80	35.7	1,385	gy. yl. glob. oz. mang. parts.
3884	115	Oct. 17	Northwest point Raroia, SE. ¼ m.		81	40.2	508	crs. co. s. pter. oz.
3885	116	Oct. 18	Southwest point Takume Atoll, NE. 1.5 m.		79	38.7	572	crs. co. s.
3886	117	Oct. 18	Midway between Raroia and Takume atolls.		79	38.0	563	mang. part.
3887	118	Oct. 18	Southwest point Raroia Atoll, NE. 1 m.		80	38.2	630	co. s. mang.
3888	119	Oct. 18	16 14 00	142 50 00	80	35.5	1,516	glob. oz. mang.
3889	120	Oct. 18	Southwest face Taenga Atoll, N. 67°, E. 3 m.		80	36.5	928	glob. pter. oz.
3890	121	Oct. 19	16 25 00	143 33 00	79	36.1	1,108	glob. oz. mang.
3891	122	Oct. 19	16 30 00	143 41 00	79	39.7	540	co. s. pter. oz.
3892	123	Oct. 25	Northeast pass Makemo, S. 1 m.		80	39.0	603	crs. co. s.
3893	124	Oct. 25	East point Makemo, N. 78°, W. 11 m.		79	36.0	1,221	glob. mang.
3894	125	Oct. 26	Midway between Marutea and Nihiru Ids.		79	36.0	1,135	glob. oz.
3895	126	Oct. 26	17 07 00	142 49 00	79	35.9	1,235	glob. mang.
3896	127	Oct. 26	Tekokoto Atoll, E. 1 m.		79	38.4	617	co. s.
3897	128	Oct. 26	Center Hikueru Atoll, S. 6 m.		80	36.6	1,600	pter. oz. glob.
3898	129	Oct. 27	Northwest point Hikueru Atoll, E. ¼ m.		80	43.8	348	co. s. brk. sh.
3899	130	Oct. 27	Northwest point Hikueru Atoll, E. 1.3 m.		80	37.8	798	co. s. pter. oz.
3900	131	Oct. 28	Midway between Hikueru and Marokau.		79	35.7	1,372	glob. oz.
3901	132	Oct. 28	Northwest point, Marokau, E. 8 m		77	35.6	1,620	glob. oz. mang.
3902	135	Oct. 28	Pass between Marokau and Ravahere.		79	48.1	278	fne. co. s. mang. glob.
3903	136	Oct. 28	18 08 00	141 49 00	79	35.2	2,187	vol. m. glob.
3904	137	Oct. 29	18 07 00	141 26 00	78	.....	1,713	glob. oz.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Nos.		Date.	Position.		Temp.		Depth.	Character of bottom.
Ser.	A.A.		Lat. S.	Long. W.	Surf.	Bot.		
			Paumotu and Society Islands.					
		1899.	° ′ ″	° ′ ″	° F.	° F.	Fms.	
3905	138	Oct. 29	Northwest point Hao Atoll, SE. ¼ m.		79	42.0	425	crs. co. s.
3906	140	Oct. 29	18 27 00	140 21 00	77	35.1	2,042	fne. co. s. glob.
3907	141	Oct. 30	18 29 00	139 53 00	78	35.0	1,490	glob. mang.
3908	142	Oct. 30	18 30 00	139 30 00	78	35.1	2,103	fne. vol. m. glob.
3909	143	Oct. 30	Aki Aki Atoll, E. 5 m ...		78	35.6	1,364	glob. mang.
3910	144	Oct. 30	Southwest point Aki Aki, E. 1 m.		79	43.0	377	co. s.
3911	145	Oct. 30	Aki Aki Atoll, N. 5 m...		78	35.0	1,725	crs. co. s.
3912	146	Oct. 31	18 56 00	139 05 00	78	35.1	2,343	red c.
3913	147	Oct. 31	Northeast end Nukutavake, E. 6 m.		78	35.2	1,688	mang. glob
3914	148	Oct. 31	Northeast point Nukutavake, S. 1 m.		78	38.9	636	co. s.
3915	149	Oct. 31	Pinaki Atoll, SE. 3.5 m..		78	37.0	860	glob. mang.
3916	150	Oct. 31	Pinaki Atoll, E. 1 m.....		79	41.0	486	crs. co. s. pter. oz.
3917	151	Oct. 31	Pinaki Atoll, N. 68°, E. 5 m.		79	35.0	1,907	glob. oz. vol. m.
3918	152	Oct. 31	19 35 00	139 13 00	78	35.1	2,335	red c. glob.
3919	153	Nov. 1	19 45 30	139 54 00	77	35.4	1,494	glob. mang.
3920	154	Nov. 1	19 52 00	140 16 00	77	35.0	2,284	red c. glob.
3921	155	Nov. 1	20 07 00	141 00 00	78	35.0	2,391	mang.
3922	156	Nov. 2	20 31 00	142 00 00	77	35.0	2,467	no spec.
3923	157	Nov. 2	Nukutipipi Atoll, NW. 5 m.		78	35.0	2,315	red c. glob.
3924	158	Nov. 2	Nukutipipi Atoll, NW. 1 m.		77	39.0	649	co. s. brk. sh.
3925	159	Nov. 2	Nukutipipi Atoll, S. 68°, E. 1 m.		77	.....	736	co. s. brk. sh.
3926	160	Nov. 2	Midway between Nukutipipi and Anu Anurunga.		78	35.5	1,609	co. s. mang. glob.
3927	161	Nov. 2	Anu Anurunga, W. 1 m.		78	39.0	574	crs. co. s. mang. pter. oz.
3928	162	Nov. 2	Anu Anurunga, SE. 1 m.		78	38.5	659	co. s. brk. sh. pter. oz.
3929	163	Nov. 2	Midway between Anu Anurunga and Anu Anuraro.		78	35.2	1,890	glob. oz.
3930	164	Nov. 2	Anu Anuraro Atoll, NW. ¼ m.		78	40.7	438	co. s.
3931	165	Nov. 2	Anu Anuraro Atoll, SE. ¼ m.		77	42.5	405	co. s. pter. oz. mang. part.
3932	166	Nov. 2	20 15 00	144 00 00	77	34.8	2,205	red c. mang.
3933	167	Nov. 3	20 02 00	144 28 00	78	34.9	2,524	sft. red c.
3934	168	Nov. 3	Hereheretue Atoll, W. 6 m.		77	35.0	1,719	glob. oz.
3935	169	Nov. 3	Hereheretue Atoll, W. 1 m.		78	39.5	594	crs. co. s.
3936	170	Nov. 3	Hereheretue Atoll, E. 0.3 m.		78	62.1	189	co. s. mang. part.
3937	171	Nov. 3	Hereheretue Atoll, SE. 5.3 m.		78	35.3	1,688	lt. br. glob. oz. mang. part.
3938	172	Nov. 3	19 22 00	145 47 00	77	35.0	2,322	vol. m. glob.
3939	174	Nov. 3	18 28 00	147 11 00	79	35.0	2,087	mang. nods.
3940	175	Nov. 5	South end Mehetia Island, NW. 14 m.		78	34.8	2,129	vol. m.
3941	176	.....	Southeast point Mehetia Island, NW. 1.25 m.		80	38.1	832	vol. co. s.
3942	177	.....	Northwest point Mehetia Island, S. ¼ m.		80	69.0	142	vol. r. crs. co. s.
3943	178	.....	17 46 00	148 23 00	81	34.9	2,111	vol. s.
3944	179	.....	17 35 00	148 48 00	80	35.0	1,755	br. vol. s.
3945	180	.....	Northeast point Murea Island, SW. 5 m.		79	36.7	981	crs. vol. s. pter.
3946	181	.....	18 54 00	102 31 00	79	34.7	2,498	no spec.
			Cook to Marshall Islands.					
3947	182	.....	18 59 00	164 47 00	82	33.4	2,382	red c. glob.
3948	184	.....	20 15 00	172 00 00	80	34.0	3,141	red c.
3949	186	.....	21 18 00	173 51 00	77	34.2	4,540	lt. br. vol. m.
3950	187	Dec. 4	Fatumanga Isl., Vavau Group Tonga, E. 4 m.		79	.....	682	co. s. glob. pter. oz.
3951	188	Dec. 6	18 43 00	175 28 00	79	36.2	1,881	vol. m. glob. oz.
3952	189	Dec. 7	Equidistant from Mothe, Nomuka, and Yangasa Islands, Lau Group, Fiji.		79	42.9	453	co. s. glob. pter. oz.

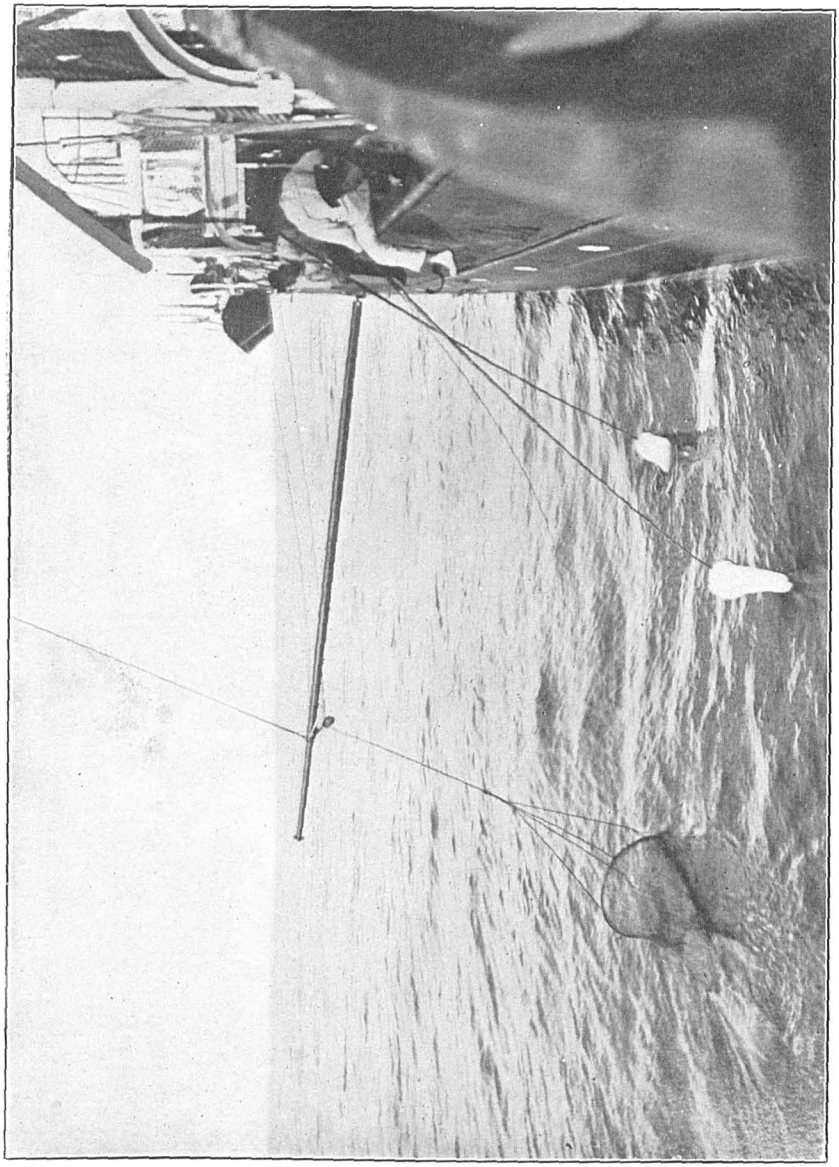
Record of hydrographic soundings of the Albatross, etc.—Continued.

Nos.		Date.	Position.		Temp.		Depth.	Character of bottom.
Ser.	A.		Lat. S.	Long. W.	Surf.	Bot.		
			Cook to Marshall Islands.					
		1899.	° ′ ″	° ′ ″	° F.	° F.	Fms.	
3953	190	Dec. 7	Between reefs of Yangasa and Nomuka groups.		79	47.0	324	co. s. mang.
3954	191	Dec. 7	West end Nomuka Isl., N 33°, E. 6 m.		79	39.2	600	co. s. pum. pter. oz.
3955	192	Dec. 7	Marembo Island, S. 2.7 m.		79	42.4	450	co. s. mang. pter. glob.
3956	193	Dec. 9	18 56 30	179 16 00 Long. E.	80	37.0	990	fne. co. s. oz.
3957	195	Dec. 22	South point Nurakita Island, N. ½ m.		86	.....	245	co.
3958	196	Dec. 23	Village, south coast Apamama Island, N. ½ m.		88	.....	Did not sound.	
		1900.	Lat. N.					
3959	197	Jan. 2	Abatiku Isl., Apamama Atoll, S. 63°, E. 16 m.		83	35.0	2,221	lt. gy. glob. oz.
3960	198	Jan. 2	South point Maiana Atoll, N. 55°, W. 9 m.		84	35.6	1,365	lge. yl. glob. oz.
3961	199	Jan. 2	Center south coast Tarawa, N. 10 m.		84	43.5	413	crs. br. glob. oz.
3962	200	Jan. 2	Center south coast Tarawa, N. ½ m.		84	.....	99	co.
3963	201	Jan. 2	South coast Tarawa, sta. No. 3963, N. ½ m., W. 1 m.		84	.....	208	co.
3964	202	Jan. 3	Southeast point Tarawa, N. 12°, W. 5 m.		84	35.3	1,569	glob. oz.
3965	203	Jan. 4	Apalang Atoll, in line with north point Tarawa, N. 2 m.		84	51.3	170	gy. glob. oz.
3966	204	Jan. 4	1 52 00	173 15 00	84	34.9	2,156	gy. glob. oz.
3967	205	Jan. 4	Monument, west shore Maraki Atoll, S. 56°, E ½ m.		83	.....	431	no spec.
3968	206	Jan. 5	2 27 00	173 09 00	83	34.8	2,255	glob. oz.
3969	207	Jan. 5	2 49 00	173 01 00	83	35.3	1,461	glob. oz.
3970	208	Jan. 7	3 57 00	172 00 00	83	34.7	2,486	lt. yl. glob.
3971	209	Jan. 8	4 25 00	171 13 00	83	34.7	2,505	lt. gy. glob. oz.
3972	210	Jan. 8	4 54 00	170 21 00	83	34.7	2,444	glob. oz.
3973	211	Jan. 9	5 20 00	169 43 00	83	34.8	2,411	glob. oz.
3974	212	Jan. 9	South point Jaluit Atoll, N. 14°, E. 5 m.		82	35.0	1,937	crs. gy. glob. oz.
3975	213	Jan. 14	6 34 00	169 13 00	83	35.0	2,013	glob. oz. m.
3976	214	Jan. 15	Southeast point Elmore Atoll, N. 30°, W. 14 m.		82	35.0	2,136	crs. glob. oz.
3977	215	Jan. 15	Southeast point Elmore Atoll, N. 30, W. 9 m.		82	35.9	1,283	crs. glob. oz.
3978	216	Jan. 15	Wotju Island, Elmore Atoll, SE. 6 m.		82	36.5	1,068	co. s.
3979	217	Jan. 15	Midway between Wotju Island, Elmore Atoll, and Leuen Island, Namu Atoll, 12 m. from latter.		82	37.0	906	crs. glob. cz.
			Marshall to Ladrone Islands.					
3980	218	Jan. 15	South point Leuen Isl., Namu, N. 2 m.		83	39.7	630	crs. co. s.
3981	219	Jan. 15	8 02 00	167 43 00	82	35.0	2,179	glob. m.
3982	220	Jan. 16	South point Kwajalong Atoll, NE. 12 m.		82	35.0	1,897	glob. m.
3983	221	Jan. 18	Entrance South Pass, Rongelab, N. ½ m.		80	43.4	400	co. s.
3984	222	Jan. 18	Entrance South Pass, Rongelab, N. 1½ m.		81	39.0	746	crs. co. s.
3985	223	Jan. 18	10 49 00	167 15 00	80	35.0	2,469	glob. oz.
3986	224	Jan. 19	10 30 00	167 42 00	80	35.0	2,586	glob. oz. vol. part.
3987	225	Jan. 20	10 15 00	168 06 00	81	34.9	2,609	vol. m. glob.
3988	226	Jan. 20	Kapenor Island, Likieb, N. 63°, E. 8 m.		80	34.9	2,231	wh. glob. m.
3989	227	Jan. 21	S. Pass, Likieb, N. ½ m.		81	42.6	468	crs. co. s.
3990	228	Jan. 21	S. Pass, Likieb, N. 1½ m.		81	36.9	933	crs. co. s.
3991	229	Jan. 21	9 40 00	169 32 00	81	35.5	1,583	glob. oz.
3992	230	Jan. 23	Schischmarev Pass, Wotje, N. 1 m.		81	41.7	482	co. s.

Record of hydrographic soundings of the Albatross, etc.—Continued.

Nos.		Date.	Position.		Temp.		Depth.	Character of bottom.
Ser.	A. A.		Lat. N.	Long. E.	Surf.	Bot.		
			Marshall to Ladrone Islands.					
		1900.	° ′ ″	° ′ ″	° F.	° F.	Fms.	
3993	231	Jan. 23	Schischmarev Pass, Wotje, N. 3 m.		81	36.1	1,187	co. s. mang.
3994	232	Jan. 23	8 50 00	170 26 00	81	34.9	2,221	glob. oz.
3995	233	Jan. 24	7 54 00	170 56 00	81	36.5	1,009	crs. glob. oz.
3996	234	Jan. 24	North point Arhno Atoll, S. 50°, E. 7 m.		81	36.0	1,325	crs. glob. oz.
3997	235	Jan. 28	Southwest point Arhno Atoll, NE. 6 m.		82	36.0	1,253	glob. oz.
3998	236	Jan. 28	6 34 00	170 59 00	81	34.9	2,482	glob. m.
3999	237	Jan. 29	6 11 00	170 25 00	81	34.7	2,486	glob. m.
4000	238	Feb. 5	5 48 00	169 01 00	82	35.0	2,424	glob. oz.
4001	239	Feb. 9	Entrance Port Lottin, Kusaie, N. ½ m.		82	43.5	371	vol. co. s.
4002	240	Feb. 13	6 49 00	156 36 00	82	34.9	2,475	glob. oz. vol. m.
4003	241	Feb. 13	6 51 00	154 39 00	81	35.0	2,533	glob. m. vol. part.
4004	242	Feb. 14	6 55 00	152 40 00	82	41.5	525	crs. co. s.
4005	243	Feb. 15	South Island, Royalist Cluster Truk Group, NW. 17 m.		82	35.0	2,162	gy. glob. m. vol. parts.
4006	244	Feb. 17	8 06 00	151 08 00	81	35.0	2,205	glob. m.
4007	245	Feb. 18	9 31 00	149 36 00	81	35.0	2,735	red c.
4008	246	Feb. 19	10 34 00	148 25 00	81	35.0	2,993	red c. mang.
4009	247	Feb. 20	11 35 00	147 15 00	80	35.0	3,213	red c. mang. pum.
4010	248	Feb. 20	12 51 00	145 46 00	81	35.8	a 4,813	red c. mang. pum.
4011	249	Feb. 21	13 08 00	145 25 00	80	35.0	2,337	vol. s.
			East Coast Honshu Island, Japan.					
4012	.....	June 2	Inuboe Saki Light, S. 77°, W. 47 m.		72	.....	1,371	vol. s. part.
4013	.....	June 3	Inuboe Saki Light, S 74°, W. 76 m.		72	.....	1,759	vol. s. part.
4014	.....	June 3	Inuboe Saki Light, S. 73°, W. 96 m.		75	.....	3,800	vol. s. part.
4015	.....	June 3	Inuboe Saki Light, S. 72°, W. 118 m.		75	35.2	4,300	no spec.
4016	.....	June 3	Shioya Saki Light, N. 73°, W. 74 m.		66	35.1	2,976	no spec.
			East of Kuril Islands, North Pacific.					
4017	.....	June 16	Cape Rollin, N. 67°, W. 21 m.		36	.....	528	vol. s. fne. g.
			Cape Tschipunski, Kamchatka, eastward across Bering Sea.					
4018	.....	June 23	Cape Tschipunski, N. 33°, W. 9 m.		47	35.2	87	bk. vol. s. fne. g. co.
4019	.....	June 24	Cape Kosloff, N. 15°, W. / Cape Taschipunski, S. 82°, W.	each about 72 miles.	45	35	2,991	gn. m. vol. s.
4020	.....	June 24	S. E. end Bering Id., N. E. / Cape Kronotski, N. W.	each about 108 miles.	47	35	1,804	gy. vol. s.
4021	.....	June 26	W. end Attu Id., S. 90 m. appx.		45	35	2,166	fne. yl. vol. s.
4022	.....	June 27	54 31 00	179 21 00	45	38	282	gn. m. fne. vol. s.
4023	.....	June 27	54 31 00	179 30 00	45	37	636	gn. m. vol. s. wh. sp.
4024	.....	June 27	54 24 20	179 24 00	45	37.7	454	gn. m. fne. vol. s.
4025	.....	June 27	54 18 00	179 14 00	45	37.2	536	gy. m. fne. vol. s.
4026	.....	June 27	54 14 00	179 08 00	45	.....	897	no spec.
4027	.....	June 27	54 22 00	179 08 00	45	.....	708	gy. s.
4028	.....	June 27	54 40 00	179 08 00	45	.....	310	gy. vol. s. wh. sp.
4029	.....	June 27	54 47 20	179 08 00	45	.....	913	gy. s. c.
4030	.....	June 27	54 47 20	179 25 00	45	.....	1,270	gy. s.
4031	.....	June 27	54 47 20	179 54 00	45	.....	2,111	bn. m. bk. s.
				Long. W.				
4032	.....	June 27	54 50 00	177 11 00	46	35	2,086	vol. m.

a Deepest sounding by the *Albatross*.



THE ALBATROSS, WITH SURFACE AND DIP NETS IN USE.

TOW-NET RECORDS.

Record of surface tow-net stations of the Albatross, 1887–88. (Voyage around South America.)

Serial No.	Equivalent dredging station.	Date.	Time. Out.	Time. In.	Instrument used.	Position. Lat. N.	Position. Long. W.	Sky.	Sea.	Temperature. Air dry.	Temperature. Air wet.	Temperature. Surface water.	Barometer.
		1887.				° ′ ″	° ′ ″			° F.	° F.	° F.	
Sur. 1	.....	Nov. 22	4.15 p. m.	5.00 p. m.	3-foot net	34 13 00	74 13 30	Clear	Smooth	64	61	75	30.38
2	.....	Nov. 23	5.00 p. m.	6.15 p. m.	do	31 16 00	71 50 00	Slightly cloudy	do	68	65	70	30.30
3	2750	Nov. 27	6 52 p. m.	8.25 p. m.	do	18 40 00	63 30 00	Cloudy and rainy	Rough	81	80	80	29.84
4	2751	Nov. 28	10.00 a. m.	11.19 p. m.	do	16 54 00	63 12 00	Clear	Smooth	82	80	81	29.92
5	2753	Dec. 4	12.15 p. m.	2.01 p. m.	do	13 34 00	61 04 00	Part overcast	do	82	80	82	29.88
6	2754	Dec. 5	12.55 p. m.	2.15 p. m.	do	11 40 00	58 33 00	Slightly cloudy	do	85	83	83	29.84
7	2755	Dec. 7	12.50 p. m.	1.45 p. m.	do	8 04 00	52 47 00	Showery	do	83	82	81	29.88
						Lat. S.							
8	2756	Dec. 14	10.40 a. m.	11.30 a. m.	do	3 22 00	37 49 00	Light clouds	Rough	80	79	79	29.86
9	2760	Dec. 18	4.15 p. m.	5.30 p. m.	do	12 07 00	37 17 00	Clear	Smooth	84	81	80	29.96
10	2761	Dec. 26	12.45 p. m.	2.30 p. m.	do	15 39 00	38 32 54	Light clouds	Light swell	82	80	79	30.00
11	2762	Dec. 30	6.45 a. m.	6.55 a. m.	do	23 08 00	41 34 00	do	Smooth	76	76	70	29.88
		1888.											
12	2769	Jan. 15	11.40 a. m.	12.10 p. m.	do	45 22 00	64 20 00	Overcast	do	60	58	58	30.02
13	2770	Jan. 16	11.45 a. m.	12.05 p. m.	do	48 37 00	65 46 00	Light clouds	Very smooth	58	55	52	29.92
14	2771	Jan. 17	11.45 a. m.	11.55 a. m.	do	51 34 23	68 00 00	Clear	Smooth	49	46	50	30.14
15	.....	Feb. 24	8.05 a. m.	8.25 p. m.	2 Tanner combination nets	22 54 00	77 10 00	Moonlight	Very smooth	74	71	76	29.90
16	.....	Mar. 1	4.31 a. m.	4.45 a. m.	do	4 21 00	81 59 00	do	do	73	73	74	29.80
17	2792	Mar. 2	3.25 p. m.	4.15 p. m.	Tanner combination	00 37 00	81 00 00	Overcast	do	80	78	77	29.74
						Lat. N.							
18	2793	Mar. 3	6.40 a. m.	8.20 a. m.	do	1 3 00	80 15 00	do	Smooth	78	76	78	29.84
19	2794	Mar. 5	1.55 p. m.	2.15 p. m.	do	7 37 00	78 46 30	Hazy	Light swell	79	77	78	29.76
20	2795	Mar. 5	4.25 p. m.	4.45 p. m.	do	7 57 00	78 55 00	Light clouds	Very smooth	79	77	78	29.74
21	2796	Mar. 5	5.54 p. m.	6.15 p. m.	do	8 5 00	78 51 00	Hazy sundown	do	79	77	78	29.74
22	.....	Mar. 5	7.15 p. m.	10.25 p. m.	.....	At anchor off Perlas Isds. Gulf of Panama.		Starlight	do	77	76	77	29.76
23	2799	Mar. 6	11.15 a. m.	11.35 a. m.	Tanner combination	8 44 00	79 09 00	Overcast	do	77	76	75	29.90
24	.....	Mar. 31	7.00 p. m.	7.30 p. m.	do	6 44 00	80 27 00	Clear starlight	Light swell	82	80	81	29.80
25	.....	Apr. 1	8.45 p. m.	12.00 midnight.	Scoop nets; electric lights	4 18 00	85 14 00	do	Very smooth	84	83	83	29.80
26	2806	Apr. 3	5.00 p. m.	7.35 p. m.	Tanner combination	00 30 00	88 37 30	Light clouds	Light swell	84	82	80	29.68
						Lat. S.							
27	2807	Apr. 4	5.31 a. m.	7.48 a. m.	do	00 24 00	89 06 00	Very cloudy	Smooth	79	79	79	29.74
28	.....	Apr. 7	8.00 p. m.	9.00 p. m.	Scoop nets, electric light	Off Hood Island, Galapagos Archipelago.		Clear starlight	do	82	81	80	29.80
29	2817	Apr. 15	9.45 a. m.	10.45 a. m.	Tanner combination	00 46 00	89 42 00	Light clouds	Very smooth	85	83	81	29.80
30	2818	Apr. 15	1.30 p. m.	2.20 p. m.	do	00 29 00	89 54 30	do	do	85	83	83	29.74
31	2819	Apr. 15	6.30 p. m.	7.30 p. m.	do	00 08 00	90 06 00	do	Smooth	82	82	82	29.72

Record of Tanner intermediate tow-net stations of the Albatross, 1891.

[Region from Panama and Galapagos Islands to Gulf of California.]

Serial No.	Date.	Time.	Position.		Temperature.			Depth.	Character of bottom.	Wind.		Drift.		Mean depth.	Remarks.
			Lat. N.	Long. W.	Air.	Surface.	Bottom.			Direction.	Force.	Towed at a depth.	Time towing.		
	1891.		° ′ ″	° ′ ″	°F.	°F.	°F.	Fms.				Fms.	Min.	Fms.	
3382 Dr..	Mar. 7	8.50 a.m.	6 21 00	80 41 00	77	75	35.8	1,793	gn. m.....	N.....	3	200	15	.....	
3382 Dr..	Mar. 7	9.53 a.m.	6 21 00	80 41 00	77	75	35.8	1,793	gn. m.....	N.....	3	200	.....	.....	Hauled direct from 200 fathoms in 10 minutes; ship stationary.
3382 Dr..	Mar. 7	10.23 a.m.	6 21 00	80 41 00	77	75	35.8	1,793	gn. m.....	N.....	3	100	.....	.....	Hauled direct from 100 fathoms in 5 minutes; ship stationary.
3388 Dr..	Mar. 9	10.31 a.m.	7 06 00	79 48 00	75	73	36.2	1,168	gn. glob. oz.	N.....	2	400	17	.....	
2619 Hyd	Mar. 11	8.25 a.m.	7 31 00	78 42 30	72	68	36.5	1,100	gn. glob. oz.	N.....	2	300	19	.....	
2619 Hyd	Mar. 11	9.44 a.m.	7 31 00	78 42 30	72	68	36.5	1,100	gn. glob. oz.	N.....	2	1,000	16	.....	Sounded at 7.06 a. m. in 1,100 fms. Took second trial of net at 9.44 a. m., and finished at 11.56 a. m., having drifted into deeper water, as shown by soundings taken at 12.03 p. m. in 1,482 fms. Greatest amount of wire out while towing, 1,160 fms., the angle equaling depth of 1,000 fms.
2627 Hyd	Mar. 25	6.49 a.m.	0 36 00	82 45 00	80	81	36	1,832	gy. glob. oz.	WNW	1	1,773 1,739	20	1,756	Fathoms=mean depth at which towed net. Net was lowered to 1,740 fms. vertically, and veered to 1,800 fathoms at an angle between 10° and 15°, equaling a depth varying between 1,773 and 1,739 fms.
2628 Hyd	Mar. 26	9.14 a.m.	Lat. S. 0 13 00	84 52 00	81	81	.....	.....	.....	Calm..	0	214 234	20	224	Fathoms=mean depth at which towed net. Towed 14 minutes between 200 fathoms and surface to fill upper bag.
3414 Dr..	Apr. 8	6.57 a.m.	Lat. N. 10 14 00	96 28 00	81	82	35.8	2,232	gn. m.....	ENE..	2	85 105	14	95	Fathoms=mean depth at which towed net.
3414 Dr..	Apr. 8	7.47 a.m.	10 14 00	96 28 00	81	82	35.8	2,232	gn. m.....	ENE..	2	195 200	10	198	
3414 Dr..	Apr. 8	8.49 a.m.	10 14 00	96 28 00	81	82	35.8	2,232	gn. m.....	ENE..	3	300	15	.....	
3414 Dr..	Apr. 8	10.00 a.m.	10 14 00	96 28 00	81	82	35.8	2,232	gn. m.....	ENE..	3	300	15	.....	
3414 Dr..	Apr. 9	10.04 a.m.	12 34 00	97 21 00	84	82	.....	.....	.....	NNW.	1	175	8	.....	
2414 Dr..	Apr. 9	8.03 p.m.	13 33 30	97 57 30	82	83	.....	.....	.....	Calm..	0	175	10	.....	No soundings taken; depth estimated approximately as over 2,000 fathoms.
3414 Dr..	Apr. 11	8.45 a.m.	16 32 00	99 42 00	79	80	.....	.....	.....	WSW.	1	300	10	.....	
3414 Dr..	Apr. 16	10.10 a.m.	17 39 30	102 11 30	77	76	.....	.....	.....	W.....	2	175	15	.....	
3436 Dr..	Apr. 22	1.22 p.m.	27 03 40	110 53 40	75	72	37.2	905	bn. m. bk. sp	WNW	1	800	15	.....	Net dragged on bottom.
2637 Hy..	Apr. 23	7.21 p.m.	27 20 00	110 54 00	72	71	38	773	bn. m. bk. sp	WNW	1	700	15	.....	
3437 Dr..	Apr. 23	5.31 a.m.	27 39 40	111 00 30	71	70	40	628	bn. m. bk. sp	E.....	1	600	15	.....	Do.
2638 Hy..	Apr. 23	7.26 a.m.	27 38 00	111 04 00	72	72	39.2	622	bn. m. bk. sp	ENE..	2	500	15	.....	

Record of surface tow-net stations of the Albatross, 1891.

[Region from Panama and Galapagos to Gulf of California.]

Serial No.	Date.	Time.	Position.		Temperatures.		Depth.	Character of bottom.	Remarks.
			Lat. N.	Long. W.	Surface.	Bottom.			
	1891.		° ′ ″	° ′ ″	°F.	°F.	Fms.		
3353 Dr	Feb. 23	8.56 a.m.	7 06 15	80 34 00	73	39	695	gn. m	
3354 Dr	Feb. 23	1.25 p.m.	7 09 45	80 50 00	78	46	322	gn. m	
3356 Dr	Feb. 23	7.30 p.m.	7 09 30	81 08 30	83	40.1	546	sft. bl. m	15 miles from Mariato Point.
3357 Dr	Feb. 24	6.17 a.m.	6 35 00	81 44 00	83	38.5	782	Modern greensand	
3360 Dr	Feb. 24	5.20 p.m.	6 17 00	82 05 00	83	36.4	1,672	fne. bk. dk. gn s	
3361 Dr	Feb. 25	7.33 a.m.	6 10 00	83 06 00	82	36.6	1,471	gn. oz	
3363 Dr	Feb. 26	4.37 p.m.	5 43 00	85 50 00	83	37.5	978	wh. glob. oz	
3365 Dr	Feb. 27	1.30 p.m.	5 31 00	86 31 00	85	37	1,010	yl. glob. oz	
3366 Dr	Feb. 27	8.04 p.m.	5 30 00	86 45 00	84	37	1,067	yl. glob. oz	
3368 Dr	Feb. 28	7.21 a.m.	5 32 45	86 54 30	82	58.4	66	rky	
3370 Dr	Feb. 28	10.03 a.m.	5 36 40	86 56 50	84	54.8	134	rks. and s	At Cocos Island. Surface net at night.
3372 Dr	Mar. 1	5.51 p.m.	4 49 00	86 11 20	84	38.8	761	gy. glob. oz	Surface net 8 p.m.
3375 Dr	Mar. 4	6.36 a.m.	2 34 00	82 29 00	77	36.6	1,201	gy. glob. oz	
3376 Dr	Mar. 4	4.27 p.m.	3 09 00	82 08 00	78	36.3	1,132	gy. glob. oz	
3382 Dr	Mar. 7	10.46 a.m.	6 21 00	80 41 00	75	35.8	1,793	gn. m	Surface net 8.30 p.m.
3387 Dr	Mar. 8	7.21 p.m.	7 40 00	79 17 50	74	56.4	127	fne. gy. s	
3397 Dr	Mar. 11	6.32 p.m.	7 33 00	78 34 20	71	57.3	85	stf. gn m. brk	
3398 Dr	Mar. 23	3.16 p.m.	1 07 00	80 21 00	84	36	1,573	gn. oz	Off Galera Point.
3399 Dr	Mar. 24	6.37 a.m.	1 07 00	81 04 00	80	36	1,740	gn. oz	
3400 Dr	Mar. 27	6.10 a.m.	Lat. S. 0 36 00	86 46 00	81	36.0	1,322	lt. gy. glob. oz	
3409 Dr	Apr. 3	7.24 p.m.	Lat. N. 0 18 40	90 34 00	82	42.3	327	bk. s	Off Bindloe Island, 4 miles.
3412 Dr	Apr. 4	6.11 p.m.	1 23 00	91 43 00	82	38	918	r	5 miles off Wenman Island. Surface net 9 p.m.
3413 Dr	Apr. 5	8.34 a.m.	2 34 00	92 06 00	82	36	1,360	glob. oz. dk. sp	Surface net noon.
3414 Dr	Apr. 8	11.14 a.m.	10 14 00	96 28 00	82	35.8	2,232	gn. m	
3419 Dr	Apr. 11	5.59 p.m.	16 34 30	100 03 00	81	39	772	gn. m. bk. sp	
3433 Dr	Apr. 21	6.34 a.m.	25 26 15	109 48 00	69	36.5	1,218	br. m. bk. sp	
3434 Dr	Apr. 21	10.14 a.m.	25 29 30	109 48 00	70	36.4	1,588	br. m. bk. sp	
3435 Dr	Apr. 22	8.56 a.m.	26 48 00	110 45 20	70	37.3	859	br. m. bk. sp	
3436 Dr	Apr. 22	3.10 p.m.	27 34 00	110 53 40	72	37.2	905	br. m. bk. sp	

Record of tow-net stations of the Albatross, 1891, 1892.

[California to Hawaiian Islands.]

Serial No.[a]	Date.	Time.	Position.		Temperatures.			Depth at which used.	Condition of sea	Wind.		Drift.		Appearance of sky.	Remarks.
			Lat. N.	Long. W.	Air.	Surface.	Bottom.			Direction.	Force.	Direction.	Distance.		
	1891.		° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*						*Miles.*		
45	Oct. 13	11.26 a.m.	35 41 50	126 22 20	61	62	34.9	Surface	Moderate	WNW	2	SW. ¼ S	0.5	Cloudy	Surface tow net.
54	Oct. 14	3.33 p.m.	35 03 30	129 05 00	67	66	35	do	Smooth	West	1	SW. ¼ S	.5	Clear	Do.
64	Oct. 15	7.12 p.m.	33 54 30	131 45 00	66	65	35	do	do	West	3	SW. ¼ S	.5	do	Do.
69	Oct. 16	8.50 a.m.	33 24 00	133 01 00	67	67	35.5	do	do	Calm	0	SW. ¼ S	.5	Showery	Do.
74	Oct. 16	6.55 p.m.	30 04 30	133 56 30	67	67		do	do	SSE	2	SW. by S.	.5	Clear	Do.
129	Nov. 8	11.49 a.m.	32 43 40	134 42 30	68	68	35.1	do	do	ENE	2	SSW. ½ W	.5	do	Do.
130	Nov. 8	2.50 p.m.	32 41 00	134 49 30	68	68		do	do	ENE	2	SSW. ½ W	.5	do	Do.
133	Nov. 8	7.25 p.m.	32 35 00	135 03 00	69	68		do	do	East	2	SSW. ½ W	.5	do	Do.
144	Nov. 9	8.43 p.m.	31 50 00	136 54 30	65	67		do	do	East	2	SW. by S.	.5	Cloudy	Do.
149	Nov. 10	8.47 a.m.	31 27 00	137 47 00	67	68	35.1	do	do	ESE	2	SW. by S.	.5	do	Do.
150	Nov. 10	11.04 a.m.	31 23 00	137 58 00	66	67		do	do	ESE	1	SW. by S.	.5	Clear	Do.
152	Nov. 10	3.16 p.m.	31 14 30	138 19 00	70	69		330 fath.	do	East	2	SW. by S.	.5	do	Tanner submarine net.
153	Nov. 10	6.00 p.m.	31 10 00	138 29 30	70	70	35	Surface	do	East	2	SW. by S.	.5	do	Surface tow net.
154	Nov. 10	7.42 p.m.	31 05 00	138 40 00	68	70		do	do	East	2	SW. by S.	.5	do	Do.
163	Nov. 11	1.10 p.m.	30 31 30	140 05 30	71	69		330 fath.	do	East	2	SW. by S.	.5	do	Tanner submarine net.
165	Nov. 11	6.00 p.m.	30 23 00	140 26 30	69	69		Surface	do	East	2	SW. by S.	.5	do	Surface tow net.
174	Nov. 12	2.43 p.m.	29 38 00	142 17 00	72	70		330 fath.	do	SE	1	SW. by S.	.5	do	Tanner submarine net.
185	Nov. 13	3.34 p.m.	28 52 00	144 00 00	72	72	35.3	Surface	do	SE	2	SSW. ½ W	.5	Cloudy	Surface tow net.
192	Nov. 14	9.42 a.m.	28 20 00	145 03 30	72	72		do	do	SE	2	SSW. ½ W	.5	Clear	Do.
195	Nov. 14	6.00 p.m.	28 00 30	145 35 00	73	73		do	do	SE	1	SSW. ½ W	.5	do	Do.
196	Nov. 14	7.29 p.m.	27 54 00	145 45 30	72	72	35.2	do	do	ESE	1	SSW. ½ W	.5	do	Do.
204	Nov. 15	2.13 p.m.	27 06 00	147 14 00	75	74		100 fath.	do	ESE	1	SSW. ½ W	.5	Cloudy	Tanner submarine net.
257	Nov. 20	2.45 p.m.	22 11 00	156 09 00	77	77	35.4	Surface	do	NNW	2	SSW. ½ W	.5	Clear	Surface tow net.
259	Nov. 20	7.26 p.m.	21 55 30	156 29 30	78	77		do	do	West	1	SSW. ½ W	.5	do	Do.
288	Dec. 2	5.00 p.m.	21 15 49	157 44 27	76	75		do	do	NE	1.2	WNW	.5	do	Do.
452	Dec. 24	4.00 p.m.	29 52 30	138 24 00	63	67		do	do	ENE	3	NE. by E ½ E.	.5	Cloudy	Do.
	1892.														
540	Jan. 14	1.58 p.m.	35 19 30	125 21 30	62	58	35.1	300 fath.	do	North	2	NE. ½ E	.5	Clear	Tanner subm. net.
541	Jan. 14	5.17 p.m.	35 25 30	125 09 30	59	57		Surface and 300 fath.	do	NNE	1	NE. ½ E	.5	do	Tanner submarine net and surface tow net.
542	Jan. 14	7.19 p.m.	35 31 00	124 57 30	57	56		Surface	do	NNE	2	NE. ½ E	.5	Moonlight	Surface tow net.
543	Jan. 14	9.28 p.m.	35 36 30	124 45 30	56	56		do	do	NNN	2	NE. ½ E	.5	do	Do.

[a] Serial numbers indicate cable survey numbers of stations, where Tanner submarine and surfce tow nets were used. Numbers same as regular hydrographic series from No. 2655 to 3202.

Record of surface tow-net stations of the Albatross, 1893.

[Bering Sea—except 3478, California coast.]

Dredging No.	Date.	Time.	Position.		Temperature.			Depth.	Character of bottom.	Wind.		Drift.	
			Lat. N.	Long. W.	Air.	Surface.	Bottom.			Direction.	Force.	Direction.	Force.
	1893.		° ′	° ′ ″	°F.	°F.	°F.	Fms.					
3478	Apr. 26	11.24 a. m.	36 44 45	120 57 00	56	53	.....	68	gy. s. m	SW	2		
3500	July 17	11.53 a. m.	56 02 00	169 30 00	49	46	38.6	121	fne. gy. s. g	South	3	SE. by S	0.7
3501	July 17	2.16 p. m.	55 51 00	169 18 00	50	47	36.9	688	gn. m	South	3	SE. ½ E	4.0
3502	July 17	6.55 p. m.	55 38 00	169 00 00	49	46	.....	368	gn. m. dk. s	SSW	3	SE. ½ E	0.5
3507	July 29	1.00 p. m.	57 43 00	164 42 00	50	43	37.5	31	fne. gy. s	NNW	2	NNW. ½ W	0.8
3508	July 29	7.33 p. m.	58 33 00	164 49 00	43	41	42	23	fne. gy. s. sh	NW	2	W. ½ S	1.0
3517	Aug. 2	8.01 p. m.	60 27 00	169 04 00	41	41	40.3	24	fne. gy. s	West	4	WSW. ½ W	1.0
3518	Aug. 3	6.40 a. m.	60 22 00	171 42 00	41	42	33.9	36	gn. m	West	3	SSE. ½ E	1.0
3519	Aug. 3	10.03 a. m.	60 06 00	171 25 00	43	42	31.1	37	bk. m. fne. s	SSE	2	ESE	0.5
3520	Aug. 3	4.10 p. m.	59 28 00	170 57 00	43	43	32.2	38	gn. m. fne. s	SE	3	E. by S	0.7
3521	Aug. 3	7.35 p. m.	59 09 00	170 48 00	43	43	31.9	40	gn. m. fne. s	SE	5	ESE	0.5
3522	Aug. 4	9.24 a. m.	57 58 00	170 09 00	46	44	35.7	41	crs. gy. s. g	SW	4	SSE	1.0
3523	Aug. 4	1.18 p. m.	57 39 00	170 02 00	47	45	38	39	gn. m. fne. s	SSW	3	SSE	0.7
3524	Aug. 4	4.08 p. m.	57 24 00	169 56 00	46	45	40.3	36	gy. s. p	SSW	4	SSE	1.3
3527	Aug. 5	10.35 a. m.	57 48 00	171 21 00	48	44	38	52	gn. m	SSW	4	NW. by W	0.8
3530	Aug. 6	7.33 a. m.	59 39 00	173 53 00	45	44	34.9	59	dk. gn. m. fne. s	Calm	0	W. ½ N	0.5
3531	Aug. 6	11.00 a. m.	59 55 00	174 17 00	47	46	35.1	59	gn. m	SE	1	W. ½ S	1.0
3532	Aug. 6	7.40 p. m.	59 12 00	175 39 00	48	44	34.8	77	dk. gn. m. fne. s	N. by E	3	SE	1.2
3537	Aug. 9	6.55 a. m.	54 45 00	169 06 00	45	43	38	49	fne. gy. s	SW	2	E. ½ N	1.0
3538	Aug. 9	10.13 a. m.	56 41 00	168 29 00	48	46	38	59	gn. m. s	West	2	E. ½ N	0.8
3539	Aug. 9	3.49 p. m.	56 34 00	167 19 00	49	45	38.9	57	gn. m. s	SW	3	E. ½ S	0.5
3540	Aug. 9	9.12 p. m.	56 27 00	166 08 00	47	45	36	51	gn. m. fne. s	SSW	3	East	0.6
3541	Aug. 10	5.19 a. m.	56 14 00	164 08 00	48	46	36.1	49	bk. m. fne. s	SSE	3	E. ½ N	0.5
3542	Aug. 10	8.43 a. m.	56 10 00	163 26 00	49	47	39.2	49	dk. m. fne. s	SE	3	SE. by E. ½ E	0.7
3543	Aug. 18	4.17 p. m.	56 41 00	169 39 00	48	44	42.7	43	bk. s. sh	WNW	2	East	1.0
3544	Aug. 18	7.20 p. m.	56 50 00	169 59 00	47	44	41.1	41	fne. gy. s. sh	NW by N	2	WSW	0.5
3545	Aug. 21	5.07 p. m.	56 15 00	171 33 00	52	48	36	1,020	gn. m. fne. s. c	West	5	NNE. ½ E	0.7
3547	Aug. 31	12.38 p. m.	54 16 00	165 45 00	54	47	45	51	fne. bk. s	South	2.3	NNE. ½ E	0.7
3548	Sept. 1	9.03 a. m.	54 44 00	165 42 00	52	47	39.5	91	bk. s	East	3	W. ½ S	1.5
3549	Sept. 1	11.54 a. m.	55 00 00	166 10 00	53	49	40.1	78	fne. bk. s	E. by S	5	WNW	2.0
3550	Sept. 1	4.26 p. m.	55 24 00	167 02 00	51	48	39	76	br. m	NE	5	NNW. ½ W	0.8
3551	Sept. 1	6.56 p. m.	55 36 00	167 28 00	49	47	39.1	74	gn. m	NE	3	N. by W. ½ W	1.2
3553	Sept. 2	7.58 a. m.	56 28 00	169 46 00	48	48	39.5	51	fne. gy. s. m	NNE	3	NNW. ½ W	0.8
3554	Sept. 2	10.33 a. m.	56 34 00	170 19 00	48	47	39.5	62	gn. m	NE. by N	4	N. by W. ½ W	0.7
3555	Sept. 2	12.41 p. m.	56 45 00	170 18 00	47	46	40.2	57	gn. m	NE. by N	4	N. by W. ½ W	1.0
3556	Sept. 2	3.21 p. m.	56 57 30	170 33 00	49	46	41	49	gn. m. fne. s	NE	4	NW. by W	1.5
3559	Sept. 3	9.17 a. m.	56 56 00	169 52 00	47	46	42.5	39	gy. s. brk. sh	NE. by E	4	East	0.8

Record of Tanner intermediate tow-net stations of the Albatross, 1893.

[Condition of sea, smooth.]

Serial No.	Date.	Time.	Position.		Temperature.			Depth (in fathoms).	Wind.		Appearance of sky.	Remarks.
			Lat. N.	Long. W.	Air.	Surface.	Bottom.		Direction.	Force.		
			California coast.									
	1893.		° ′ ″	° ′ ″	°F.	°F.	°F.					
31	Apr. 26	10.11 a. m.	36 48 15	121 59 05	58	54	.....	5 to surface	N	1	Clear	Entire net open.
32	Apr. 27	8.30 a. m.	37 29 00	123 01 20	54	55	41.7	100 to surface	WNW	3	..do	All specimens from upper net.
			Bering Sea.									
33	Aug. 3	6.40 a. m.	60 22 00	171 42 00	41	42	33.9	25 to surface	W	3	Cloudy	
33	Aug. 3	6.40 a. m.	60 22 00	171 42 00	41	42	33.9	25 fathoms *a*	W	3	....do	Specimens from both nets.
34	Aug. 3	10.03 a. m.	60 06 00	171 25 00	43	42	31.1	25 to surface	SSE	2	....do	
34	Aug. 3	10.03 a. m.	60 06 00	171 25 00	43	42	31.1	25 fathoms *a*	SSE	2	....do	Do.
35	Aug. 4	9.24 a. m.	57 58 00	170 09 00	46	44	35.7	30 to surface	SW	4	....do	
35	Aug. 4	9.24 a. m.	57 58 00	170 09 00	46	44	35.7	30 fathoms *a*	SW	4	....do	Do.
36	Aug. 6	7.33 a. m.	59 39 00	173 53 00	45	44	34.9	43 to surface	Calm	0	....do	
36	Aug. 6	7.33 a. m.	59 39 00	173 53 00	45	44	34.9	43 fathoms *a*	Calm	0	....do	All specimens from upper net.
37	Aug. 6	11.00 a. m.	59 55 00	174 17 00	47	46	35.1	44 to surface	SE	1	....do	
37	Aug. 6	11.00 a. m.	59 55 00	174 17 00	47	46	35.1	44 fathoms *a*	SE	1	....do	Specimens from both nets.
38	Aug. 9	6.55 a. m.	54 45 00	169 06 00	45	43	38	40 to surface	SW	2	....do	
38	Aug. 9	6.55 a. m.	54 45 00	169 06 00	45	43	38	40 fathoms *a*	SW	2	....do	Do.
39	Aug. 10	8.43 a. m.	56 10 00	163 26 00	49	47	39.2	30 to surface	SE	3	....do	
39	Aug. 10	8.43 a. m.	56 10 00	163 26 00	49	47	39.2	30 fathoms *a*	SE	3	....do	Do.
40	Aug. 18	4.17 p. m.	56 41 00	169 39 00	48	44	42.7	30 to surface	WNW	2	Overcast ...	
40	Aug. 18	4.17 p. m.	56 41 00	169 39 00	48	44	42.7	30 fathoms *a*	WNW	2	....do	Do.
41	Aug. 20	4.03 p. m.	54 38 00	175 27 00	56	49	35.1	125 to surface	NNE	3	....do	
41	Aug. 20	4.03 p. m.	54 38 00	175 27 00	56	49	35.1	125 fathoms *a*	NNE	3	....do	Do.
42	Aug. 21	9.48 a. m.	55 46 00	172 44 00	51	48	35.1	250 to surface	W	5	....do	
42	Aug. 21	9.48 a. m.	55 46 00	172 44 00	51	48	35.1	250 fathoms *a*	W	5	....do	Do.
43	Aug. 22	1.29 p. m.	54 59 00	171 49 00	49	48	35.1	100 to surface	SE. by S	2	Cloudy	
43	Aug. 22	1.29 p. m.	54 59 00	171 49 00	49	48	35 1	100 fathoms *a*	SE. by S	2	....do	Do.
44	Sept. 1	9.03 a. m.	54 44 00	165 42 00	52	47	39.5	50 to surface	E	3	....do	
44	Sept. 1	9.03 a. m.	54 44 00	165 42 00	52	47	39.5	50 fathoms *a*	E	3	....do	Do.
			Coast of Washington.									
	1894.											
45	Apr. 30	1.06 p. m.	48 14 30	122 58 00	53	46	44	4 to surface	W	1	Clear	Do.

a Lower net closed at this depth by messenger.

Record of Townsend intermediate and surface tow-net stations of the Albatross, 1895.

Serial No.	Date.	Position.		Temperature.		Time of day.	Depth of net.	Length of trial.	Net used.	Result.
		Lat. N.	Long. W.	Surface.	Depth.					
		Bering Sea.								
	1895.	° ′	° ′ ″	° *F.*			*Fms.*	*Min.*		
46	Aug. 5	55 06	169 08 00	46	38.2	1.17 p.m.	200	26	Intermediate	Abundance small crustacea, young shrimps, and sagitta.
		55 06	169 08 00			1.17 p.m.	Surface.	26	Surface	2 small fish and abundance of small crustacea.
47	Aug. 7	55 36	170 45 00	44		11.28 a.m.	100	23	Intermediate	Numerous small crustacea and sagitta.
		55 36	170 45 00	44		11.28 a.m.	Surface.	23	Surface	Few small crustacea and sagitta.
48	Aug. 7	55 10	170 56 00	45	38	7.17 p.m.	150	27	Intermediate	Numerous small crustacea and sagitta and 4 small fish.
		55 11	170 56 00	45		7.17 p.m.	Surface.	27	Surface	Abundance of small crustacea and sagitta.
		55 11	171 13 00	45		10.00 p.m.	1	20	do	Abundance of small crustacea and siphonophore.
49	Aug. 8	55 53	171 40 00	45	37.4	10.43 a.m.	200	58	Intermediate	Numerous small crustacea and sagitta.
		55 53	171 40 00	45		11.30 a.m.	10 feet.	16	Surface	Very few crustacea and sagitta.
50	Aug. 8	55 44	171 17 00	44	37.7	5.08 p.m.	100	20	Intermediate	2 small fish, abundance amphipod crustacea.
		55 44	171 17 00	44		5.15 p.m.	20 feet.	20	Surface	10 small fish, few crustacea and fish eggs.
51	Aug.10	56 15	172 35 00			1.40 p.m.	43	23	Intermediate	Abundance small crustacea of several species; numerous sagitta.
		56 15	172 35 00			1.40 p.m.	2	24	Surface	1 very small squid; few larval shells; abundance pelagic refuse.
52	Aug.10	56 13	172 20 00	45		4.27 p.m.	50	21	Intermediate	Minute crustacea of several species; few sagitta.
		56 13	172 20 00	45		4.27 p.m.	Surface.	15	Surface	Quantity of small crustacea.
53	Aug.11	55 23	170 31 00			12.43 p.m.	48	23	Intermediate	1 young gadoid; few medusæ and annelida; 1 embryo octopus; sagitta and crustacea.
		55 23	170 31 00			12.43 p.m.	Surface.	23	Surface	Quantity brownish pelagic refuse.
						2.47 p.m.	Surface.	25	do	Quantity of brownish spicules and pelagic refuse.
				45		10.00 p.m.	Surface.	20	do	Few small red medusæ; 1 large white medusa; many small crustacea and worms.
54	Aug.12	54 54	168 59 00	45	39.5	11.47 a.m.	25	30	Intermediate	Numerous small crustacea and sagitta.
		54 54	168 59 00	45		11.47 a.m.	Surface.	30	Surface	2 small fish; few medusæ, worms, and crustacea.
						9.45 p.m.	Surface.	20	do	Few large brown medusæ; few smaller medusæ; 4 young cod; few small pelagic fishes; many small crustacea, etc.
55	Aug.13					12.53 p.m.	30	25	Intermediate	3 species small medusæ; several species minute crustacea; small cod; small invertebrates.
						12.53 p.m.	Surface.	25	Surface	Abundance brownish algæ and pelagic refuse; few larval squid.
						5.10 p.m.	Surface.	40	do	
56	Aug.18					5.00 p.m.	200	32	Intermediate	Few small medusæ, abundance sagitta, and minute crustacea.
						5.00 p.m.	Surface.	32	Surface	Quantity of larval shells, minute crustacea, and minute brownish algæ.
57	Aug.19	54 17	168 53 30			12.00 m.	50	25	Intermediate	Abundance sagitta and minute crustacea; few larval squid.
		54 17	168 53 30			12.00 m.	Surface.	25	Surface	Small quantity sagitta and minute black crustacea; few small medusæ, larval crabs, and small pelagic fish.
58	Aug.19						575	30	Intermediate	Few sagitta, crimson prawns, small medusæ, larval ophiurans; few ascidians; crustacea.

Record of Townsend intermediate and surface tow-net stations of the Albatross, 1895—Continued.

Serial No.	Date.	Position.		Temperature.		Time of day.	Depth of net.	Length of trial.	Net used.	Result.
		Lat. N.	Long. W.	Surface.	Depth.					
		Bering Sea.								
	1895.	° ′	° ′ ″	°*F.*			*Fms.*	*Min.*		
58	Aug. 19	.....	.....	.....	.....	.....	Surface.	30	Surface	Quantity of larval shells, small crustacea, and medusæ.
		.....	.....	.....	.....	9.25 p. m.	Surface.	25	.....do	Hauled with electric light.
59	Aug. 20	.....	.....	.....	.....	12.01 p. m.	200	20	Intermediate	Struck bottom; sagitta and minute pink crustacea; small ophiurans; 3 small fishes; worms.
		.....	.....	.....	.....	12.01 p. m.	Surface.	20	Surface	Few small crustacea.
59	Aug. 20	55 19	168 11 00	.....	.....	9.55 a. m.	Surface.	.....	.....do	
		55 11	167 56 00	.....	.....	10.15 p. m.	Surface.	.....	.....do	
60	Aug. 20	.....	.....	.....	.....	.....	70	25	Intermediate	Abundance of small crustacea and sagitta.
		.....	.....	.....	.....	.....	Surface.	25	Surface	Similar to above.
		.....	.....	.....	.....	10.35 p. m.	Surface.	20	.....do	Many small medusæ and abundance of small crustacea.
61	Aug. 21	.....	.....	.....	.....	9.20 p. m.	50	20	Intermediate	Abundance minute pinkish crustacea of many species.
		.....	.....	.....	.....	9.20 p. m.	Surface.	20	Surface	Small quantity ova and larval squid; many larval crabs; few small pelagic fishes; brown algæ.
62	Aug. 21	.....	.....	.....	.....	.....	30	20	Intermediate	Abundance small crustacea and sagitta.
		.....	.....	.....	.....	.....	Surface.	20	Surface	Few crustacea.
63	Aug. 22	.....	.....	.....	.....	9.18 p. m.	20	25	Intermediate	Few larval Gadidæ and squid; abundance of petropods with shells; few small medusæ.
		.....	.....	.....	.....	9.18 p. m.	Surface.	25	Surface	Usual sagitta and crustacea.

Record of surface and intermediate tow-net stations of the Albatross, 1899–1900.

Serial No.	Agassiz serial No.	Date.	Time.	Position and true bearings.		Temperatures.			Depth.	Character of bottom.	Wind.		Remarks.
				Lat. N.	Long. W.	Air.	Surface.	Bottom.			Direction.	Force.	
				San Francisco, Cal., to Nukuhiva Isd., Marquesas Isds.									
		1899.		° ′ ″	° ′ ″	°F.	°F.	°F.	Fms.				
Hy. 3778	1	Aug. 26	4.52 a. m.	31 10 00	125 00 00	62	64	.....	1,955	No specimen.	NNW	3	Open intermediate to 300 fms.
Hy. 3778	1	Aug. 26	5.06 a. m.	31 10 00	125 00 00	62	64	.....	1,955	do	NNW	2	Surface 31 minutes.
Dr. 3681	2	Aug. 27	10.15 a. m.	28 23 00	126 57 00	66	66	34.6	2,368	lt. br. vol. oz.	N	3	Surface 30 minutes.
Dr. 3681	2	Aug. 27	3.36 p. m.	28 23 00	126 57 00	67	66	34.6	2,368	lt. br. vol. oz.	NE. by N	2	Open intermediate to 350 fms.
Dr. 3681	2	Aug. 27	4.25 p. m.	28 23 00	126 57 00	67	66	34.6	2,368	lt. br. vol. oz.	NE	2	Open intermediate to 100 fms.
Substation	Substation.	Aug. 27	8.20 p. m.	28 11 00	127 16 00	66	65	.....		(Did not sound.)	NNE	2	Surface 20 minutes.
Substation	3	Aug. 28	3.42 p. m.	26 18 00	128 54 00	69	68	.....		(Did not sound.)	NE	3	Open intermediate to 200 fms.
Hy. 3779	4	Aug. 29	9.41 a. m.	24 45 00	130 16 00	70	68	34.6	2,628	lt. br. vol. oz.	NNE	4	Open intermediate to 500 fms.
Hy. 3779	4	Aug. 29	9.35 a. m.	24 45 00	130 16 00	70	68	34.6	2,628	lt. br. vol. oz.	NNE	5	Surface 25 minutes.
Hy. 3779	4	Aug. 29	10.03 a. m.	24 45 00	130 16 00	71	68	34.6	2,628	lt. br. vol. oz.	NNE	5	Surface 8 minutes.
Hy. 3780	5	Aug. 30	8.30 a. m.	22 42 00	131 54 00	71	70	34.6	2,740	br. vol. oz	N. by E	4	Surface 20 minutes.
Hy. 3780	5	Aug. 30	8.23 a. m.	22 42 00	131 54 00	71	70	34.6	2,740	br. vol. oz	N. by E	4	Open intermediate to 150 fms.
Hy. 3781	6	Aug. 31	9.56 a. m.	20 26 00	133 28 00	75	75	.....	2,810	dk. br. vol. oz.	NE	2	Surface 14 minutes.
Hy. 3781	6	Aug. 31	10.05 a. m.	20 26 00	133 28 00	75	75	.....	2,810	dk. br. vol. oz.	NE	2	Open intermediate to 150 fms.
Hy. 3782	7	Sept. 1	9.26 a. m.	18 19 00	134 57 00	77	76	.....	2,881	dk. br. vol. oz.	NNE	2	Do.
Hy. 3782	7	Sept. 1	9.30 a. m.	18 19 00	134 57 00	78	76	.....	2,881	dk. br. vol. oz.	NNE	1	Surface 15 minutes.
Substation	Substation.	Sept. 1	8.06 p. m.	17 32 00	135 40 00	76	76	.....		(Did not sound.)	NNE	2	Surface 19 minutes.
Hy. 3786	12	Sept. 4	10.05 a. m.	12 07 00	137 18 00	82	81	.....	2,883	lt. br. rad. oz.	NE	4	Open intermediate to 150 fms.
Hy. 3786	12	Sept. 4	10.13 a. m.	12 07 00	137 18 00	82	81	.....	2,883	lt. br. rad. oz.	NE	4	Surface 13 minutes.
Substation	Substation.	Sept. 4	7.55 p. m.	10 57 35	137 35 25	80	80	.....		(Did not sound.)	NE	3	Surface 22 minutes.
Substation	Substation.	Sept. 4	8.48 p. m.	10 57 35	137 35 25	80	80	.....		(Did not sound.)	NE	3	Surface 15 minutes.
Dr. 3683	13	Sept. 5	10 a. m.	9 57 00	137 47 00	83	82	.....	2,690	lt. br. m. rad. oz.	NE	2	Surface 25 minutes.
Dr. 3683	13	Sept. 5	1.30 p. m.	9 57 00	137 47 00	84	82	.....	2,690	lt. br. m. rad. oz.	E	2	Surface 15 minutes.
Substation	Substation.	Sept. 5	8.08 p. m.	9 26 00	137 49 00	82	82	.....		(Did not sound.)	E	2	Surface 21 minutes.
Hy. 3787	14	Sept. 7	10 a. m.	6 41 00	137 00 00	81	82	.....	2,776	lt. gy. glob. oz	E. by S	3	Open intermediate to 150 fms.
Hy. 3787	14	Sept. 7	10.03 a. m.	6 41 00	137 00 00	81	82	.....	2,776	lt. gy. glob. oz	E. by S	3	Surface 15 minutes.
Substation	Substation.	Sept. 7	8.01 p. m.	5 40 00	136 47 00	81	81	.....		(Did not sound.)	SE	3	Surface 20 minutes.
Substation	Substation.	Sept. 7	8.22 p. m.	5 40 00	136 47 00	81	81	.....		(Did not sound.)	SE	3	Elec. light and dip nets 18 min.
Hy. 3788	15	Sept. 8	9.58 a. m.	4 35 00	136 54 00	81	80	.....	2,583	lt. gy. oz. glob. rad.	SE	3	Open intermediate to 150 fms.
Hy. 3788	15	Sept. 8	10 a. m.	4 35 00	136 54 00	81	80	.....	2,583	lt. gy. oz. glob. rad.	SE	3	Surface 15 minutes.
Substation	Substation.	Sept. 8	8.01 p. m.	3 28 00	136 54 00	80	80	.....		(Did not sound.)	E. by S	3	Surface 20 minutes.
Hy. 3789	16	Sept. 9	9.23 a. m.	2 38 00	137 22 00	82	80	35.2	2,440	lt. gy. glob. oz	SE. by E	3	Do.
Hy. 3789	16	Sept. 9	9.28 a. m.	2 38 00	137 22 00	82	80	35.2	2,440	lt. gy. glob. oz	SE. by E	3	Open intermediate to 250 fms.

Record of intermediate and surface tow-net stations of the Albatross, 1899-1900—Continued.

Serial No.	Agassiz serial No.	Date.	Time.	Position and true bearings.		Temperatures.			Depth.	Character of bottom.	Wind.		Remarks.
				Lat. N.	Long. W.	Air.	Surface.	Bottom.			Direction.	Force.	
		1899.		° ′ ″	° ′ ″	°F.	°F.	°F.	Fms.				
Substation	Substation.	Sept. 9	7.20 p. m.	1 45 00	137 36 00	80	79	.....	(Did not sound.)		SE. by E	3	Surface 20 minutes.
Substation	Substation.	Sept. 9	7.35 p. m.	1 45 00	137 36 00	80	79	.....	(Did not sound.)		SE. by E	2	Tanner intermediate to 350 fms.
Dr. 3684	17	Sept. 10	10.45 a. m.	0 50 00 Lat. S.	137 54 00	80	80	.....	2,463	gy. yl. glob. oz	SE	3	Surface 15 minutes.
Hy. 3790	18	Sept. 13	9.38 a. m.	6 25 00	138 59 00	81	80	35	2,475	lt. gy. glob. oz	ESE	5	Surface 20 minutes.
Hy. 3790	18	Sept. 13	9.48 a. m.	6 25 00	138 59 00	81	80	35	2,475	lt. gy. glob. oz	ESE	5	Open intermediate to 400 fms.
Dr. 3685	25	Sept. 14	2.30 p. m.	Haunanu Point, UaHuka Isd.		81	80	38	830	vol. s. glob	E	2	Surface 20 minutes.
Dr. 3685	25	Sept. 14	2.57 p. m.	S. 72° E. (true), dist. 13 m.		81	80	38	830	vol. s. glob	E. by N	2	Surface 18 minutes.
Hy. 3797	26	Sept. 14	9 p. m	Haunanu Point, UaHuka Isd. E., dist. 17 m.		80	80	.....	1,173	gy. vol. oz	E. by N	2	Surface 15 minutes.
Hy. 3797	26	Sept. 14	9.05 p. m.	do		80	80	.....	1,173	gy. vol. oz	E. by N	2	Open intermediate to 300 fms.
Hy. 3798	27	Sept. 15	7.01 a. m.	Cape Martin, Nukuhiva Isd., N. 30° E., dist. 6¼ m.		80	80	39.5	687	drab vol. oz. glob.	E	3	Do.
				Nukuhiva, Marquesas Isds., to Tahiti, Society Isds., via NW. Paumotu.									
Hy. 3801	30	Sept. 18	9.28 a. m.	10 29 00	141 52 00	81	81	35	2,456	lt. gy. vol. oz. glob.	SE. by E	3	Surface 20 minutes.
Hy. 3801	30	Sept. 18	9.33 a. m.	10 29 00	141 52 00	81	81	35	2,456	lt. gy. vol. oz. glob.	SE. by E	3	Open intermediate to 300 fms
Dr. 3686	31	Sept. 19	9.42 a. m.	12 20 00	144 15 00	79	79	35	2,700	red. c.	SE. by E	3	Surface 30 minutes.
Substation	Substation.	Sept. 19	6.59 p. m.	12 41 00	144 40 00	78	80	.....	(Did not sound.)		E	2	Surface 21 minutes.
Substation	Substation.	Sept. 19	7.15 p. m.	12 41 00	144 40 00	78	80	.....	(Did not sound.)		E	2	Open intermediate to 300 fms.
Hy. 3802	32	Sept. 20	9.18 a. m.	13 37 00	145 42 00	83	80	35	2,451	red. c. foram.	E	3	Surface 20 minutes.
Hy. 3802	32	Sept. 20	9.26 a. m.	13 37 00	145 42 00	83	80	35	2,451	red. c. foram.	E	3	Open intermediate to 300 fms.
Substation	Substation.	Sept. 24	8.02 p. m.	15 24 30	147 59 40	77	80	.....	(Did not sound.)		SE	2	Surface 24 minutes.
				From Tahiti, Society Isds., through Paumotu Archipelago.									
Dr. 3687	74	Oct. 5	8.40 a. m.	Point Venus, Tahiti Isd., S. 82° E., 4.5 m.		74	79	.....	725	fne. vol. s. yl. m.	ENE	1	Surface 15 minutes.

Substation	Substation	Oct. 5	7.08 p.m.	16 39 00	149 11 00	78	79	.....	(Did not sound.)	E	3	Surface 20 minutes.
Substation	Substation	Oct. 5	7.19 p.m.	16 39 00	149 11 00	78	79	.....	(Did not sound.)	E	2	Open intermediate to 350 fms.
Hy. 3860	91	Oct. 14	3.56 p.m.	SW. end Fakarava, NE. 2 m.		87	80	.....	602 co. s. pter. oz.	ESE	3	Surface 20 minutes.
Hy. 3860	91	Oct. 14	4.12 p.m.	....do		87	80	.....	602 co. s. pter. oz.	ESE	3	Open intermediate to 300 fms.
Dr. 3688	133	Oct. 28	8.15 a.m.	NW. point Marokau, E. 2 m.		80	78	34.5	742 pter. oz. mang.	NE. by E	2	Surface 12 minutes.
Dr. 3688	133	Oct. 28	11.50 a.m.	....do		80	79	34.5	742 pter. oz. mang.	ENE	2	Open intermediate to 350 fms.
Dr. 3690	139	Oct. 29	10.28 a.m.	NW. Face, Hao Atoll, E. 2 m.		83	79	37.6	812 co. s	NE	2	Surface 16 minutes.
Dr. 3691	173	Nov. 4	9.15 a.m.	18 55 00	146 32 00	78	78	34.8	2,440 vol. m. glob. co. part.	E	2	Surface 21 minutes.
Dr. 3691	173	Nov. 4	12.54 p.m.	18 55 00	146 32 00	82	79	34.8	2,440 vol. m. glob. co. part.	E	1	Open intermediate to 100 fms.
Dr. 3691	173	Nov. 4	2.22 p.m.	18 55 00	146 32 00	82	80	34.8	2.440 vol. m. glob. co. part.	E	1	Open intermediate to 300 fms.
				From Tahiti, Society Isds., via Leeward, Cook, Niue, Tonga, and Fiji Isds., to Suva, Fiji Isds.								
Substation	Substation	Nov. 16	10.23 a.m.	Huaheine Island, SE. 5 m.		.....	82	.....	(Did not sound.)	NW. by N	1	Surface 9 minutes.
Dr. 3692	183	Nov. 24	9.30 a.m.	19 04 00	167 41 00	82	80	33.9	2,472 red c. rod. oz.	E	1	Surface 25 minutes.
				Through Gilbert and Ellice chains to Jaluit, Marshall Isds.								
		1900.		Lat. N.	Long. E.							
Hy. 3958	196	Jan. 1	11.57 a.m.	Village, south coast Apamama Island, N. ¼ m.		92	88	.....	(Did not sound.)	NNW	0-1	Surface 31 minutes.
Hy. 3958	196	Jan. 1	12.07 p.m.	....do		92	88	.....	(Did not sound.)	NNW	0-1	Open intermediate to 150 fms.
				Through Marshall Islands.								
Hy. 3984	222	Jan. 18	12.41 p.m.	Ent. South Pass. Rongelab, N. 1.5 m.		82	81	39	746 crs. co. s	ENE	2	Do.
Hy. 3984	222	Jan. 18	12.45 p.m.	....do		81	81	39	746 crs. co. s	ENE	2	Surface 15 minutes.

Record of surface and intermediate tow-net stations (off Japan), 1900.

Serial No.	Date.	Time.	Position.		Temperatures.			Depth.	Character of bottom.	Remarks.
			Lat. N.	Long. E.	Air.	Surface.	Bottom.			
			Suruga Gulf, Honshu Island, Japan.							
	1900.		° ′ ″	° ′ ″	°F.	°F.	°F.	*Fms.*		
3705 Dr	May 7	1.10 p. m.	34 49 15	138 34 45	64	64	.....	Did not sound		Open intermediate; 20 minutes at 106 fathoms.
	May 7	1.13 p. m.	Seno Umi, S. 18° W., 5.3 m.		.....	.....	.....	.....	.....	Surface; 28 minutes.
3712 Dr	May 10	4.09 p. m.	35 03 30	138 39 50	65	64	.....	500	.....	Surface; 27 minutes; poor haul.
	May 10	4.17 p. m.	Oze Zaki, S. 72° E., 6¼ m.		59	65	.....	600	.....	Open intermediate; 19 minutes at 250 fathoms; good haul.
			South coast Honshu Island, Japan.							
3730 Dr	May 16	8.31 a. m.	Omai Zaki Light, N. 17° E., 14.5.		61	64	.....	.....	.....	Surface; 22 minutes.
			East coast Honshu Island, Japan.							
3766 Dr	June 3	3.08 p. m.	36 36 00 Shioya Saki Lt., N. 78° W., 108 m.	143 12 00	70	69	.....	Did not sound		Surface; 22 minutes; excellent haul.

MISCELLANEOUS RECORDS.

Record of gill-net stations of the Albatross, 1897.

Serial No.	Date.	Position. Lat. N.	Position. Long. W.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth.	Character of bottom.	Nets set. Hours.	Nets set. Number.	Nets set. Kind.
		Santa Catalina Island, California.									
	1897.	° ′ ″	° ′ ″	° F.	° F.	° F.	Fms.				
	Apr. 7	1′ 3″ SE. of Avalon, Dakins Cove.		64	58	.....	6–10	rky	11	2	Menhaden.
	Apr. 8	do		60	58	.....	6–10	rky	(?)	2	Do
		Monterey Bay and vicinity.									
1	Apr. 13	36 45 15	121 53 00	64	55	47.7	68	m. s. bldr	70	2	Cod.
2	Apr. 13	36 39 30	121 53 00	57	56	48.7	39	gy. s. mica	19	2	Salmon.
3	Apr. 14	Off Pacific Grove, Point Pinos.		60	57	.....	5	gy. s. rky	13	2	Do.
4	Apr. 16	36 47 00	122 10 00	55	57	42.7	278	gy. m. fne. s	17	1 2	Salmon. Cod.
5	Apr. 17	36 43 00	122 12 00	57	55	37.8	581	gy. m. s	51	1 1	Salmon. Cod
6	Apr. 21	37 00 30	122 20 30	53	50	.....	56	gy. m. s	48	1 1	Salmon. Cod.
7	Apr. 24	37 37 30	123 02 00	56	49	49.0	68	s. co. r	20	1 2	Salmon.
		Flattery Bank.									
8	May 14	48 21 30	124 50 15	53	48	45.0	80	gn. m. s	22	1 2	Salmon. Cod.

April 7.—1 anchovy.
April 8.—Barren.
No. 1.—One net badly torn. 8 rockfish (S. paucispinis), 3 badly eaten by sea lice—skin only remaining; average length of 5 not destroyed, 26½ inches; average weight, 8 lbs.; 4 females, all with empty stomachs; 1 male with fish bones. 1 rockfish (S. melanops), 20 inches long, also badly eaten. 1 cultus-cod (badly eaten), 38 inches long. 3 ground sharks (2 badly eaten), 1 with beaks of large octopus in stomach. 3 dogfish.
No. 2.—Barren.
No. 3.—2 rock-bass.
No. 4.—One cod and one salmon net badly torn; 7 black cod, 3 males and 4 females; average length, 28 inches; average weight, 8½ pounds; 3 stomachs empty; others with fish bones, young shrimps, and medusæ. 3 red rockfish; bodies of 2 badly eaten; the other, 19 inches, 3 pounds; male, stomach empty. 1 large flounder; 2 dogfish; 6 crabs; branch of cherry tree with anemone attached (preserved section with anemone.)
No. 5.—Cod net badly torn; 8 black cod; all females; average length, 30½ inches; average weight, 11½ pounds; 2 stomachs empty; 1 with small piece fishbone; ova partially developed; 9 Macruri; 8 males, 1 female; average length, 24½ inches; average weight, 2½ pounds.
No. 6.—Barren. Set from ship.
No. 7.—1 rockfish (S. eutomelas); female; 18 inches; 3 pounds; stomach empty. 8 rockfish (S. paucispinis); 1 badly eaten by sea lice and slime eels; eel found in skin; of otner 7, 3 were females and 4 males; average length, 27 inches; average weight, 6½ pounds; stomachs all empty; 2 black cod; 1 chimæra; 1 barndoor skate; 5 small dogfish.
No. 8.—Nets badly torn; 1 ground shark 10½ feet long; several dogfish; 1 flounder; 1 black cod.

Record of dip-net trials with electric light.

Date.	Time.	Position.	Length of trial.	State of sea.	Temperature. Air D. B.	Temperature. Sea surface.
1897.		*Santa Catalina Island, Cal.*			° F.	° F.
Apr. 8	8 p. m	Anchorage, Isthmus Cove	1 hour	Smooth	60	56
Apr. 9	8 p. m	do	do	do	70	58
		Monterey Bay and vicinity, Cal.				
Apr. 12	7.30 p. m.	Anchorage, Santa Cruz	1¼ hours	Smooth	59	54
Apr. 23	8 p. m	Anchorage, Halfmoon Bay	1 hour	Light	55	49

April 6.—Quantity of minute crustacea, medusæ, and marine refuse. One worm.
April 9.—Several annelids. Quantity of minute crustacea and marine refuse.
April 12.—1 small fish.
April 23.—Many young fishes, thought to be anchovies and sand launces; 4 very tiny fishes; 3 young shrimps; many minute crustacea; large crustacean like a centipede; several minute worms.

RECORD OF SERIAL TEMPERATURES.

Record of serial temperatures, 1883.

Date.	Position.						Depth.	Temperature.																								
	Lat. N.			Long. W.				Air.	Surface.	5 fathoms.	10 fathoms.	15 fathoms.	20 fathoms.	25 fathoms.	40 fathoms.	60 fathoms.	100 fathoms.	200 fathoms.	300 fathoms.	400 fathoms.	500 fathoms.	600 fathoms.	700 fathoms.	800 fathoms.	900 fathoms.	1,000 fathoms.	1,100 fathoms.	1,200 fathoms.	1,300 fathoms.	1,400 fathoms.	1,600 fathoms.	Bottom.
1883.	°	′	″	°	′	″	*Fms.*	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.
Apr. 27	35	09	40	75	04	36	92	67	72	75	75	74	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	74½
27	35	09	58	74	59	18	69	76	76	76	76	76	76	....	76	69	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
28	35	29	35	74	46	45	531	64	69	69	71	70½	69	....	65	59	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
28	35	31	00	74	45	30	724	66	62	....	....	....	....	....	....	....	....	42½	40½	40	....	....	....	....	....	....	....	....	....	....	....	....
28	35	30	00	74	44	45	890	65	61	61	69	70	69	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
30	36	46	15	74	27	50	670	70	46	45	44	42	42	....	45	43	52	....	41	....	39½	39	39	....	....	....	....	....	....	....	....	....
May 5	37	31	00	74	52	36	19	48½	47	45½	45½	45½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	45½
5	37	29	40	74	53	00	17	49	47	46½	45½	45½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	45½
7	37	12	22	74	20	04	788	62	54	52½	51½	52½	53	....	52	50	50½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	39
7	37	13	52	74	23	52	600	56½	52½	51½	51½	51½	51½	....	52	52½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	39
21	37	37	50	74	15	30	143	56	54	....	....	....	52½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
21	37	36	00	74	15	00	179	58	54	52½	53	57	54	....	51½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	45
21	37	32	00	74	13	30	487	59	52	52½	52	52	52½	....	53½	53	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	40
21	37	48	00	74	01	30	377	62	56	55	55	54½	55	....	54	54	54	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
25	40	02	00	70	27	00	239	57	49	48½	48	46	44½	....	42½	42½	48½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	40½
25	39	58	25	70	37	00	198	56	52	....	....	....	....	....	....	....	48	....	....	....	....	....	....	....	....	....	....	....	....	....	....	43
25	39	57	50	70	32	00	209	56	52	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	41
25	39	42	00	70	47	00	1,168	57	53	52	52	52	51	....	50½	50½	50	46½	40½	40	39½	....	....	....	....	....	....	....	....	....	....	38½
26	39	29	00	72	19	40	74	55	50	49	48½	43	39½	....	46½	43½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	47½
26	39	32	30	72	18	35	379	62	49½	49	48½	46½	43½	....	39½	40½	50	42	41½	....	....	....	....	....	....	....	....	....	....	....	....	41
July 17	39	26	16	70	02	37	1,362	73	71	71	69½	52½	48	44	46	....	44½	41	40½	39½	40	40	39½	40	39	40	....	....	....	....	....	....
18	38	52	40	69	24	40	1,735	82	76	74	72	68	65	62½	60	....	....	....	....	48	48	40	39½	....	38½	....	38½	40½	40½	38½	38	38
18	38	53	00	69	23	30	1,731	79	76	74	73	66	63	62	61	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	38
26	38	30	30	69	08	25	2,033	77	76½	77	77	71	66	62½	58	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
27	37	58	30	69	01	20	2,451	78	82	....	....	....	....	72	....	....	53	....	....	54	....	....	....	....	....	....	....	....	....	....	....	36½
28	38	19	26	68	20	20	2,369	77½	81	81	81	81	81	77	68	60	50½	55	43	40½	....	40	39	39	39	39	....	....	....	....	....	....
29	38	35	13	68	16	00	2,226	76	76	75½	75½	76	75½	68	56½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
30	39	33	00	68	26	45	1,555	74	71	....	71½	....	....	....	57½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
31	40	01	50	68	50	30	608	72	72	70	68	55	65	58	44	43½	45	43½	40	40	....	....	....	....	....	....	....	....	....	....	....	40
Aug. 30	41	58	00	67	57	45	43	58	58½	58	57	57	56	56	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	50
31	42	23	00	66	23	00	141	60	57½	57½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	46
31	42	23	30	66	21	15	115	57	54	53	53	53	49½	53	51½	44	42½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	42½
Sept. 1	41	55	30	65	47	10	113	61	57	....	55	54½	53	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	42½
1	41	56	40	65	50	10	102	58	55	55	55	55	54	52½	53	41½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	43

2	41	53	00	65	35	00	858	70	56	56																							39
3	41	40	30	65	35	00	855	58	58			59	54½	48½																			39
4	41	13	00	66	19	50	75	60	67½	67½																							45
20	40	06	50	70	34	15	65	71	67	58																							50
20	40	01	50	70	39	20	111	70	68	68	68	69½	69½	61	47	52																	49
21	39	42	50	71	01	20	1,000	75	69	68	68	68																					39
21	39	44	30	71	04	00	1,022	70	68	68	67½	67½	67	47½	51	52½																	38½
30	39	29	00	70	58	40	1,342	71½	69½	67																							
30	39	22	20	70	52	20	1,451	70	69	67½	68	68	67	66	56½	65½	53½	47	40½	40	40	40	39½	39½	38½	39	38½						37½
Oct. 1	37	56	20	70	57	30	1,917	73	72½	68																							
1	37	40	30	70	37	30	2,221	73	72½	72																							
2	37	12	20	69	39	00	2,949	71	82																								
3	39	18	30	68	24	00	1,686	61	67	69	68																						37
Nov. 5	38	44	00	72	38	00	1,209	64	62½	62	61½	61½																					39
5	38	48	00	72	40	30	991	60	61	62	62	62	62	62	59	55	53½	43½	40½	40	40	40	39½	39		39							41½
6	37	34	48	73	03	15	1,542	62	62	62	62	62	62	62½	54	39½	51½	43½	41	39½	39½	39½	39	39	39	38½							37
9	35	16	00	75	02	30	48	76	78½	77	78	78	77	75	68½																		66
9	35	16	20	75	04	00	34	75	77																								74
9	35	14	30	75	00	30	102	74	76																								52
11	35	44	30	74	28	45	1,066	76	76½	77	77	77	77	77	68½	69	40	45	41	40	40	40	39										
12	36	16	15	74	51	20	40	65	68																								56

Record of serial temperatures, 1884.

Serial No.	Date.	Position.		Depth.	Temperature.															
		Lat. N.	Long. W.		Air.	Surface.	25 fathoms.	50 fathoms.	100 fathoms.	200 fathoms.	300 fathoms.	400 fathoms.	500 fathoms.	600 fathoms.	700 fathoms.	800 fathoms.	900 fathoms.	1,000 fathoms.	1,300 fathoms.	Bottom.
	1884.	° ′ ″	° ′ ″	*Fms.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*
Hyd. 46	Jan. 24	17 51 00	65 08 25	2,423	80	77	77	77	77	60	51	.....	.....	.....	.....	.....	.....	.....	.....	39.1
Hyd. 47	Jan. 24	17 46 30	65 10 25	1,482	78	77	77	78	67	.....	.....	45	.....	.....	40	.....	40	.....	.....	38.8
Hyd. 57	Jan. 25	17 49 06	65 29 00	2,188	77	77	77	77	67	59	.....	.....	43	.....	.....	.....	40	.....	.....	38.8
Hyd. 62	Jan. 25	17 32 40	65 52 20	2,017	77	77	77.5	78	66.3	58.5	48	.....	44	.....	.....	.....	40	40	40	.....
Hyd. 64	Jan. 26	16 59 00	65 19 20	2,543	76	77	77.5	77	65.3	.....	62.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hyd. 66	Jan. 26	16 28 00	64 42 30	2,192	78	77	77.8	76	65	55	47	.....	.....	.....	.....	.....	.....	.....	.....	39.8
Hyd. 71	Jan. 27	15 44 10	63 42 10	950	76	77	78	77.3	67	54.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.8
Hyd. 80	Jan. 28	13 56 35	63 02 00	684	75	77	77	72.5	61	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.5
Hyd. 82	Jan. 28	13 29 00	62 42 40	1,051	80	77	.....	.....	.....	.....	44.5	.....	.....	.....	.....	.....	.....	.....	.....	39.3
Hyd. 83	Jan. 28	13 23 00	62 34 15	1,686	77	78	76	68	61.3	50	45	43	.....	40.5	40	40	.....	39.5	.....	39.5
2119	Jan. 29	11 48 30	62 17 30	1,140	75	77	75	68.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.3
Hyd. 116	Feb. 5	14 21 44	63 58 45	1,615	78	77	77.5	72	62	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.3
Hyd. 120	Feb. 6	16 01 00	65 56 20	2,492	76	77	77.5	.....	64.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.8
Hyd. 121	Feb. 6	16 36 20	66 41 00	2,501	76	77	77	77	67	55	47.8	.....	.....	.....	.....	.....	.....	.....	.....	39.5
Hyd. 123	Feb. 7	15 49 00	67 36 40	2,616	76	77	77.3	77.3	67	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hyd. 124	Feb. 7	15 02 00	67 13 20	2,747	80	77	77.8	78	66.5	53	.....	.....	.....	.....	40.5	39.8	39.5	.....	.....	.....
Hyd. 127	Feb. 8	13 25 04	66 25 00	2,844	77	77	77.8	77.8	55.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hyd. 128	Feb. 8	12 54 40	66 11 10	2,768	81	78	77.5	.....	61.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.5
Hyd. 133	Feb. 9	11 33 20	66 19 00	553	77	75	70.5	65	58	48.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	40.8
Hyd. 134	Feb. 9	11 18 50	66 24 20	656	79	76	71.8	65	58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40
Hyd. 135	Feb. 9	11 05 00	66 30 00	239	78	76	71	64.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	49.3
Hyd. 139	Feb. 9	11 01 00	67 14 15	605	75	75	.....	.....	.....	.....	.....	.....	40.5	.....	.....	.....	.....	.....	.....	.....
Hyd 145	Feb. 10	11 52 00	68 35 46	630	78	76	76	68.5	59.8	49.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hyd. 150	Feb. 18	11 56 00	68 56 00	733	77	76	76	66	63	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.6
Hyd. 151	Feb. 18	11 50 45	68 56 30	738	77	76	75	66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.6
Hyd. 152	Feb. 18	11 40 25	68 57 30	321	76	75	.....	.....	.....	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	45.2
2126	Feb. 19	13 17 45	70 01 00	1,701	78	77	76	66.5	65.5	.....	47	.....	.....	.....	.....	.....	.....	.....	.....	39.3
Hyd. 162	Feb. 19	13 40 20	70 10 45	2,694	75	76	76	69	62	53	46	.....	.....	.....	.....	.....	.....	.....	.....	39.6
Hyd. 165	Feb. 20	15 55 00	71 03 00	2,209	76	77	76	74	67.5	.....	47	.....	.....	.....	.....	.....	.....	.....	.....	39.6
Hyd. 166	Feb. 20	16 42 00	71 18 30	2,028	76	77	.....	.....	66	.....	54	.....	.....	.....	.....	.....	.....	.....	.....	40.1
Hyd. 170	Feb. 21	17 48 00	72 12 20	2,434	77	77	77.5	77	69	.....	51	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hyd. 171	Feb. 21	18 01 30	72 23 00	1,929	81	79	77	76	67	.....	51	.....	.....	.....	.....	.....	.....	.....	.....	39.6
Hyd. 172	Feb. 21	18 07 00	72 29 00	1,538	80	79	77.5	77	67	.....	50	.....	.....	.....	.....	.....	.....	.....	.....	39.6
Hyd. 179	Feb. 22	17 36 30	72 56 00	2,423	78	77	.....	77	70.5	.....	51	.....	.....	.....	.....	.....	.....	.....	.....	39.7
Hyd. 189	Feb. 22	17 45 30	73 04 00	2,391	79	77	.....	.....	.....	.....	51.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hyd. 188	Feb. 23	17 51 40	74 36 30	894	75	77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hyd. 190	Feb. 23	17 33 30	74 45 00	955	78	77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Hyd. 197	Feb. 24	18 45 00	74 32 40	1,347	78	77	77.5	76	72		61										
Hyd. 198	Feb. 24	18 50 00	74 12 00	1,537	84	79	78	77	68.5		58										
Hyd. 199	Feb. 24	18 56 00	73 51 00	1,974	80	79	78	77.4	68.2		51.5										39.7
Hyd. 205	Feb. 25	19 40 00	74 42 00	1,923	77	77	78	74.6	66.7		54										39.7
2127	Feb. 25	19 45 00	75 04 00	1,639	78	77	77.6	76	69	61	54.2	47.5	43.5	40	39		39.7				
Hyd. 206	Feb. 25	19 43 21	75 15 30	1,745	76	77	77	76	71												39.7
Hyd. 215	Feb. 26	18 54 30	74 16 30	1,486	77	78	78.4	78	74.4		51										39.9
Hyd. 216	Feb. 28	18 32 30	75 06 00	870	78	78		78.4			52.4										39.7
Hyd. 217	Feb. 28	18 34 00	74 21 00	1,015	79	78	77.8	77.6	68.7		49.7										39.7
Hyd. 346	Mar. 23	9 46 00	76 18 30	255	81	82		72.2	62.9												
Hyd. 353	Mar. 24	9 44 40	77 56 00	550	79	79	76	72.2	61.1												41.8
Hyd. 354	Mar. 24	9 47 00	78 09 30	630	79	78	78.7	72.5	61.4	51.6											
Hyd. 355	Mar. 24	9 48 00	78 24 00	1,017	79	79		72.1	61.4	52											
Hyd. 363	Mar. 25	9 45 15	79 34 00	370	80	79		75	56.5												
Hyd. 371	Apr. 3	11 20 00	80 42 10	1,832	80	79	78	74	63.8	51.6	46.6	44.8	40.4	40.5	39.5	39.6	39.5	39.2			39.3
2151	Apr. 10	15 28 39	80 36 00	653	79	78	78.8	77.8	67.9	55.3	47.8	42.7	41.4								40.2
Hyd. 419	Apr. 14	23 48 14	84 06 55	1,356	79	79	78.6	77.9	67.9	57.1	51.4	44.6		40.9	40.1	40		39.8			39.7
2172	July 20	38 01 15	73 44 00	568	76	76	58.8	55.4	51	45.1	40.7	40									38.6
2173	July 21	37 57 00	72 34 00	1,600	70	68	53	51.7	51.7	51.7	39.7	39.7	39.5	38.7	38.7	38.7	38.1	38.1			37
2175	July 22	39 33 00	72 18 30	452	69	68	50.5	51.3	50.6	44.1	40.6	40.2									40.7
Hyd. 533	July 23	39 23 45	71 43 00	992	70	69	57	52.8	50.7	44.2	40.7	40.2	40	39.6	38.7	38.7	38.6				38.6
Hyd. 544	Aug. 3	39 55 00	71 07 00	221	71	68	64.3	51.8	51.8												49.3
Hyd. 545	Aug. 4	39 47 00	70 16 30	784	74	72	61.1	52.6	52.2	45.9	40.9	39.6	39.3	39.2							
2197	Aug. 6	39 56 30	69 43 30	84	77	74	49.8	52.8	52.3												52.3
Hyd. 549	Aug. 20	39 34 00	71 34 30	925	75	74	66.2	54.8	51.2	43.8	40.6	40.1	40.6	39.2	38.5	39					38.6
Hyd. 552	Aug. 23	39 40 05	69 23 00	1,098	75	74	63.2	55.9	52.5	44.3	40.7	39.3	40.6	39.2	39.1	38.6		38.8			38.3
Hyd. 553	Sept. 7	37 41 00	69 15 16	2,704	79	81	82	79.8	72.7	57.3	44	45.6	40.5	39.6	39.6	39.5	39	38.6			36.3
2224	Sept. 8	36 16 30	68 21 00	2,574	79	80	79.8	77.1	67.1	64.8	64.6	63.8	52.5	44.9	41	40.2	39.5	39.5			36.8
2225	Sept. 9	36 05 30	69 51 45	2,512	77	81	78.3	71.9	67.6	64.3	64.8	60	51.1	44.7	41.4	40.2	39.6	39.2			36.7
2227	Sept. 10	36 55 23	71 55 00	2,109	81	82	82.2	77.1	71.4	65.2	62.8	57.7	52.7	42.5	40.4	39.3	39.2	39.1			36.8
Hyd. 554	Sept. 11	37 22 53	73 06 30	1,600	78	74	76	63.2	63.8	48	46.3	39.7	39.4	39.3	39.1	38.8		38.7			36.8
Hyd. 556	Sept. 12	39 40 00	73 03 00	474	70	74	61.8	52.9	49.3	43.5	40.4										39.7
Hyd. 557	Sept. 13	39 08 30	72 12 30	851	66	72		66.8	53.5	43.1	40.6	39.7	39.2	39.1	38.7						38.7

Record of serial temperatures, 1885.

Serial No.	Date.	Position.		Depth.	Temperature.													
		Lat. N.	Long. W.		Air.	Surface.	25 fathoms.	50 fathoms.	100 fathoms.	200 fathoms.	300 fathoms.	400 fathoms.	500 fathoms.	600 fathoms.	700 fathoms.	800 fathoms.	900 fathoms.	1,000 fathoms.	Bottom.
	1885.	° ′ ″	° ′ ″	*Fathoms.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*
2393	Mar. 13	28 43 00	87 14 30	525	70	64	65.2	64	57.9		45.7	43							41
Hyd. 699	Apr. 1	31 54 45	79 17 00	86	66	69	*a* 69.9	*b* 68.4	*c* 66.3	*d* 63.3	*e* 60.8								60.3
Hyd. 702	Apr. 3	36 30 00	73 14 00	2,340	69	72				*f* 59.6			41.3						36.8
Hyd. 703	Apr. 4	36 45 00	73 28 00	1,646	68	66				*f* 43			39.6						37.2
Hyd. 704	Apr. 4	36 57 30	73 47 00	1,436	61	55	50.8	49.9	52.2	43		39.5		38.4	38.6	52.2	38.1	40.6	37.5
Hyd. 705	Apr. 4	37 01 08	74 10 00	1,208	50	52	50.1	44	51.3	44		39.7	39.3	40.8					38.7
Hyd. 712	Apr. 5	37 04 30	74 32 00	98	43	49	50.3	48.2											
2542	Aug. 7	40 00 15	70 42 20	129	73	76	59.8	56.3	49.8										47.2
Hyd. 849	Aug. 9	39 49 00	70 42 00	452	71	77	59.5	57	49.8	44	40.5								39.6
Hyd. 854	Aug. 10	39 41 00	71 42 00	378	76	77	62.5	45.8	49	42.1	40.1								39.6
2564	Aug. 11	39 22 00	71 23 30	1,396	79	78	61.6	58.1	51.3	48.8	40.3	40	39.4	39	39.2	38.8	38.5	41.3	37.3
2565	Aug. 28	38 19 20	69 02 30	2,069	72	77	76.8	53.7	53.1	54.2	49.9	40.1	39.4	38.7	39	38.6	38.8	38.6	36.2
2566	Aug. 29	37 23 00	68 08 00	2,620	75	80	81.2	79.2	66.6	64.6	63	59.1	53.7	45.3	40.7	40.2	39.5	39.3	38.4
2571	Sept. 1	40 09 30	67 09 00	1,356	75	72	65.7	60.2	54.8	45.7	41.8	40	39.7	38.8	39.8				37.8
2573	Sept. 2	40 34 18	66 09 00	1,742	11	71	68.3	61	52.8	49.4	42	40.2	39.7	39.1	39.4	38.6	38.8	38.1	37.3
2575	Sept. 3	41 07 00	65 26 30	1,710	64	77	71.2	59.1	52.8	47	41.3	40.2	39.8	39.3	38.7	38.8	38.4	38	37.1
2628	Oct. 21	32 24 00	76 55 30	528	70	77	79.9	77.6	59	48	45.5	40.2							38.5

a 5 fathoms. *b* 10 fathoms. *c* 15 fathoms. *d* 25 fathoms. *e* 50 fathoms. *f* 250 fathoms.

Record of serial temperatures, 1891.

Serial No.	Date.	Position.		Temperature.														
		Lat. N.	Long. W.	Air.	Surface.	25 fathoms.	50 fathoms.	100 fathoms.	200 fathoms.	300 fathoms.	400 fathoms.	500 fathoms.	600 fathoms.	700 fathoms.	800 fathoms.	900 fathoms.	1,000 fathoms.	Bottom.	Depth.
	1891.	° ′ ″	° ′ ″	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	Fms.
Hy. 2609	Feb. 23	7 12 30	80 56 00	79	81	67.2	63.2											57.7	127
Dr. 3356	Feb. 23	7 09 30	81 08 00	80	83	68.4	65.9	58.5	52.9	44.9	48.7							40.1	546
Dr. 3357	Feb. 24	6 35 00	81 44 00	80	83	74.4	76		51.8	46.1	43	41						38.5	782
Dr. 3361	Feb. 25	6 10 00	83 06 00	81	82	76.9	59	55.7	50.5	46.8	43.6	41.9	40.2	38.3	38.9	37.5	36.5	36.6	1,471
Dr. 3362	Feb. 26	5 56 00	85 10 30	80	84	71.8		55.8	51.3	46.7		59.3		39.1		37.3	36.8	36.8	1,175
Dr 3364	Feb. 27	5 30 00	86 08 30	79	81	68.9	71.4	54.4	48.8	44.9	42.8	41						38	902
Dr. 3366	Feb. 27	5 30 00	86 45 00	83	84	73.7	58.9	55.8	50.9	45.9	44.7	41.5	40.4	36.8				37	1,067
Dr. 3367	Feb. 28	5 31 30	86 52 30	81	82	72.4	69											57.1	100
Dr. 3372	Mar. 1	4 49 00	86 11 20	85	84	74.4	58.8	55	49.1	44.9	42.5	41						38.8	761
Dr. 3373	Mar. 2	4 02 00	84 58 00	83	82	77.7	60.9	55.9	49.7	44.4	41.9		38.9	38	37.5	37.1	37	36.6	1,877
Dr. 3374	Mar. 3	2 35 00	83 53 00	81	80	74.8	61.1	56.6	51.3	45.8	42.3	40.9	39.4					36.4	1,823
Dr. 3375	Mar. 4	2 34 00	82 20 00	76	77	66.7		58	54.2	46.6	43.8	40.9	39.9	38.9	38	37.6	37.2	36.6	1,201
Hy. 2613	Mar. 5	3 50 00	81 44 20	77	77	69.9	59.9	57.7	50.8	45.6	43.3	40.9	39.7	38.8		37.3		36.5	1,181
Dr. 3381	Mar. 6	4 56 00	80 52 30	78	77	70.9	59.3	55.4	51.5	46.7	42.8	40.5	39.4	38.6	37.7	37.4	36.6	35.8	1,772
Dr. 3382	Mar. 7	6 21 00	81 41 00	77	75	67.7	61.1	55.3	49.9	45.8	42.8	41.1	39.4	38.8	38.1	36.7	36.3	35.8	1,793
Dr. 3383	Mar. 8	7 21 00	79 02 00	75	74	63.2	63.4	56.4	49.1	45.0	43.3	41.3	39.6	39.4	39	37.4	37	36	1,832
Dr. 3387	Mar. 8	7 40 00	79 17 50	77	74	65.8	64											56	127
Dr. 3388	Mar. 9	7 06 00	79 48 00	75	73	64	60.9	56.1	49	45.5	43.4	43.1	39.8	39.2	38.1	37.7	37.2	36.2	1,168
Dr. 3392	Mar. 10	7 05 30	79 40 00	76	73	63		55.9	49.8	45	43.2	40.5	39.7	38.6	39.5	37.3	36.8	36.4	1,270
Hy. 2619	Mar. 11	7 31 00	78 42 30	72	68	65	61.8	61.3	48.9	45.5	42.6	41.1	40.2	38.7	37.8			36.5	1,100
Dr. 3396	Mar. 11	7 32 00	78 36 30	77	70	64.5	62.4	55.9										47.4	259
Hy. 2624	Mar. 23	1 18 00	80 01 00	77	80		59.1	58.1	56.4	45.6	43.1	41.9	41					39	724
Hy. 2626	Mar. 23	1 07 00	79 59 00	79	80	68.9	60.7											57.3	90
Dr. 3398	Mar. 23	1 07 00	80 21 00	84	84	68.8	64.4	59	53.8	45.1	42.9	42	40.3	39.5	38.4	38	37	36	1,573
Dr. 3399	Mar. 24	1 07 00	81 04 00	79	80	72.7	65.7	56.1	50	44.9	43	41.4	40.1	38.9	38	37.6	36.7	36	1,740
Hy. 2627	Mar. 25	0 36 00	82 45 00	80	81	71.4	64.3	56.8	49.2	44.8	42.5	41.9	40.2	38.7	38.2	37.7	37.1	36	1,832
		Lat. S.																	
Hy. 2629	Mar. 26	0 20 00	85 08 00	85	83	69.9	63.7	56.2	50.1	45	42.4	41.8	40.3	39.2	38.6	37.8	36.8	36	1,488
Dr. 3401	Mar. 28	0 59 00	88 58 30	81	82	70.1	63.7	56.6	50	46.1								43.8	395
Dr. 3406	Apr. 3	0 16 00	90 21 30	79	81	73.5	59.9	57.9	53.9	45	42.3							41.3	551
		Lat. N.																	
Dr. 3411	Apr. 4	0 54 00	91 09 00	79	82	71.8	67.8	61.5	54	46.8	43	41.3	40.8	39.8	38.9	38.1	37.5	36.2	1,189
Dr. 3414	Apr. 8	10 14 00	96 28 00	81	82	81.9	72.1	59.5	51.8	47.8	44.4	42	40.8	39.6	38.8	38.1	37.3	35.8	2,232

Record of serial temperatures, 1893.

No. of station.	Date.	Depth.	Position.		Temperature.																				
			Lat. N.	Long. W.	Air.	Surface.	Bottom.	5 fathoms.	10 fathoms.	15 fathoms.	20 fathoms.	25 fathoms.	30 fathoms.	40 fathoms.	50 fathoms.	60 fathoms.	70 fathoms.	80 fathoms.	90 fathoms.	100 fathoms.	200 fathoms.	300 fathoms.	400 fathoms.	500 fathoms.
	1893.	*Fms.*	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*
Dr. 3482	July 12	42	57 18 00	170 42 00	43	42	38.9	42.1	40.1	.....	39.8	.....	38.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3483	July 12	56	57 18 00	171 18 00	44	42	36.8	44.1	43.6	.....	38.2	.....	37.7	36.8	36.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3484	July 12	60	57 18 00	171 54 00	43	44	37.4	44.8	46.8	.....	47.8	.....	47.5	44.6	45.9	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3485	July 12	62	57 18 00	172 34 00	42	44	37.1	45	44.8	.....	38.6	.....	39	36.1	36.1	.....	.....	.....	.....	.....	*110.*	*120.*	*130.*	*140.*
Dr. 3486	July 13	150	57 19 00	173 53 00	43	43	38	45.8	45.6	.....	40.8	.....	39.1	39	37.8	37.6	37.1	36.9	36.8	37	37	37.3	37.5	38
Hy. 3301	July 14	100	56 30 00	172 23 00	46	44	38	45.5	45.2	.....	41.7	.....	41.5	41	38.6	39.1	38	37.9	37.8	.....	.....	.....	.....	.....
Dr. 3494	July 14	65	56 34 00	170 34 00	50	46	38.5	44.6	44.2	.....	39.6	.....	37.9	38	37.7	37.8	.....	.....	.....	.....	*200.*	*300.*	*400.*	*500.*
Hy. 3303	July 17	843	55 24 00	168 34 00	48	45	.....	47	42	.....	.....	39.9	.....	.....	38.1	.....	.....	.....	.....	38.8	38.3	38.4	38	38.5
Hy. 3306	July 18	442	54 42 00	167 39 00	50	48	.....	46.8	45.6	.....	.....	42.4	.....	.....	38.9	.....	.....	.....	.....	38.6	38.2	38.1	38.1	.....
Dr. 3503	July 28	17	57 06 15	170 11 00	54	43	37.9	41.5	42.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3504	July 28	34	56 57 00	169 27 00	54	45	37.8	43.5	36.6	.....	36.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3308	July 28	43	57 03 00	168 52 00	50	45	37.6	45.1	45.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3505	July 28	44	57 09 00	168 17 00	46	44	38.1	45.1	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3309	July 28	41	57 15 00	167 42 00	45	43	36	42	41.9	.....	34.8	.....	38.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3310	July 29	33	57 21 00	167 05 00	45	42	35	41.9	42.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3311	July 29	38	57 27 00	166 30 00	45	42	34.8	42.8	42.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3506	July 29	36	57 33 00	165 55 00	43	42	32	42.3	42.7	.....	39.2	.....	38.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3312	July 29	35	57 38 00	165 20 00	45	42	35.5	41.5	41.2	37.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3507	July 29	31	57 43 00	164 42 00	50	43	37.5	41	41	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3313	July 29	26	58 13 00	164 47 00	44	42	41.4	41.2	40.7	.....	40.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3508	July 29	23	58 33 00	164 49 00	43	41	42	41.7	42.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3314	July 29	22	58 42 00	165 30 00	43	41	41.8	42	41.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3315	July 30	21	58 51 00	166 11 00	42	41	41	41	42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3316	July 30	25	58 36 00	166 38 00	42	41	40.1	40.2	40.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3317	July 30	29	58 22 00	167 04 00	44	42	37	41.2	39.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3319	July 30	38	57 52 00	167 54 00	46	43	37.5	43	42.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3320	July 30	36	57 38 00	168 19 00	46	43	36.1	44	43.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3321	July 31	41	57 24 00	168 42 00	46	44	36.8	43.2	43.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3322	July 31	42	57 10 00	169 05 00	46	44	37.3	43.1	42.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3509	July 31	35	57 00 00	169 43 00	46	43	40.8	42	41.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3510	Aug. 1	27	57 12 30	169 51 00	47	43	40.1	43.5	43.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3511	Aug. 1	39	57 32 00	169 38 00	48	44	37.2	43.9	43.9	.....	43.2	.....	36.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3512	Aug. 1	38	57 49 30	169 27 00	49	45	36.6	44	43.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3323	Aug. 1	38	58 08 30	169 14 00	47	45	31.8	43.9	42.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3513	Aug. 1	35	58 27 00	169 01 00	46	43	.....	42.1	41.6	.....	30.9	.....	31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3514	Aug. 2	21	59 22 00	168 21 00	40	40	40.8	40.6	40.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3326	Aug. 2	22	59 41 00	168 06 00	42	41	41.1	41.1	41.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3515	Aug. 2	13	59 59 00	167 53 00	42	42	41.8	42	41.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3516	Aug. 2	17	60 28 00	168 08 00	43	44	43.2	42.3	43.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Dr. 3517	Aug. 2	24	60 27 00	169 04 00	41	41	40.3	41.8	41																				
Hy. 3347	Aug. 2	27	60 26 00	169 54 00	41	41	35.3	41.3	41.1																				
Hy. 3348	Aug. 3	35	60 24 00	170 48 00	42	42	32	42	41.8		31																		
Dr. 3518	Aug. 3	36	60 22 00	171 42 00	41	42	33.9	41.7	41.1																				
Dr. 3519	Aug. 3	37	60 06 30	171 25 00	43	42	31.1	42	40.8																				
Hy. 3349	Aug. 3	38	59 47 00	171 08 00	43	43	31.8	43	42.5		29.8		29.8																
Dr. 3520	Aug. 3	38	59 28 00	170 57 00	43	43	32.2	42.6	39.1																				
Dr. 3521	Aug. 3	40	59 09 00	170 48 00	43	43	31.9	43	42.8																				
Hy. 3350	Aug. 3	40	58 52 00	170 38 00	45	44	30.8	43.2	42.8																				
Hy. 3352	Aug. 4	40	58 15 00	170 18 00	46	44	35.4	43.1	41.1		40		32																
Dr. 3522	Aug. 4	41	57 58 00	170 09 00	46	44	35.7	44	44																				
Dr. 3523	Aug. 4	39	57 39 00	170 02 00	47	45	38	44.5	44																				
Dr. 3524	Aug. 4	36	57 24 00	169 56 00	46	45	40.3	44	43.5		42.3		37.9																
Dr. 3525	Aug. 4	29	57 21 00	170 05 00	46	45	41.6	43	41.9		41.3																		
Hy. 3353	Aug. 5	37	57 24 00	170 24 00	47	43	40.3	43.3	42.9																				
Dr. 3526	Aug. 5	49	57 31 00	170 57 00	47	44	38.9	44.2	43.9		43.1		39.1	37.2															
Dr. 3527	Aug. 5	52	57 48 00	171 21 00	48	44	38	45	45																				
Hy. 3354	Aug. 5	55	58 04 00	171 41 00	48	45	37.4	44.8	44.4																				
Dr. 3528	Aug. 5	55	58 19 30	172 02 00	47	45	35.9	45.6	45.2		44.5		43	35.5	35.2														
Dr. 3529	Aug. 5	56	58 36 00	172 24 00	46	45	36.1	45.2	44.5																				
Hy. 3355	Aug. 5	57	58 52 00	172 45 00	46	44	35.3	45.2	44.2																				
Hy. 3356	Aug. 6	57	59 09 00	173 09 00	45	43	34.2	43.3	43.2		39		34.9	33.2	33.7														
By. 3357	Aug. 6	57	59 24 00	173 31 00	45	43	35.7	44.7	41.8																				
Dr. 3530	Aug. 6	59	59 39 00	173 53 00	45	44	34.9	44.3	45																				
Dr. 3531	Aug. 6	59	59 55 00	174 17 00	47	46	35.1	43.5	43.4		33.6		34	33.6	33.6														
Hy. 3358	Aug. 6	70	59 33 00	175 00 00	51	46	36.7	44.8	44.4																				
Dr. 3532	Aug. 6	77	59 12 00	175 39 00	48	44	34.8	44.6	42.9																				
Hy. 3359	Aug. 7	71	58 43 00	176 10 00	44	44	.....	45.1	45		45		44.2	34.9	37.1	36.8													
Hy. 3360	Aug. 7	1,744	58 11 00	176 38 00	45	44	35.5	35.9	35																				
Hy. 3361	Aug. 7	1,367	58 01 00	175 41 00	48	46	35.2	46.7	45.8																				
Hy. 3362	Aug. 7	77	57 41 00	174 05 00	49	47	38	46	45.5		40.1		39	38	38.1	38.1	38												
Dr. 3533	Aug. 7	70	57 34 00	173 33 00	47	46	39.2	45.9	45																				
Hy. 3363	Aug. 7	69	57 25 00	172 50 00	47	45	37.8	46.1	45.3																				
Hy. 3364	Aug. 8	60	57 08 00	171 38 00	47	45	37.8	44.4	45		45.1		39.6	38.1															
Dr. 3534	Aug. 8	59	57 03 00	171 19 00	47	45	38.1	45.3	46.1																				
Dr. 3535	Aug. 8	52	57 02 00	170 46 00	48	45	39	43.4	43.5																				
Dr. 3536	Aug. 8	40	57 05 00	170 35 00	48	45	42.4	43.4	42.5		42.2		41.9																
Hy. 3365	Aug. 9	37	56 49 00	169 42 00	48	44	40.9	44.1	41		40		39.9																
Dr. 3537	Aug. 9	49	54 45 00	169 06 00	45	43	38	45.6	45.2																				
Dr. 3538	Aug. 9	59	56 41 00	168 29 00	48	46	38	45.5	46.1																				
Hy. 3366	Aug. 9	59	56 37 00	167 55 00	49	46	38	45.9	45.4		38.8		36.5	37.2	37														
Dr. 3539	Aug. 9	57	56 34 00	167 19 00	49	45	38.9	46.2	46.7																				
Hy. 3367	Aug. 9	55	56 31 00	166 43 00	48	46	37.5	46.5	46.6																				
Dr. 3540	Aug. 9	51	56 27 00	166 08 00	47	45	36	46.4	46		34.1		34.1	34.2															
Dr. 3541	Aug. 10	49	56 14 00	164 08 00	48	46	36.1	46.9	47.2		35.4		34.9	35.2															
Dr. 3542	Aug. 10	49	56 10 00	163 26 00	49	47	39.2	47	47																				
Hy. 3385	Aug. 18	1,036	55 50 00	169 24 00	48	47	36	47.7	48.2																				
Dr. 3543	Aug. 18	43	56 41 00	169 39 00	48	44	42.7	42	41.9		41.3		41	41															
Dr. 3544	Aug. 18	41	56 50 00	169 59 00	47	44	41.1	44.6	43																				
Hy. 3392	Aug. 19	76	56 39 00	172 21 00	47	45	38.9	46	46	46.6	42.4		39.1	38.4	38	38.4													

Record of serial temperatures, 1893—Continued.

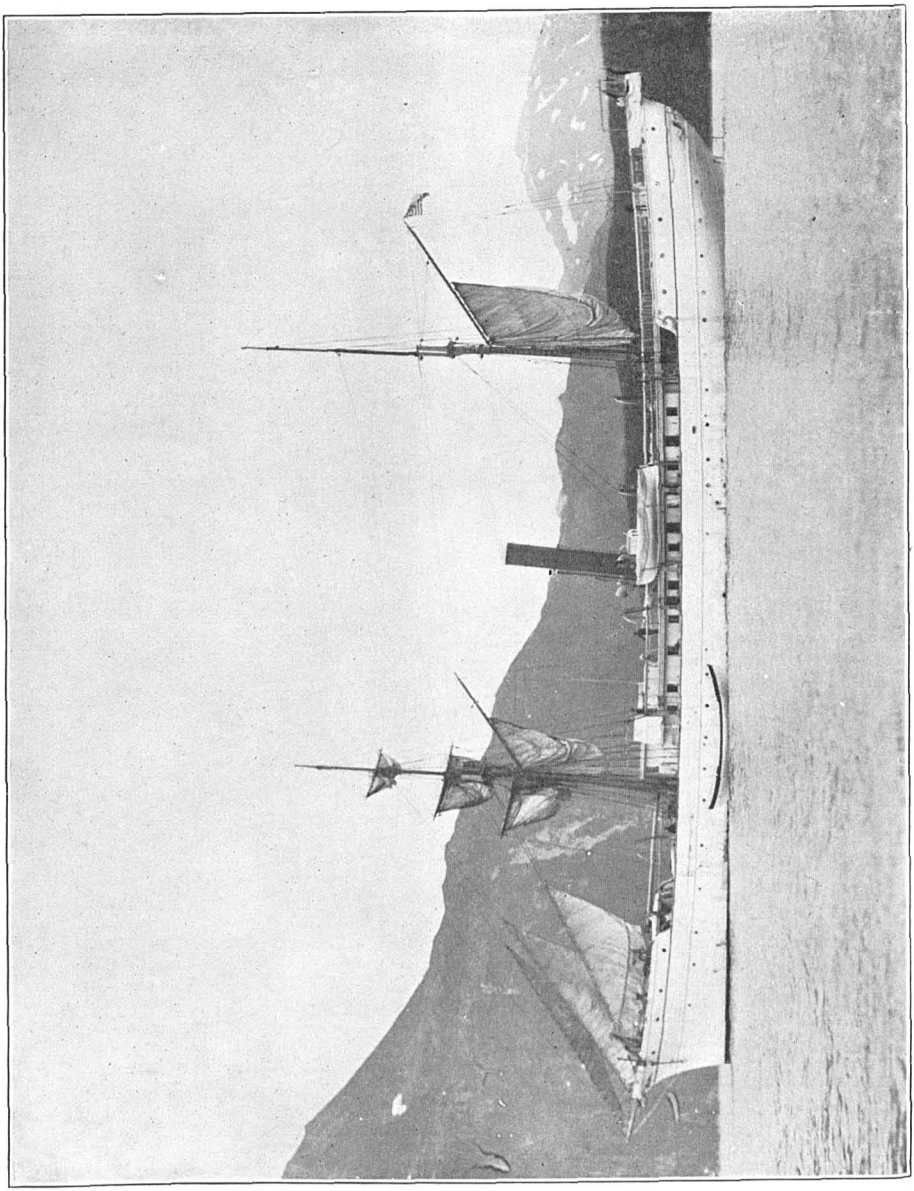
No. of station.	Date.	Depth.	Position.		Temperature.																						
			Lat. N.	Long. W.	Air.	Surface.	Bottom.	5 fathoms.	10 fathoms.	15 fathoms.	20 fathoms.	25 fathoms.	30 fathoms.	40 fathoms.	50 fathoms.	60 fathoms.	100 fathoms.	200 fathoms.	300 fathoms.	400 fathoms.	500 fathoms.	600 fathoms.	700 fathoms.	800 fathoms.	900 fathoms.	1,000 fathoms.
	1893.	*Fms.*	° ′ ″	° ′ ″	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*
Hy. 3399	Aug. 20	2,041	54 38 00	175 27 00	56	49	35.1	47.8	47	.....	.....	47	.....	.....	37	.....	36.3	39	44.1	38.2	37.4	37.9	36.9	36.3	.....	35.7
Hy. 3402	Aug. 21	1,833	55 46 00	172 44 00	51	48	35.1	.....	.....	.....	.....	39.4	.....	.....	38.3	.....	37	39	38.1	38.2	37.8	38	37.2	36.4	36.2	38.9
Dr. 3558	Sept. 3	25	56 58 00	170 09 00	46	45	42	45.3	45.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3559	Sept. 3	39	56 56 00	169 52 00	47	46	42.5	45	45	.....	41.1	.....	41	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3451	Sept. 3	43	56 48 00	169 26 00	47	45	39	46	45.3	.....	42.6	.....	37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1894.																									
Dr. 3600	June 26	9	55 06 00	163 28 00	43	41	40.0	40.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Record of serial temperatures, 1895.

No. of station.	Date.	Position.		Depth.	Temperature.																		
		Lat. N.	Long. W.		Air, D. B.	Surface.	Bottom.	5 feet.	5 fathoms.	10 fathoms.	25 fathoms.	30 fathoms.	50 fathoms.	100 fathoms.	150 fathoms.	200 fathoms.	300 fathoms.	400 fathoms.	500 fathoms.	600 fathoms.	700 fathoms.	800 fathoms.	900 fathoms.	1,000 fathoms.
	1895.	° ′ ″	° ′ ″	Fms.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.
Hy. 3589	Aug. 4	54 00 30	169 20 30	1,003	45	45	35.5	46	45.3	45													
Hy. 3590	Aug. 5	54 30 00	169 31 00	1,491	44	45	35.5	45	44.8	44.5													
Hy. 3591	Aug. 5	54 59 00	169 41 00	1,676	46	45	35	45	45	42.8													
Dr. 3601	Aug. 5	55 06 00	169 08 00	1,044	46	46	35.8	46	45.5	44.3	40.1		38.1	37.1		38.2		37.5	37.6	37.1	36.2	36.7	35.7
Hy. 3592	Aug. 5	55 12 00	168 47 00	1,035	46	44	35.2	45	44.5	43.8													
Hy. 3593	Aug. 6	55 34 00	169 22 00	1,315	46	45	34.7	45	44.8	44													
Int. 47	Aug. 7	55 36 00	170 45 00	------	45	44	------	44	44	43.3				37.4									
Hy. 3594	Aug. 7	55 10 00	170 56 00	1,664	45	44	34.7	45	45	43.8	37.8		37.2	37.1		38.6	38.1	38.3	37.8	37.1	36.7	35.9	36.7	35.5
Hy. 3595	Aug. 8	55 12 00	171 48 00	1,819	44	45	35.2	45	45	43.8													
Hy. 3596	Aug. 8	55 32 00	172 17 00	1,901	43	43	35.5	45	44.5	43.8													
Int. 49	Aug. 8	55 53 00	171 40 00	------	44	45	------	45	44.3	44						37.4							
Int. 50	Aug. 8	55 44 00	171 17 00	------	44	45	------	45	44.5	43.8				37.7									
Hy. 3597	Aug. 10	56 15 00	172 35 00	1,267	46	45	36	45	45	44.3	41.4		37	36.2		38.2	37.6	38	36.8	36.7	------	36.1	35.8	36
Int. 52	Aug. 10	56 13 00	172 20 00	------	46	45	------	45	44.5	43.8													
Hy. 3598	Aug. 10	56 28 00	172 39 00	296	45	44	38.1	45	44	43.3													
Hy. 3599	Aug. 10	56 29 00	172 39 00	200	45	45	38.1	45	44	43.3													
Hy. 3600	Aug. 10	56 30 00	172 40 00	156	45	45	37.1	45	43.8	43.5													
Hy. 3601	Aug. 10	56 31 00	172 40 00	110	45	44	37.1	45	44	43.3													
Dr. 3602	Aug. 10	56 32 00	172 40 00	81	45	44	37.1	45	43.8	43.5													
Dr. 3603	Aug. 11	55 23 00	170 31 00	1,771	46	45	35.1	45	44.3	44	38.1		38.4	36		38.3	38.4	38.1	37.5	37.2	35.9	36.1	35.6	35.3
	Aug. 11	55 10 00	170 25 00	------	45	45	------	44	43.8	44.5													
	Aug. 11	54 56 00	170 16 00	------	46	45	------	45	44	43.8													
Hy. 3603	Aug. 12	54 39 00	170 19 00	1,025	46	44	35.3	45	44	43.3													
Hy. 3604	Aug. 12	54 46 00	169 29 00	1,355	45	45	35.2	45	44.8	44													
Dr. 3604	Aug. 12	54 54 00	168 59 00	1,401	46	45	35.2	45	45	43.8	39.5		37.2	38		38.2	37.6	38.3	37.1	37	36.3	36.2	35.5	35.6
Hy. 3605	Aug. 12	55 01 00	168 33 00	1,162	44	45	35.1	45	45	44													
Hy. 3606	Aug. 13	54 54 00	168 13 00	1,132	44	44	35.5	45	44	43.8													
Hy. 3607	Aug. 13	54 41 00	168 01 00	823	44	45	37.1	45	44	43.8													
Hy. 3608	Aug. 13	54 41 00	168 25 00	1,122	44	45	35.3	45	44	43.8													
Hy. 3609	Aug. 13	55 09 00	167 40 00	189	45	45	37.5	45	44	43.8													
Dr. 3605	Aug. 13	55 17 00	167 34 00	91	45	44	37.1	45	44	43.3		41.4											
Dr. 3606	Aug. 13	55 27 00	167 47 00	87	46	45	38.1	45	43.5	42.8													
Hy. 3611	Aug. 13	55 32 00	168 11 00	83	45	45	38.9	44	43.8	43													
Hy. 3612	Aug. 13	55 42 00	168 32 00	76	45	45	38.3	45	43.8	44													
Hy. 3613	Aug. 18	54 14 00	166 54 30	778	52	46	38.3	45	44	43.3													
Hy. 3614	Aug. 18	54 25 00	167 13 00	334	50	46	38.1	45	44.8	44													
Dr. 3607	Aug. 18	54 11 30	167 25 00	987	46	45	35.9	45	44.3	43.5	40.1		40	38.9		37.3	38.1	38.1	38.1	37.4	36.4	36.1	36	
Hy. 3615	Aug. 18	54 25 00	167 38 00	486	45	46	37.1	45	44.3	44													
Hy. 3616	Aug. 19	54 11 30	167 50 00	1,048	44	42	35.2	44	43.3	42													
Hy. 3617	Aug. 19	54 24 00	168 02 00	538	44	42	37.1	44	43	41.8													

Record of serial temperatures, 1895—Continued.

No. of station.	Date.	Position.		Depth.	Temperature.																			
		Lat. N.	Long. W.		Air, D. B.	Surface.	Bottom.	5 feet.	5 fathoms.	10 fathoms.	25 fathoms.	30 fathoms.	50 fathoms.	100 fathoms.	150 fathoms.	200 fathoms.	300 fathoms.	400 fathoms.	500 fathoms.	600 fathoms.	700 fathoms.	800 fathoms.	900 fathoms.	1,000 fathoms.
	1895.	° ′ ″	° ′ ″	*Fms.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*
Hy. 3618	Aug. 19	54 10 00	168 14 00	1,075	44	42	35.5	42	42.3	41.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3619	Aug. 19	54 06 00	168 37 00	1,231	45	43	35.3	43	42.8	42.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3620	Aug. 19	54 17 00	168 53 30	1,014	45	43	35.6	44	44	43.3	43.6	.....	37.5	37.3	.....	38.2	38.1	38.2	38.4	36.7	36.8	35.8	36.3	35.6
Hy. 3621	Aug. 19	54 39 00	168 52 30	975	47	44	35.5	45	44	43.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3622	Aug. 19	54 53 00	169 19 00	1,471	46	45	35.1	45	43.8	44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3623	Aug. 20	55 11 00	168 30 30	944	47	45	35.9	45	43.8	44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3624	Aug. 20	55 32 00	168 36 00	273	48	47	38.1	45	43.8	43.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3625	Aug. 20	55 19 30	168 09 00	229	46	45	38.1	45	44.3	44.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3626	Aug. 20	55 19 30	168 10 00	244	46	45	38.1	45	43.8	43	38.8	.....	39.6	37.7	37.6	37.7	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3608	Aug. 20	55 19 00	168 11 00	276	46	45	37.8	44	43	42.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3627	Aug. 20	55 17 00	168 01 00	219	46	45	38	45	44.5	43.8	39.3	.....	38.2	38	37.5	37.9	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3629	Aug. 20	55 11 00	167 56 00	367	46	45	37.8	45	44	43.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3630	Aug. 21	55 04 00	167 24 00	99	47	45	37.6	45	44	43.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3631	Aug. 21	55 19 00	167 27 00	78	47	47	36.5	45	43.8	44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3632	Aug. 21	55 30 00	167 51 00	74	46	46	37.6	46	44.8	43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3609	Aug. 21	55 35 00	168 20 00	74	46	46	37.9	46	45	43.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3633	Aug. 21	55 41 00	168 34 00	77	46	46	37.8	46	45	43.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3634	Aug. 21	55 43 00	168 42 00	89	46	45	38.4	46	45	43.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3635	Aug. 21	55 44 00	168 47 00	141	46	45	37.8	45	44	42.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3636	Aug. 21	55 43 00	168 44 00	108	47	45	38	45	44	43.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3637	Aug. 21	55 27 00	168 01 30	104	47	46	36.8	45	45	43.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3638	Aug. 22	55 42 00	166 09 00	68	47	46	37.5	46	45	44.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3610	Aug. 22	55 58 00	167 16 00	75	45	47	36.8	46	45	43.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3611	Aug. 22	56 45 00	167 25 00	50	45	46	34.6	46	45	43.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3640	Aug. 24	56 02 00	169 06 30	77	47	45	37.9	45	44.5	44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3641	Aug. 24	54 57 30	167 14 00	137	48	47	37.7	47	45.8	43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3642	Aug. 24	54 56 00	167 02 30	116	47	46	37.3	46	44.8	44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3643	Aug. 24	54 55 30	166 57 30	113	48	46	37.3	46	43.8	43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3644	Aug. 24	54 57 00	166 53 00	93	46	46	37.8	46	45	43.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3645	Aug. 24	54 52 00	166 43 30	113	46	46	37.5	45	43.8	43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3649	Aug. 25	54 41 00	166 15 30	171	47	45	37.7	45	43.8	43.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3650	Aug. 25	54 32 00	166 09 00	264	47	45	37.8	45	44	43.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1896.																							
Hy. 3652	Apr. 13	33 06 00	119 17 00	892	58	56	39.1	54.6	56	56	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. 3627	Apr. 13	32 44 00	119 32 00	776	55	55	39.2	55	55	54.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3653	Apr. 13	32 38 00	119 36 00	180	55	55	45.4	54	55	54.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3654	Apr. 13	32 30 00	119 43 00	659	55	55	38.6	54	55	54.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hy. 3655	Apr. 13	32 34 00	119 55 00	891	55	55	38.2	54	55	54.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....



THE ALBATROSS.

CHRONOLOGICAL BIBLIOGRAPHY RELATIVE TO THE WORK OF THE ALBATROSS.

1.

1884. GILL, THEODORE. Diagnoses of new genera and species of deep-sea fish-like vertebrates.

Proc. U. S. Nat. Mus. 1883, vol. 6, pp. 253–260.

The new genera and species described are as follows: *Histiobranchus, Sigmops, Hyperchoristus, Plectromus, Stephanoberyx, Caulolepis, Bassozetus, Petromyzon bairdii, Chimæra abbreviata, Histiobranchus infernalis, Notacanthus analis, Sigmops stigmaticus, Hyperchoristus tanneri, Alepocephalus productus, Halosaurus goodei, Plectromus suborbitalis, Stephanoberyx monæ, Caulolepis longidens, Bassozetus normalis, Onos rufus.*

2.

1884. GILL, THEODORE, and JOHN A. RYDER. Diagnoses of new genera of Nemichthyoid eels.

Proc. U. S. Nat. Mus. 1883, vol. 6, pp. 260–262.

The new genera and species described are as follows: *Serrivomer, Spinivomer, Labichthys, Serrivomer beanii, Spinivomer goodei, Labichthys carinatus, L. elongatus.*

3.

1884. GILL, THEODORE. Deep-sea fishing fishes.

Forest and Stream, vol. 21, Nov. 8, p. 284.

The following genera and species from *Albatross* dredgings are described as new: *Typhlopsaras shufeldti, Cryptopsaras couesii.*

3a.

1884. GILL, THEODORE, and JOHN A. RYDER. On the anatomy and relations of the Eurypharyngidæ.

Proc. U. S. Nat. Mus. 1883, vol. 6, pp. 282–273.

Material dredged by the *Albatross*. *Gastrostomus bairdii* described as new genus and species.

4.

1884. TANNER, Z. L., Lieut., U. S. N. Report on the work of the U. S. F. C. steamer *Fish Hawk* for the year ending Dec. 31, 1882, and on the construction of the steamer *Albatross*.

Rep. U. S. F. C. 1882, pp. 3–34, 3 pls.

5.

1884. GILL, THEODORE. The ichthyological peculiarities of the Bassalian Fauna.

Science, vol. 3, No. 68, pp. 620–622, 3 cuts.

Based on *Albatross* dredgings; 28 families noted as founded on deep-sea fishes.

6.

1884. GILL, THEODORE. Three new families of fishes added to the deep-sea fauna in a year.

Am. Nat., vol. 18, p. 483.

Notes on Derichthyidæ and Stephanoberycidæ from *Albatross* dredgings. The third family, Eurypharyngidæ, described previously. The new genera are *Derichthys, Acanthochænus* and *Alepocephalus;* new species, *Derichthys serpentinus, Acanthochænus lutkenii, Alepocephalus copei.*

7.

1885. GILL, THEODORE, and JOHN A. RYDER. On the literature and systematic relations of the Saccopharyngoid fishes.

Proc. U. S. Nat. Mus., 1884, vol. 7, pp. 48–65, 1 pl.

Based in part on *Albatross* collections. Remarks on bibliography, history, relationship, synonymy, etc.

8.

1884. BAIRD, G. W., P. A. Engr., U. S. N. Annual report on the electric lighting of the U. S. steamer *Albatross*, Dec. 31, 1883.

Bull. U. S. F. C. 1884, vol. 4, pp. 153–158, 8 figs.

9.

1884. BAIRD, G. W., P. A. Engr., U. S. N. Report on the working of the boilers and engine of the U. S. F. C. steamer *Albatross*.

Bull. U. S. F. C. 1884, vol. 4, pp. 145–151, 6 figs.

10.

1884. SMITH, SIDNEY I. Report on the Decapod Crustacea of the *Albatross* dredgings off the east coast of the United States in 1883.

Rep. U. S. F. C. 1882, vol. 10, pp. 345–426, 10 pls.

The new genera and species here described are as follows: *Ethusina*, *Benthœcetes*, *Parapasiphaë*, *Ethusina abyssicola*, *Galacantha bairdii*, *Pentacheles nanus*, *P. debilis*, *Pontophilus abyssi*, *Acanthephyra eximea*, *Notostomus robustus*, *Pasiphaë princeps*, *Parapasiphaë sulcatifrons*, *P. cristata*, *P. compta*, *Benthesicymus carinatus*, *Amalopenœus valens*, *Aristeus tridens*, *Hepomadus tener*, *Hymenopenœus microps*, *Sergestes mollis*.

11.

1884. VERRILL, A. E. Second catalogue of Mollusca recently added to the fauna of the New England coast and adjacent parts of the Atlantic, consisting mostly of deep-sea species, with notes on others previously recorded.

Trans. Conn. Acad. Arts and Sciences, vol. 6, pp. 139–294, 5 pls.

Based chiefly on *Albatross* dredgings. New genera and species described are as follows: *Leptoteuthis*, *Eledonella*, *Gymnobela*, *Benthodolium*, *Leptoteuthis diaphana*, *Eledonella pygmœa*, *Pleurotomella bairdii*, *P. benedicti*, *P. sandersoni*, *P. saffordi*, *P. diomedeœ*, *P. emertoni*, *P. bruneri*, *P. catharinœ*, *Gymnobela engonia*, *G. curta*, *G. curta subangulata*, *Bela subvitrea*, *B. subturgida*, *Spirotropis ephamilla*, *Typhlomangelia tanneri*, *Marginella borealis*, *Buccinum abyssorum*, *Sipho obesus*, *S. profundicola*, *S. profundicola dispar*, *S. cœlatus hebes*, *S.* (*Mohnia*) *cœlatulus*, *S.* (*Mohnia*) *simplex*, *S. leptaleus*, *Benthodolium abyssorum*, *Cingula brychia*, *C. syngenes*, *C. leptalea*, *C. apicina*, *Cithna cingulata*, *C.* (*?*) *olivacea*, *Seguenzia eritima*, *S. formosa nitida*, *Eulimella lucida*, *E. charissa*, *E. nitida*, *E.* (or *Menestho*) *lissa*, *Odostomia tornata*, *O. disparilis*, *Cyclostrema cingulatum*, *C. affine*, *C. diaphanum*, *Cocculina leptalea*, *Cocculina dalli*, *C. conica*, *Puncturella* (*Fis-*

11.

1884. VERRILL, A. E.—Continued.

surisepta) *eritmeta*, *Propilidium elegans*, *Scaphander nobilis*, *Atlanta pulchella*, *Dentalium solidum*, *Cadulus grandis*, *Thracia nitida*, *Poromya sublevis*, *Necœra undata*, *N. gigantea*, *Yoldia regularis*, *Leda bushiana*, *Pecten leptaleus*, *Octopus carolinensis*, *O. gracilis*, *Bela rathbuni*, *Urosalpinx carolinensis*, *U. macra*, *Sipho hispidulus*, *Cingula sandersoni*, *Rotella cryptospira Ethalia multistriata*, *Taranis morchii tornatus*, *Cyclostrema dalli ornatum*.

12.

1884. VERRILL, A. E. List of deep-water and surface Mollusca taken off the east coast of the United States by the U. S. F. C. steamers *Fish Hawk* and *Albatross*, 1880–1883.

Ext. Conn. Acad. Sci. Transactions, *New Haven*. The society. July. vol. 6, pp. 263–290. 8°.

Lists giving bathymetric range.

13.

1885. TANNER, Z. L., Lieut. Commander, U. S. N. Report on the construction and outfit of the U. S. F. C. steamer *Albatross*.

Rep. U. S. F. C. 1883, part 11, pp. 3–116, 55 pls.; 20 figs.

Contains chapters on the construction of the vessel, machinery, and appliances, apparatus for deep-sea research, methods of sounding, etc.

14.

1885. TANNER, Z. L., Lieut. Commander, U. S. N. Report on the work of the U. S. F. C. steamer *Albatross* for the year ending December 31, 1883.

Rep. U. S. F. C. 1883, part 11, pp 117–236, 3 pls.

General outline of contents: Investigations of menhaden and mackerel fisheries; records of sounding, dredging, and other operations; list of fishes dredged, etc.; report of naturalist, etc.

15.

1885. SCHROEDER, SEATON, Lieut., U. S. N. Hydrographic work of the *Albatross* in 1884.

Bull. U. S. F. C. 1885, vol. 5, pp. 269, 270.

Chiefly hydrographic notes relating to the West Indies.

16.

1885. VERRILL, A. E. Results of the explorations made by the steamer *Albatross* off the northern coast of the United States in 1883.

Rep. U. S. F. C. 1883, part 11, pp. 503–699, 44 pls.

Contains chapters on character of deep-sea deposits; fauna of deep water; notes on several groups of invertebrates; fauna of northern waters; lists of species dredged, with descriptions of new species; fauna of shallow waters near Cape Hatteras; fauna of surface waters of Gulf Stream, etc. New genera and species described as follows: *Nauphantopsis*, *Pterophysa*, *Angelopsis*, *Ephyroides*, *Synapta brychia*, *Ophiacantha fraterna*, *O. varispina*, *O. gracilis*, *Amphiura fragilis*, *Mangilia ephamilla*, *M. oxytata*, *M. glypta*, *Niso œgleës*, *Dentalium leptum*, *Cadulus carolinensis*, *Neæra costata*, *Atolla verrillii*, *Nauphantopsis diomedeæ*, *Pterophysa grandis*, *Angelopsis globosa*.

17.

1885. VERRILL, A. E. Notice of the remarkable marine fauna occupying the outer banks off the southern coast of New England. No. 11. [Brief contributions to zoology from the museum of Yale College. No. LVII.] Work of the *Albatross* in 1884.

Am. Jour. Sci. 1885, third series vol. 29, No. 170, Feb., pp. 149–157.

Work of the *Albatross* in 1884. The genus *Benthoptillum* and the following species described as new: *Benthoptillum sertum*, *Desmophyllum nobile V.*, *Hymenaster modestus*, *Archaster sepitus*, *Solaster abyssicola V.*, *Ophiacantha crassidens*, *O. enopla*, *O. granulifera V.*, *O. aculeata*, *Ophiomitra spinea V.*

18.

1885. VERRILL, A. E. Third catalogue of Mollusca recently added to the fauna of the New England coast and the adjacent parts of the Atlantic, consisting mostly of deep-sea species, with notes on others previously recorded.

Trans. Conn. Acad. of Arts and Sciences 1885, vol. 6, pp. 395–452, 3 pls.

Based on *Albatross* dredgings. Contains notes on character of deep-sea deposits and lists giving bathymetric range. The genus *Benthoteuthis*, and the following species are described as new: *Ancistrocheirus megaptera*, *Teleoteuthis* (*Onychia*) *agilis*, *Benthoteuthis megalops*, *Cirrhoteuthis plena*, *C. megaptera*, *Pleurotomella jeffreysii*, *P. tincta*, *P. frielei*, *P. vitrea*, *P. lottæ*, *Gymnobela brevis*, *Bela blakei*, *Admete nodosa*, *Marginella virginiana*, *Trophon abyssorum*, *T. abyssorum limicola*, *Jumala brychia*, *Omalaxis nobilis*, *Delphinula nitida*, *Puncturella abyssicola*, *Cocculina reticulata*, *Turbonilla perlepida*, *T. grandis*, *Actæon hebes*, *Cylichna eburnea*, *Pleurobranchus americanus*, *Dentalium laqueatum*, *Cadulus spectabilis*, *Periploma undulata*, *Pecchiolia granulifera*, *Choristodon* (?) *cancellatus*, *Cryptodon grandis*, *C. plicatus*, *Kelliella nitida*, *Nucula trigona*, *Arca profundicola*, *Limopsis plana*, *L. affinis*, *Crenella fragilis*, *Pecten undatus*.

18.

1885. VERRILL, A. E.—Continued.

gaptera, *Pleurotomella jeffreysii*, *P. tincta*, *P. frielei*, *P. vitrea*, *P. lottæ*, *Gymnobela brevis*, *Bela blakei*, *Admete nodosa*, *Marginella virginiana*, *Trophon abyssorum*, *T. abyssorum limicola*, *Jumala brychia*, *Omalaxis nobilis*, *Delphinula nitida*, *Puncturella abyssicola*, *Cocculina reticulata*, *Turbonilla perlepida*, *T. grandis*, *Actæon hebes*, *Cylichna eburnea*, *Pleurobranchus americanus*, *Dentalium laqueatum*, *Cadulus spectabilis*, *Periploma undulata*, *Pecchiolia granulifera*, *Choristodon* (?) *cancellatus*, *Cryptodon grandis*, *C. plicatus*, *Kelliella nitida*, *Nucula trigona*, *Arca profundicola*, *Limopsis plana*, *L. affinis*, *Crenella fragilis*, *Pecten undatus*.

19.

1885. BUSH, KATHERINE J. Additions to the shallow-water Mollusca of Cape Hatteras, N. C., dredged by the U. S. F. C. steamer *Albatross* in 1883 and 1884.

Trans. Conn. Acad. of Arts and Sciences 1885, vol. 6, pp. 453–480, 1 pl.

The following are described as new: *Mangilia psila*, *M. eritima*, *M. ceroplasta*, *Skenea trilix*, *Scalaria leptalea*, *S. teres*, *Odostomia engonia*, *O. engonia teres*, *Cylichna cœlata*, *Volvula oxytata*, *V. minuta*, *Cadulus incisus*, *Pandora carolinensis*, *Venericardia obliqua*.

20.

1885. SMITH, SIDNEY I. On some new or little-known Decapod Crustacea, from recent Fish Commission dredgings off the east coast of the United States.

Proc. U. S. Nat. Mus. 1884, vol. 7, pp. 493–511.

Descriptions of new genera and species, mostly from *Albatross* dredgings: *Ephyrina*, *Benthonectes*, *Munidopsis crassa*, *M. similis*, *Bythocaris gracilis*, *B. nana*, *Acanthephyra microphthalma*, *A. brevirostris*, *Ephyrina benedicti*, *Benthonectes flipes*.

21.

1885. RIDGWAY, ROBERT. On a collection of birds made by Messrs. J. E. Benedict and W. Nye, of the steamer *Albatross*.

Proc. U. S. Nat. Mus. 1884, vol. 7, pp. 172–180.

Collections from St. Thomas, W. I.; Curaçao, Venezuela; Sabanilla, New Granada; Old Providence, Caribbean Sea. The following species are described as new: *Mimus gilvus rostratus*, *Dendroica rufopileata*, *Icterus curaso-*

21.

1885. RIDGWAY, ROBERT—Continued.
ensis, Zenaida vinaceo-rufa, Certhiola tricolor, Vireosylvia grandior, Vireo approximans, Elainea cinerascens.

22.

1885. RIDGWAY, ROBERT. Descriptions of some new specie. of birds from Cozumel Island, Yucatan.
Proc. Biol. Soc. Wash., vol. 3, 1884-85.
Preliminary descriptions—see No. 37, Catalogue of Cozumel birds.

23.

1885. RIDGWAY, ROBERT. A new petrel for North America.
The Auk, 1885, vol. 2, pp. 386-387.
A record of the capture on board the *Albatross* of *Pelagodroma marina*.

24.

1885. NYE, Jr., WILLARD. Notes taken during cruise of the *Albatross* to Grand Banks in June and July, 1885.
Bull. U. S. F. C. 1885, vol. 5, p. 336.

25.

1885. NYE, Jr., WILLARD. Notes upon octopus, flying-fish, etc., taken during the *Albatross* cruise in January, 1884.
Bull. U. S. F. C. 1885, vol. 5, pp. 189-190.

26.

1886. BEAN, TARLETON H. Description of a new species of Plectromus (P. crassiceps) taken by the U. S. Fish Commission.
Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 73, 74.
This specimen was dredged by the *Albatross* in 2,949 fathoms.

27.

1886. GOODE, G. BROWN, and TARLETON H. BEAN. Description of Leptophidium cervinum and L. marmoratum, new fishes from deep water off the Atlantic and Gulf coasts.
Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 422-424.

28.

1886. GOODE, G. BROWN, and TARLETON H. BEAN. Descriptions of new fishes obtained by the United States Fish Commission mainly from deep water off the Atlantic and Gulf coasts.

28.

1886. GOODE, G. BROWN, and TARLETON H. BEAN—Continued.
Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 589-605.
New genera and species here described are as follows: *Neobythites, Porogadus, Bathyonus, Aphoristia diomedeana, A. pusilla, Hemirhombus fimbriatus, Citharichthys ventralis, Etropus rimosus, Macrurus caribbæus, M. occa, Coryphænoides sulcatus, Malacocephalus occidentalis, Bathygadus cavernosus, B. macrops, B. longifilis, Neobythites gilli, Porogadus miles, Bathyonus catena, B. pectoralis.*

29.

1886. GOODE, G. BROWN, and TARLETON H. BEAN. Descriptions of thirteen species and two genera of fishes from the *Blake* collection.
Bull. Mus. Comp. Zool., vol. 12, No. 5, pp. 153-170.
Based in part on *Albatross* collections. The new genera and species described are as follows: *Barathronus, Benthosaurus, Aphoristia marginata, A. pigra, Monolene atrimana, Citharichthys dinoceros, Bathygadus arcuatus, B. favosus, Neobythites robustus, N. marginatus, Aphyonus mollis, Barathronus bicolor, Bregmaceros atlanticus, Peristedium longispatha, P. platycephalum, Benthosaurus grallator.*

30.

1886. FEWKES, J. WALTER. Report on the Medusæ collected by the U. S. F. C. steamer *Albatross*, in the region of the Gulf Stream, in 1883-84.
Rep. U. S. F. C. 1884, part 12, pp. 927-980, 10 pls.
A systematic arrangement of the species, with the following genera and species described as new: *Nauphantopsis, Ephyroides, Pterophysa, Angelopsis, Periphylla humilis, Atolla bairdii, A. verrilli, Nauphantopsis diomedeæ, Ephyroides rotaformis, Solmaris incisa, Polycanna americana, Mesonema bairdii, Rhizophysa uvaria, Pterophysa grandis, Angelopsis globosa.*

31.

1886. FEWKES, J. WALTER. On a collection of Medusæ made by the steamer *Albatross* in the Caribbean Sea and Gulf of Mexico.
Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 397-402.
Nine species discussed.

32.

1886. RATHBUN, RICHARD. Report upon the Echini collected by the U. S. F. C. steamer *Albatross* in the Caribbean Sea and Gulf of Mexico, January to May, 1884.

Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 83–89.

A list of 23 species, with brief notes.

33.

1886. RATHBUN, RICHARD. Notice of a collection of Stalked Crinoids made by the steamer *Albatross* in the Gulf of Mexico and Caribbean Sea, 1884 and 1885.

Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 628–635.

Descriptive notes on 4 species.

34.

1886. RATHBUN, RICHARD. Report upon the Echini collected by the U. S. F. C. steamer *Albatross* in the Gulf of Mexico from January to March, 1885.

Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 606–620.

Notice of the cruise, with an account of species obtained: Lists of species obtained in 1884–85 off Atlantic coast, in the Gulf of Mexico and Caribbean Sea.

35.

1886. TANNER, Z. L. Report on the work of the U. S. F. C. steamer *Albatross* for the year ending December 31, 1884.

Report U. S. F. C. 1884, part 12, pp. 3–116, 3 pls.

Outline of contents: Hydrographic and dredging operations in Caribbean Sea; fishery and deep-sea investigations off New England coast; records of dredging and other operations, report of naturalist, etc.

36.

1886. RIDGWAY, ROBERT. Description of a new hawk from Cozumel.

Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 94–95.

Rupornis gracilis described as a new species.

37.

1886. RIDGWAY, ROBERT. Catalogue of a collection of birds made on the island of Cozumel, Yucatan, by the naturalists of the U. S. F. C. steamer *Albatross*, Capt. Z. L. Tanner, commander.

Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 560–583.

An annotated catalogue of 64 species, one (*Centurus rubriventris pygmæus*) described as new. Full descriptions are given of several species, of which brief diagnoses only were given, when first received, in the Proc. Biol. Soc. Wash. 1884–85. These are as follows: *Harporhynchus guttatus*, *Troglodytes beani*, *Dendroica petechia rufivertex*, *Vireo cinereus*, *V. bairdi*, *Cyclorhis insularis*, *Spindalis benedicti*, *Euetheia olivacea intermedia*, *Cardinalis cardinalis saturatus*, *Myiarchus platyrhynchus*, *Empidonax gracilis*, *Attila cozumelæ*, *Lampornis prevosti thalassinus*, *Chlorostilbon forficatus*, *Centurus dubius leei*, *Centurus rubriventris pygmæus*, *Rupornis magnirostris gracilis*.

38.

1886. RIDGWAY, ROBERT. Description of four new species of birds from the Bahama Islands.

The Auk., *1886*, vol. 3, July, pp. 334–337.

New species described from collections made by the *Albatross*: *Geothlypis coryi*, *G. tanneri*, *Centurus nyeanus*, *C. blakei*.

39.

1886. SMITH, SIDNEY I. On some genera and species of Penæidæ, mostly from recent dredgings of the U. S. Fish Commission.

Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 170–190.

The genus, *Parapenæus*, and the following species here described as new: *Parapenæus megalops*, *P. goodei*, *Hymenopenæus robustus*, *H. modestus*.

40.

1886. SMITH, SIDNEY I. Description of a new crustacean allied to Homarus and Nephrops.

Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 167–170.

Eunephrops bairdii described as new genus and species.

41.

1886. VERRILL, A. E. Notice of recent additions to the Marine Invertebrata of the northeastern coast of America, with descriptions of new genera and species and critical remarks on others. Part V.—Annelida, Echinodermata, Hydroida, Tunicata.

Proc. U. S. Nat. Mus. 1885, vol. 8, pp. 424–448.

The genus *Ophioglycera* and the following new species described: *Polynoë aurantiaca*, *Leanira robusta*, *Amphinome lepadis*, *Leodice benedicti*, *Notophyllum americanum*, *Anaitis formosa*, *A. picta*, *Castalia cincinnata*, *Polydora tubifex*, *Syllis spongiphila*, *Ophioglycera gigantea*, *Ammochares artifex*, *Leprœa abyssicola*, *Sabella picta*, *Synapta brychia*, *Ophiacantha fraterna*, *O. varispina*, *O. gracilis*, *Amphiura fragilis*, *Cladocarpus flexilis*, *Culeolus tanneri*.

42.

1886. WASHBURN, F. L. Deep-sea dredging on the U. S. S. *Albatross*.

Trans. Am. Fish. Soc., pp. 17–21.

A brief description of the ship and the methods of deep-sea exploration.

43.

1887. BENEDICT, JAMES E. Descriptions of 10 species and a new genus of Annelids from the dredgings of the steamer *Albatross*.

Proc. U. S. Nat. Mus. 1886, vol. 9, pp. 547–553, 6 pls.

The genus *Crucigera* and the following species described: *Protula diomedeæ*, *P. alba*, *Hydroides spongicola*, *H. protulicola*, *Crucigera websteri*.

44.

1887. COLLINS, Capt. J. W. Report on the discovery and investigation of fishing grounds made by the *Albatross* during a cruise along the Atlantic coast and in the Gulf of Mexico, with notes on the Gulf fisheries.

Rep. U. S. F. C. 1885, part 13, pp. 217–311, 10 pls.

Contains chapters on shore and bank fisheries, sponge, turtle, red-snapper, and other fisheries, statistics, etc.

45.

1887. TANNER, Z. L. Report on the work of the U. S. F. C. steamer *Albatross* for the year ending December 31, 1885.

Rep. U. S. F. C. 1885, part 13, pp. 3–89, 5 pls., 9 figs.

Outline of contents: Fishery, hydrographic and deep-sea investigations off South Atlantic coast, in Gulf of Mexico, and off New England coast; notes on results of dredge hauls; tabular records of dredging and other operations; report of naturalist, etc.

46.

1887. TANNER, Z. L. Record of hydrographic soundings and dredging stations occupied by the steamer *Albatross* in 1886.

Bull. U. S. F. C. 1886, vol. 6, pp. 277–285.

47.

1887. SMITH, SIDNEY I. Report on the Decapod Crustacea of the *Albatross* dredgings off the east coast of the United States during the summer and autumn of 1884.

Rep. U. S. F. C. 1885, part 13, pp. 605–705, 20 pls.

Contains notes on bathymetrical distribution, character of eyes, number of eggs, etc.; systematic arrangement of species; the following described as new: *Notastomus vescus*, *Hymenodora gracilis*, *Benthesicymus moratus*.

48.

1887. COLLINS, J. W. Notes on an investigation of the great fishing banks of the western Atlantic.

Bull. U. S. F. C. 1886, vol. 6, pp. 369–381.

Notes by the writer as fishery expert on board the *Albatross* in June and July, 1885.

49.

1888. COPE, E. D. List of Batrachia and Reptilia of the Bahama Islands.

Proc. U. S. Nat. Mus. 1887, vol. 10, pp. 436–439.

Based partly on *Albatross* collections; *Liocephalus loxogrammus* described as a new species.

50.

1888. FEWKES, J. WALTER. Are there deep-sea Medusæ?

Amer. Jour. Sci., 1888, third series, vol. 35, No. 206, Feb., pp. 166–179.

The writer states that "our present information is insufficient to answer the question."

51.

1888. RIDGWAY, ROBERT. Description of a new form of *Spindalis* from the Bahamas.

Proc. U. S. Nat. Mus. 1887, vol. 10, p. 3.

Spindalis zena townsendi, from *Albatross* collections, described as a new subspecies.

52.

1889. TANNER, Z. L. Report on the work of the U. S. F. C. steamer *Albatross* for the year ending Dec. 31, 1886.

Rep. U. S. F. C. 1886, part 14, pp. 605–692, 10 pls.

Outline of contents: Investigations respecting mackerel, menhaden, bluefish, etc.; hydrographic, dredging, and fishery work among Bahama Islands and off New England coast; notes on results of dredge hauls; report of naturalist; list of fishes and birds taken among the Bahamas; tabular records of dredging and other operations.

53.

1889. TANNER, Z. L. Report of the movements and operations of the U. S. F. C. steamer *Albatross* from Sept. 15 to 20, 1887.

Bull. U. S. F. C. 1887, vol. 7, pp. 155–158.

54.

1889. DALL, WILLIAM HEALEY. A preliminary catalogue of the Shell-bearing Marine Mollusks and Brachiopods of the southeastern coast of the United States, with illustrations of many of the species.

Bull. U. S. Nat. Mus., No. 37, 221 pp., 74 pls.

Contains bibliography, lists in tabular form showing range in depth, etc.; much of the data due to explorations of the *Albatross*.

55.

1889. FEWKES, J. WALTER. Report on the Medusæ collected by the U. S. F. C. steamer *Albatross* in the region of the Gulf Stream in 1885–86.

Rep. U. S. F. C. 1886, part 14, pp. 513–536, 1 pl.

A systematic arrangement of species with *Pleurophysa insignis* described as new genus and species.

56.

1889. RIDGWAY, ROBERT. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. Birds collected on the island of Santa Lucia, West Indies: Abrolhos Islands, Brazil; and at Straits of Magellan in 1887–88.

Proc. U. S. Nat. Mus. 1889, vol. 12, pp. 129–139.

Geositta longipennis and *Upucerthia propinqua*, from Straits of Magellan, are described as new.

57.

1889. RIDGWAY, ROBERT. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. Birds collected in Galapagos Islands in 1888.

Proc. U. S. Nat. Mus. 1889, vol. 12, pp. 101–128.

Contains lists of species known to the different islands of the archipelago. The following are described as new: *Nesomimus macdonaldi*, *N. personatus*, *Certhidea cinerascens*, *Geospiza conirostris*, *G. media*, *Cactornis brevirostris*, *C. hypoleuca*, *Camarhyncus townsendi*, *C. pauper*, *Pœcilonetta galapagensis*.

58.

1889. SMITH, SANDERSON. Lists of the dredging stations of the U. S. Fish Commission, the U. S. Coast Survey, and the British steamer *Challenger*, in North American waters, from 1867 to 1887, together with those of the principal European government expeditions in the Atlantic and Arctic oceans.

Rep. U. S. F. C. 1886, part 14, pp. 871–1017, 5 chts.

58.

1889. SMITH, SANDERSON—Continued

Lists of dredging stations of U. S. F. C. steamers *Fish Hawk* and *Albatross*; vessels of U. S. Coast Survey; *Challenger*, *Travailleur*, *Talisman*, *Washington*; Swedish expeditions; Danish expeditions; *Lightning*, *Porcupine*, *Shearwater*, *Valorous*, *Knight Errant*, *Triton*, *Josephine*, etc.; list of the deep-water dredgings north of the Bahamas, serial temperatures, etc.

58a.

1889. GOODE, G. BROWN. The depths of the ocean.

Atlantic Monthly, *Jan.* 7, pp. 124–128.

59.

1890. TANNER, Z. L., et al. Explorations of the fishing grounds of Alaska, Washington Territory, and Oregon, during 1888, by the U. S. F. C. steamer *Albatross*.

Bull. U. S. F. C. 1888, vol. 8, pp. 1-95, 10 pls., 2 chts.

Compiled from the reports of Commander Tanner, C. H. Townsend, and A. B. Alexander, with introduction by Richard Rathbun. Presents in detail the results of hydrographic dredging and fishery investigations throughout the regions named.

60.

1890. BEAN, TARLETON H. Notes on fishes collected at Cozumel, Yucatan, by the U. S. Fish Commission, with descriptions of new species.

Bull. U. S. F. C. 1888, vol. 8, pp. 193-206, 2 pls.

Sixty species collected by the *Albatross* considered—the following described as new: *Xyrichthys ventralis*, *X. infirmus*, *Scarus cuzamilæ*.

61.

1890. BEAN, TARLETON H. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. VIII.—Description of a new cottoid fish from British Columbia.

Proc. U. S. Nat. Mus. 1889, vol. 12, pp. 641, 642.

The genus and species (*Synchirus gilli*) decribed as new.

62.

1890. COPE, E. D. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. III.—Report on the Batrachians and Reptiles collected in 1887–88.

Proc. U. S. Nat. Mus. 1889, vol. 12, pp. 141-147.

Collections from the West Indies, the east coast of Brazil, Argentine Republic, Chile, Panama, the Galapagos Islands, Lower California, and Pacific coast of North America. The following species are described as new: *Zachænus roseus*, *Paludicola frenata*, *Phyllodactylus leei*, *Tropidurus lemniscatus*.

63.

1890. DALL, WILLIAM HEALEY. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. VII.—Preliminary report on the collection of Mollusca and Brachiopoda obtained in 1887–88.

Proc. U. S. Nat. Mus. 1889, vol. 12, pp. 219–362, 10 pls.

The collections were made during the voyage of the *Albatross* from Norfolk, Va., to San Francisco, Cal., via Straits of Magellan. Mollusks were obtained at 80 dredging stations and 27 anchorages. Contains copious notes, descriptions of the new species, and discussion of the conditions under which deep-sea mollusks exist. New species: *Malletia goniura*, *M. œolata*, *M. agathida*, *M. acinula*, *M. virens*, *Yoldia scapania*, *Leda cestrota*, *L. platessa*, *L. pontonia*, *Nucula callicredemna*, *Cryptodon fuegiensis*, *Callocardia albida*, *Cytherea eucymata*, *Cymatoica occidentalis*, *C. orientalis*, *Verticordia perplicata*, *Cuspidaria monosteira*, *C. chilensis*, *Poromya cymata*, *P. microdonta*, *Dentalium megathyris*, *Cadulus albicomatus*, *Actæon curtulus*, *A. perconicus*, *Scaphander interruptus*, *Leucosyrinx persimilis*, *L. goodei*, *Pleurotoma exulans*, *Calliotectum vernicosum*, *Pleurotomella cingulata*, *P. argeta*, *P. agonia*, *P. suffusa*, *Volutilithes philippiana*, *Conomitra intermedia*, *Mesorhytis costatus*, *Buccinum viridum*, *Chrysodomus amiantus*, *C. griseus*, *C. aphelus*, *C. testudinis*, *Nassa townsendi*, *Columbella permodesta*, *Murex leeanus*, *Scala pompholyx*, *Adeorbis sincera*, *Cocculina pocillum*, *Halistylus columna*, *Calliostoma platinum*, *C. rioensis*, *Turcicula macdonaldi*, *Solariella oxybasis*, *S. actinophora*.

64.

1890. AGASSIZ, ALEXANDER. Notice of Calamocrinus diomedæ, a new Stalked Crinoid from the Galapagos, dredged by the U. S. F. C. steamer *Albatross*, Lieut. Commander Z. L. Tanner, U. S. N., commanding.

Bull. Mus. Comp. Zool., vol, 20, pp. 165–167.

A preliminary account. See detailed account *Calamocrinus diomedæ*, etc., Agassiz, 85.

65.

1890. JORDAN, DAVID STARR. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. IX.—Catalogue of fishes collected at Port Castries, St. Lucia, by the steamer *Albatross*, Nov., 1888.

Proc. U. S. Nat. Mus. 1889, vol. 12, pp. 645–652

Notes, with description of one new species—*Corvula sanctæ-luciæ*.

66.

1890. JORDAN, DAVID STARR, and CHARLES HARVEY BOLLMAN. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. IV.—Descriptions of new species of fishes collected at the Galapagos Islands and along the coast of the United States of Colombia, 1887–88.

Proc. U. S. Nat. Mus. 1889, vol. 12, pp. 149–183.

Four new genera and 31 new species are described: *Xenocys*, *Bollmannia*, *Runula*, *Engyophrys*; *Raja equatorialis*, *Discopyge ommata*, *Urolophus goodei*, *Synodus evermanni*, *S. jenkinsi*, *Ophisoma nitens*, *Ophichthus evionthas*, *O. rugifer*, *Menidia gilberti*, *Stromateus palometa*, *Diplectrum eurylectrum*, *Prionodes stilbostigma*, *Kuhlia arge*, *Xenocys jessiæ*, *Larimus pacificus*, *Polycirrhus rathbuni*, *Kathetostoma averruncus*, *Bollmannia chlamydes*, *Scorpæna russula*, *Prionotus quiescens*, *P. albirostris*, *P. xenisma*, *Runula azalea*, *Porichthys nautopœdium*, *Otophidium indefatigable*, *Bregmaceros bathymaster*, *Azevia querna*, *Engyophrys sancti-laurentii*, *Symphurus atramentatus*, *S. leei*, *Leptophidium prorates*.

67.

1890. HOWARD, L. O., et al. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. V.—Annotated catalogue of the insects collected in 1887–88.

Proc. U. S. Nat. Mus. 1889, vol. 12, pp. 185–216.

Contains notes and descriptions of new genus and species from San Clemente Island, California, Lower California and Panama, Galapagos Islands, St. Lucia, W. I., and coasts of South America: *Thymele*. *Protoparce calapagensis*, *Centruroides luctifer*, *Spirobolus sanctæ-luciæ*, *Pectiniunguis americanus*, *Scolopendra microcanthus*, *S. galapagoensis*, *S. macracanthus*, *Vejovis galapagoensis*, *Timogenes niger*.

68.

1890. STEARNS, ROBERT E. C. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XVII.—Descriptions of new West American land, freshwater, and marine shells, with notes and comments.

Proc. U. S. Nat. Mus. 1890, vol. 13, pp. 205–225.

The following genus and species are described as new: *Cyclothyca*; *Helix coloradoensis*, *H. magdalenensis*, *Holospira semisculpta*, *H. arizonensis*, *Melania acutifilosa*, *Cyclothyca corrugata*, *Mitra nodocancellata*, *Venericardia barbarensis*, *Lucina æquizonata*, *Venus effeminata*, *Periploma discus*.

69.

1890. VASEY, GEORGE. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. VI.—List of the plants collected in Alaska in 1888.

Proc. U. S. Nat. Mus. 1889, vol. 12. pp. 217, 218.

A list of species by localities.

70.

1891. TANNER, Z. L. Report on the work of the U. S. F. C. steamer *Albatross* from Jan. 1, 1887, to June 30, 1888.

Rep. U. S. F. C. 1887, part 15, pp. 371–435, 4 pls.

Outline of contents: Deep-sea investigations off North Atlantic coast;

70.

1891. TANNER, Z. L.—Continued.
investigations during voyage from Norfolk, Va., to San Francisco, Cal., including West Indies, Straits of Magellan, Galapagos Islands, etc; notes on results of dredge hauls; tabular records of dredging and other operations.

71.

1891. TANNER, Z. L. The fishing grounds of Bristol Bay, Alaska: A preliminary report upon the investigations of the U. S. F. C. steamer *Albatross* during the summer of 1890.

Bull. U. S. F. C. 1889, vol. 9, pp. 279-288. 3 chts.

Notes on hydrography and on the cod and salmon fisheries.

72.

1891. GILBERT, CHARLES H.* Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XII.—A preliminary report on fishes collected by the steamer *Albatross* on the Pacific coast of North America during the year 1889, with descriptions of 12 new genera and 92 new species.

Proc. U. S. Nat. Mus. 1890, vol. 13, pp. 49-126.

Collections from anchorages and the dredging stations off the coasts of Washington, Oregon, California, and Lower California: *Leuroglossus, Calotomus, Xenochirus, Gillellus, Cryptotrema, Plectobranchus, Lucioblennius, Aprodon, Lycodapus, Lioglossina, Radulinus, Bathyagonus, Myctophum nannochir, M. mexicanum, M. protoculus, Bathytroctes stomias, Synodus lacertinus, Etrumeus acuminatus, Argentina sialis, Leuroglossus stilbius, Neoconger vermiformis, Ophichthys notochir, Exocœtus xenopterus, Melamphœs cristiceps, M. lugubris, Serranus æquidens, Pronotogrammus eos, Micropogon megalops, Cynoscion macdonaldi, Pseudojulis adustus, P. melanotis, P. inornatus, Halichœres sellifer, Thalassoma virens, T. grammaticum, T. socorroense, Calotomus xenodon, Microspathodon cinereus, Holacanthus clarionensis, Gobius zebra, G. dalli, Microgobius cyclolepis, Sebastichthys* sp., *S. alutus, S. rupestris, S. zacentrus, S. saxicola, S. diploproa, S. aurora, S. introniger, S. sinensis, S. goodei, Scorpœna sierra, Icelinus filamentosus, I. tenuis, I. fimbriatus, I. oculatus, I. cavifrons, Radulinus asprellus, Bathyagonus nigripinnis, Xenochirus triacanthus, X. pentacanthus, X. latifrons, Paraliparis rosaceus, Gobiesox funebris, G. humeralis, G. eigenmanni, G. papillifer, Bathymaster hypoplectus, Gillellus semicinctus, G. arenicolus, Dactyloscopus lunaticus, Labrosomus cremnobates, Cryptotrema corallinum, Plectobranchus evides, Lucioblennius alepidotus, Lycodes porifer, Lycodopsis crotalinus, L. crassilabris, Aprodon cortezianus, Lycodapus fierasfer, Leptophidium pardale, L. microlepis, L. stigmatistium, L. emmelas, Ophidium galeoides, Catœtyx rubrirostris, Neobythites stelliferoides, Physiculus rastrelliger, P. nematopus, Macrurus scaphopsis, M. liolepis, M. stelgidolepis, Platophrys tœniopterus, Citharichthys xanthostigma, C. fragilis, Ancylopsetta dendritica, Hippoglossina bollmani, Lioglossina tetrophthalmus, Cynicoglossus bathybius, Halieutœa spongiosa, Melichthys bispinosus, Idiacanthus antrostomus, Bathylagus pacificus.*

73.

1891. GILBERT, CHARLES H. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XIX.—A supplementary list of fishes collected at the Galapagos Islands and Panama, with descriptions of one new genus and three new species.

Proc. U. S. Nat. Mus. 1890, vol. 13, pp. 449-55.

Thirty-four species are considered, *Dialommus, Priacanthus serrula, Dialommus fuscus, Citharichthys platophrys* being described as new.

74.

1891. AGASSIZ, A. Three letters from Alexander Agassiz to Hon. Marshall McDonald, U. S. Commissioner of Fish and Fisheries, on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross*.

Bull. Mus. Comp. Zool., vol. 21, pp. 186-200.

Preliminary reports submitted during the voyage.

75.

1891. BEAN, TARLETON H. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XI.—New fishes collected off the coast of Alaska and the adjacent region southward.

Proc. U. S. Nat. Mus. 1890, vol. 13, pp. 37–45.

The 4 new genera and 17 new species here described are all from dredging stations: *Bothrocara, Poroclinus, Dasycottus, Malacocottus, Chalinura serrula, Antimora microlepis, Lycodes brevipes, Bothrocara mollis, Maynea pusilla, M. brunnea, Poroclinus rothrocki, Careproctus spectrum, Icelus scutiger, I. euryops, Dasycottus setiger, Malacocottus zonurus, Hemitripterus marmoratus, Psychrolutes zebra, Sebastolobus alascanus, Chauliodus macouni, Labichthys gilli.*

76.

1891. JORDAN, DAVID STARR. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XVIII.—List of fishes obtained in the harbor of Bahia, Brazil, and in adjacent waters.

Proc. U. S. Nat. Mus. 1890, vol. 13, pp 318–36.

One hundred and twelve species were from Bahia and 4 species from coast of Patagonia—the following described as new: *Verecundum rasile, Paralichthys isosceles, Psammobatis rutrum.*

77.

1891. VASEY, GEORGE, and J. N. ROSE. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XVI.—Plants collected in 1889 at Socorro and Clarion islands, Pacific Ocean.

Proc. U. S. Nat. Mus. 1890, vol. 13, pp. 145–49.

Twenty-six species considered—three described as new: *Teucrium townsendii, Cardiospermum palmeri, Viguiera deltoidea townsendii.*

78.

1891. LUCAS, FREDERIC A. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XIII.—Catalogue of skeletons of birds collected at the Abrolhos Islands, Brazil, the Straits of Magellan, and the Galapagos Islands, in 1887–88.

78.

1891. LUCAS, FREDERIC A.—Cont'd.

Proc. U. S. Nat. Mus. 1890, vol. 13, pp. 127–30.

A list of 33 species, with osteological notes.

79.

1891. WHITE, CHARLES A. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. X.—On certain Mesozoic fossils from the islands of St. Pauls and St. Peters in the Straits of Magellan.

Proc. U. S. Nat. Mus. 1890, vol. 13, pp. 13, 14, 2 pls.

Two species considered—one (*Lucina townsendi*) described as new.

80.

1891. BENEDICT, J. E., and MARY J. RATHBUN. The genus Panopeus.

Proc. U. S. Nat. Mus. 1891, vol. 14, pp. 355–385, pls. XIX–XXIV.

Based in part on *Albatross* dredgings. New species described: *Panopeus areolatus, P. dissimilis, P. angustifrons, P. hemphillii, P. bermudensis, P. ovatus.*

81.

1891. RIDGWAY, ROBERT. List of birds collected on the Bahama Islands by the naturalists of the U. S. F. C. steamer *Albatross*.

The Auk, vol. 8, *1891*, No. 4, Oct., pp. 333–339.

A list of species by localities.

82.

1891. TOWNSEND, C. H. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XIV. Birds from the coasts of western North America and adjacent islands, collected in 1888–89, with descriptions of new species.

Proc. U. S. Nat. Mus. 1890, vol. 13, pp. 131–42.

Ninety two species considered, 12 described as new: *Speotyto rostrata, Zenaidura clarionensis, Troglodytes tanneri, Puffinus auricularis, Oceanodroma socorroensis, Amphispiza belli cinerea, Helminthophila celata sordida, Melospiza fasciata clementæ, M. fasciata graminea, Otocoris alpestris insularis, O. alpestris pallida.*

83.

1891. TOWNSEND, C. H. The scientific results of explorations by the U. S. F. C. steamer *Albatross*. XV. Reptiles from Clarion and Socorro islands and the Gulf of California, with description of a new species.

Proc. U. S. Nat. Mus. 1890, vol. 13, pp 143, 144.

Twelve species considered, one (*Uta clarionensis*) described as new.

84.

1891. TOWNSEND, C. H. Report upon the pearl fishery of the Gulf of California.

Bull. U. S. Fish Com. 1889, vol. 9, pp. 91-94, 3 pls.

Mentions dredging of pearl oysters by the *Albatross* in the Gulf of California.

85.

1892. AGASSIZ, ALEXANDER. Reports of an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, by U. S. F. C. steamer *Albatross*, during 1891. I. Calamocrinus diomedæ, a new Stalked Crinoid, with notes on the apical system and the homologies of Echinoderms.

Mem. Mus. Comp. Zool. 1892, vol. 17, 96 pp., 32 pls.

An elaborate paper on one of the most interesting crinoids brought to light by any of the deep-sea dredging expeditions.

86.

1892. AGASSIZ, ALEXANDER. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the West Coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross*. II. General sketch of the expedition of the *Albatross*, from Feb. to May, 1891.

Bull. Mus. Comp. Zool. 1892, vol. 23, pp. 1-90, 22 pls.

86.

1892. AGASSIZ, ALEXANDER—Cont'd.

Contains chapters on topography of the bottoms, character of bottom deposits, temperature, observations on pelagic fauna by *Albatross* and other expeditions, with critical remarks; acalephs, pelagic fauna of intermediate depths, fauna, flora, and topography of Galapagos Islands; deep-sea fauna compared with Caribbean Sea; color of deep-sea types, etc.

87.

1892. TANNER, Z. L. Report of the investigations of the U. S. F. C. steamer *Albatross* for the year ending June 30, 1889.

Rep. U. S. F. C. 1888, part 16, pp. 395-512, 3 pls.

Investigations of fisheries along coasts of Alaska, Washington, Oregon, California, Lower California, and in Gulf of California, notes on results of dredge hauls, tabular records of dredging and other operations.

88.

1892. TANNER, Z. L. Cable surveys from California to the Hawaiian Islands, 1891-92.

Trans. and Proc. Geog. Soc. Pacific, San Francisco, 1892, vol. 3, pp. 63-83

The article is based chiefly on *Albatross* soundings, and the practicability of the route demonstrated.

89.

1892. Report of the results of the survey for the purpose of determining the practicability of laying a telegraphic cable between the United States and the Hawaiian Islands.

Senate Doc. 153, 52d Congress, 1st sess., 26 pp., 4 photos, 9 charts.

This report contains extensive tabulated data on the sounding operations of the U. S. F. C. steamer *Albatross* between San Francisco and Monterey, Cal., and Honolulu, H. I., with records of temperatures and specific gravities. Similar records on the work of the U. S. S. *Thetis* between Point Conception, Cal.; and Hilo, H. I. The route along the line between Monterey and Honolulu reported as the most practicable. The *Albatross* data are from a report made by Lieut. Commander Z. L. Tanner, U. S. N., commanding.

90.

1892. Hydrographic Office, U. S. Navy. Submarine cables.

Rept. No. 103, U. S. Hyd. Office, 67 pp., maps, charts, etc.

Prepared for publication as a part of the report of the survey by the U. S. F. C. steamer *Albatross* and the U. S. S. *Thetis* for a cable route between San Francisco and the Hawaiian Islands. Contains general instructions for deep-sea sounding by Commander Z. L. Tanner, U. S. N., with information respecting submarine cables.

91.

1892. GOODE, G. BROWN, and T. H. BEAN. The present condition of the study of deep-sea fishes.

Proc. Am. Ass. Adv. Sci., vol. 40, p. 324.

An abstract—a brief reference to the progress of deep-sea ichthyology.

92.

1892. GILBERT, CHARLES H. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXI. Descriptions of apodal fishes from the tropical Pacific.

Proc. U. S. Nat. Mus. 1891, vol. 14, pp. 347-52.

Collections from dredging stations off Panama, Galapagos Islands, and in the Gulf of California. Two genera and five species described as new: *Xenomystax*, *Ilyophis*, *Chlopsis equatorialis*, *Xenomystax atrarius*, *Ophisoma prorigerum*, *O. macrurum*, *Ilyophis brunneus*.

93.

1892. GILBERT, CHARLES H. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXII. Descriptions of thirty-four new species of fishes collected in 1888 and 1889, principally among the Santa Barbara Islands and in the Gulf of California.

Proc. U. S. Nat. Mus. 1891, vol. 14, pp. 539-66.

Collections from shore and dredging stations. The genus *Chriolepis* and the following species described as new: *Raia trachura*, *Catulus xaniurus*, *C. cephalus*, *C. brunneus*, *Eulamia platyrhynchus*, *Stolephorus cultratus*, *Myctophum regale*, *Alepocephalus tenebrosus*, *Porogadus promelas*, *Siphostoma carinatum*, *Callechelys peninsulæ*, *Atherinops insularum*, *Mugil setosus*, *Diplectrum sciurus*, *Mycteroperca pardalis*, *Bodianus acanthistius*, *Upeneus xanthogrammus*, *Pomacentrus leucorus*, *Gobius microdon*, *Bollmania ocellata*, *B. macropoma*, *B. stigmatura*, *Gobiosoma crescentalis*, *Chriolepis minutillus*, *Gillellus ornatus*, *Prionotus gymnostethus*, *Careproctus melanurus*, *Paraliparis cephalus*, *P. mento*, *Trachyrhynchus helolepis*, *Macrurus pectoralis*, *Lycodes diapterus*, *Symphurus fasciolaris*, *Antennarius reticularis*.

94.

1892. GOËS, A. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross* during 1891. III. On a peculiar type of Arenaceous Foraminifer from the American tropical Pacific, Neusina agassizi.

Bull. Mus. Comp. Zool. 1892, vol. 23, pp. 195-98, 1 pl.

95.

1892. DALL, WILLIAM H. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XX. On some new or interesting West American shells obtained from the dredgings of the U. S. F. C. steamer *Albatross* in 1888, and from other sources.

Proc. U. S. Nat. Mus. 1891, vol. 14, pp. 173-91, 3 pls.

Thirty-four species are considered; the genus *Calyptogena* and twenty-one species are described as new: *Trophon cerrosensis*, *Cancellaria crawfordiana*, *Terebratella occidentalis obsoleta*, *Buccinum strigillatum*, *B. taphrium*, *Molnia frielei*, *Strombella middendorfii*, *S. fragilis*, *S. melonis*, *Chrysodomus periscelidus*, *C. phœniceus*, *C. eucosmius*, *C. hypolispus*, *C. acosmius*, *C. halibrectus*, *Trophon scitulus*, *T. disparilis*, *Solemya johnsoni*, *Calyptogena pacifica*, *Limopsis vaginatus*, *Chrysodomus ithius*.

96.

1892. RATHBUN, RICHARD. The U. S. Fish Commission, some of its work.

Century Mag. 1892, vol. 43, Mar., pp. 679-697; 20 cuts.

Contains some account of the fishery and deep-sea investigations of the *Albatross*, with illustrations showing her methods of work.

97.

1892. VERRILL, A. E. The Marine Nemerteans of New England and adjacent waters.

Trans. Conn. Acad. Arts and Sciences 1892, vol. 8, pp. 382-456; 7 pls., 9 figs.

Based in part on *Albatross* collections. New genera and species described: *Nectonemertes, Hyalonemertes; Amphiporus multisorus, A. heterosorus, A. tetrasorus, A. frontalis, A. mesosorus, A. cæcus, Tetrastemma roseum, T. vermiculus catenulatum, T. dorsale unicolor, Lineus bicolor, Micrura dorsalis, M. rubra, Nectonemertes mirabilis, Hyalonemertes atlantica.*

98.

1892. VERRILL, A. E. Marine Planarians of New England.

Trans. Conn. Acad. Arts and Sciences 1892, vol. 8, pp. 459-520, 5 pls., 2 figs.

Based in part on *Albatross* collections. New genera and species: *Eustylochus, Heterostylochus, Planoceropsis Stylochus frontalis, S. crassus, Leptoplana virilis, L. angusta, Trigonoporus dendriticus, Eurylepta maculosa, Aphanostoma aurantiacum, A. olivaceum.*

98a.

1892. Cruise of the *Albatross*.

Bull. Am. Geog. Soc. 1892, vol. 24, No. 3, pp. 464-467.

Notes from report to U. S. Fish Commission, relating to work of the vessel at various points between the Aleutian Islands and Gulf of California.

99.

1893. TANNER, Z. L. Report upon the investigations of the U. S. F. C. steamer *Albatross* from July 1, 1889, to June 30, 1891.

Rep. U. S. F. C. 1889-1891, part 17, pp. 207-342, 1 pl.

Outline of contents: Voyage to southeast Alaska with Senate Committee on Indian Affairs; investigations of fishing grounds off Oregon, Washington, California, and in Bering Sea; scientific investigations off the west coast of Mexico and Central America and off the

99.

1893. TANNER, Z. L.—Continued.

Galapagos Islands; notes on results of dredge hauls; report of fishery expert; tabular records of dredging and other operations.

99a.

1893. BROOKS, WILLIAM K. The genus Salpa.

Mems. Biol. Lab. Johns Hopk. Univ. 1893, 11, pp. 1-371, 57 pls.

Based in part on *Albatross* collections. A monograph of the genus.

100.

1893. BENEDICT, JAMES E. Corystoid crabs of the genera Telmessus and Erimacrus.

Proc. U. S. Nat. Mus. 1892, vol. 15, pp. 223-30, 3 pls.

Erimacrus described as a new genus.

101.

1893. BENEDICT, JAMES E. Preliminary descriptions of 37 new species of Hermit Crabs of the genus *Eupagurus* in U. S. Nat. Museum.

Proc. U. S. Nat. Mus. 1892, vol. 15, pp. 1-26.

Based largely on *Albatross* collections. New species described: *Eupagurus alaskensis, E. aleuticus, E. patagoniensis, E. smithi, E. impressus, E. floridanus, E. exilis, E. albus, E. gladius, E. defensus, E. capillatus, E. brandti, E. dalli, E. tanneri, E. confragosus, E. cornutus, E. townsendi, E. rathbuni, E. minutus, E. purpuratus, E. hemphilli, E. beringanus, E. newcombei, E. undosus, E. kennerlyi, E. setosus, E. munitus, E. gilli, E. curacaoensis, E. californiensis, E. mexicanus, E. roseus, E. corallinus, E. coronatus, E. varians, E. cervicornis, E. parvus, E. hispidus.*

102.

1893. BEARD, J. CARTER. The Abysmal depths of the sea.

Cosmopolitan Magazine, Mar., pp. 532-538, 11 cuts.

A popular account of deep-sea life and conditions, based chiefly on the investigations of the *Albatross*.

103.

1893. BEECHER, CHARLES E. The development of *Terebratalia obsoleta* Dall.

Trans. Conn. Acad. Arts and Sciences 1893, vol. 9, pp. 392-399, 3 pls.

104.

1893. FAXON, WALTER. Reports on dredging operations off the west coast of Central America, to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by U. S. F. C. steamer *Albatross* during 1891. VI.—Preliminary Descriptions of new species of Crustacea.

Bull. Mus. Comp. Zool. 1893, vol. 24, pp. 149-220.

Five new genera and one hundred new species are described: *Maiopsis, Trachycarcinus, Calastacus, Scolophthalmus, Ceratomysis, Euprognatha granulata, Anamathia occidentalis, Maiopsis panamensis, Lambrus hassleri, Xanthodes sulcatus, Panopeus latus, P. tanneri, Achelous affinis, Trachycarcinus corallinus, Gecarcinus malpilensis, Pinnixa panamensis, Osachila lata, Æthusa ciliatifrons, Æ. pubescens, Æthusina smithiana, Cymopolia tuberculata, Raninops fornicata, Rhinolithodes cristatipes, Echinocerus diomedeæ, Paralomis aspera, P. longipes, Lithodes panamensis, Cancellus tanneri, Pylopagurus longimanus, P. affinis, P. hirtimanus, Catapagurus diomedeæ, Spiropagurus occidentalis, Paguristes fecundus, Petrolisthes agassizii, Pachycheles panamensis, Munida obesa, M. refulgens, M. propinqua, M. gracilipes, Galacantha diomedeæ, Munidopsis vicina, M. agassizii, M. villosa, M. hystrix, M. sericea, M. margarita, M. crinita, M. ornata, M. scabra, M. tanneri, M. hamata, M. quadrata, M. depressa, M. carinipes, M. hendersoniana, M. inermis, Uroptychus nitidus occidentalis, U. pubescens, U. bellus, Axius crista-galli, Calastacus stilirostris, Nephropsis occidentalis, Willemœsia inornata, Polycheles tanneri, P. sculptus pacificus, P. granulatus, Eryonicus spinulosus, Gnathophyllum panamense, Sclerocrangon atrox, S. procax, Pontophilus occidentalis, Paracrangon areolata, Glyphocrangon alata, G. spinulosa, G. sicarius, Heterocarpus vicarius, H. hostilis, H. affinis, Nematocarcinus agassizii, Acanthephyra cristata, A. cucullata, Notostomus fragilis, N. westergreni, Pasiphœia cristata americana, P. magna, Sicyonia affinis, S. picta, Peneus balboæ, Solenocera agassizii, Peneopsis diomedeæ, Haliporus nereus, H. doris, H. thetis, Aristæus occidentalis, Hemipeneus triton, Benthesicymus tanneri, Sergestes inous, S. phorcus, S. halia, Gnathophausia dentata, Eucopia sculpticauda, Petalophthalmus pacificus, Scolophthalmus lucifugus, Ceratomysis spinosa.*

105.

1893. BEAN, TARLETON H. Description of a new species of star-gazer (*Cathetostoma albigutta*) from the Gulf of Mexico.

Proc. U. S. Nat. Mus. 1892, vol. 15, pp. 121, 122.

Based on specimens from *Albatross* dredgings.

105a.

1893. EVERMANN B. W. A skeleton of Steller's sea-cow.

Science, vol. 21, No. 52, Feb. 3, pp. 5-9.

An account of the finding of a nearly perfect skeleton on Bering Island and its purchase for the U. S. National Museum at the time of the visit of the *Albatross* to that island in 1892.

106.

1893. RATHBUN, MARY J. Catalogue of the crabs of the family Periceridæ in the U. S. National Museum.

Proc. U. S. Nat. Mus. 1892, vol. 15, pp. 231-277, pls. XXVIII-XL.

Based largely on *Albatross* collections. New species described: *Libinia macdonaldi, L. spinimana, L. mexicana, Pericera triangulata, P. atlantica, P. contigua, Macrocœloma tenuirostra, Othonia carolinensis, O. nicholsi, O. rotunda, Mithrax pilosus, M. hemphilli, M. sinensis, M. bahamensis, M. braziliensis.*

107.

1893. LUDWIG, HUBERT. Reports on the dredging operations off the west coast of Central America, to the Galapagos, to the west coast of Mexico, and to the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross* in 1897. IV. Vorläufiger Bericht über die erbeuteten Holothurien.

Bull. Mus. Comp. Zool. 1893, vol. 24, pp. 105-114.

A preliminary report on the collection of holothurians, with references to new genera and species to be described in a final report. See paper No. 124 (The Holothurioidea) by the same author.

108.

1893. SCUDDER, SAMUEL H. Reports on the dredging operations off the west coast of Central America, to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross* during 1891. VII. The Orthoptera of the Galapagos Islands.

Bull. Mus. Comp. Zool. 1893, vol. 25, pp. 1-26, 12 pls.

Five genera and seven species are described as new: *Galapagia*, *Closteridea*, *Halmenus*, *Desmopleura*, *Nesœcia*, *Anisolabis bormansi*, *Closteridea bauri*, *Halmenus robustus*, *Desmopleura concinna*, *Anaulocomera darwinii*, *Conocephalus insulanus*, *Gryllus galapageius*.

109.

1893. SCHIMKÉWITSCH, W. M. Reports on the dredging operations off the west coast of Central America, to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross* during 1891. VIII. Compte-Rendu sur les Pantopodes.

Bull. Mus. Comp. Zool. 1893, vol. 25, pp. 27-44, 2 pls.

New species here described are as follows: *Collossendeis bicincta*, *C. macerrima minor*, *C. gracilis pallida*, *C. subminuta*, *Ascorhynchus agassizii*, *Pallenopsis californica*.

110.

1893. MERRILL, GEORGE P. Reports on the dredging operations off the west coast of Central America, to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross*. V. Report upon rocks collected from the Galapagos Islands.

Bull. Mus. Comp. Zool. 1893, vol. 16, pp. 235-237.

111.

1894. TANNER, Z. L. Report upon the investigations of the U. S. F. C. steamer *Albatross* for the year ending June 30, 1892.

Rep. U. S. F. C. 1892, part 18, pp. 1-64, 1 pl.

General contents: Cruise to Pribilof Islands with U. S. Bering Sea commissioners; deep-sea and fishery investigations off coast of Washington; survey of cable route between California and Hawaiian Islands; fur-seal investigation; voyage to Commander Islands; tabular records of dredging, sounding, and other operations.

112.

1894. RIDGWAY, ROBERT. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXVII. Catalogue of a collection of birds made in Alaska by Mr. C. H. Townsend during the cruise of the U. S. F. C. steamer *Albatross* in the summer and autumn of 1888.

Proc. U. S. Nat. Mus. 1893, vol. 16, pp. 663-665.

A list of 35 species from localities along the southern side of the Alaska Peninsula.

113.

1894. RIDGWAY, ROBERT. Description of a new storm petrel from the coast of western Mexico.

Proc. U. S. Nat. Mus. 1893, vol. 16, pp. 687-688.

Oceanodroma townsendi described from *Albatross* collections.

114.

1894. PECK, JAMES I. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXVI. Report on the Pteropods and Heteropods collected by the U. S. F. C. steamer *Albatross* during the voyage from Norfolk, Va., to San Francisco, Cal., 1887-88.

Proc. U. S. Nat. Mus. 1893, vol. 16, pp. 451-466, 3 pls.

Collections from surface and dredging stations; the genera and species are discussed chiefly with reference to their distribution, form, and anatomy, and as bottom deposits.

115.

1894. STEARNS, ROBERT E. C. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXV.—Report on the Mollusk-fauna of the Galapagos Islands, with descriptions of new species.

Proc. U. S. Nat. Mus. 1893, vol. 16, pp. 353-450, 1 pl., 1 map.

This paper contains chapters on geographical and physical characteristics, origin, distribution, etc. There are supplementary lists of other Galapagos collections, among them a list of 18 new species previously described by Dall from *Albatross* dredgings near the Galapagos Islands. New species: *Bulimulus habeli*, *Onchidium lesliei*, *Nitidella incerta*, *Littorina galapagiensis*.

116.

1894. STEARNS, ROBERT E. C. The shells of the Tres Marias and other localities along the shores of Lower California and the Gulf of California.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 139-204.

Based in part on *Albatross* collections.

117.

1894. RATHBUN, RICHARD. A summary of the fishery investigations conducted in the North Pacific Ocean and Bering Sea from July 1, 1888, to July 1, 1892, by the U. S. F. C. steamer *Albatross*.

Bull. U. S. F. C. 1892, vol. 12, pp. 127-201, 5 chts.

Contains descriptions of the fishing grounds with the results of the fishing and dredging operations conducted on them; notes on deep-sea explorations; bibliography. The bay and off-shore fishing grounds from Bering Sea to the Gulf of California, with their fisheries, are considered in detail.

118.

1894. RATHBUN, MARY J. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXIV.—Descriptions of new genera and species of crabs from the west coast of North America and the Sandwich Islands.

Proc. U. S. Nat. Mus. 1893, vol. 16, pp. 223-60.

Six genera and 46 species described as new: *Ericerus*, *Erileptus*, *Œdiplax*, *Scleroplax*, *Opisthopus*, *Cryptophrys*, *Ericerus latimanus*, *Podochela tenuipes*, *P. mexicana*, *P. lobifrons*, *Erileptus spinosus*, *Anasimus rostratus*, *Inachoides magdalenensis*, *Cyrtomaia smithi*, *Collodes tenuirostris*, *Sphenocarcinus agassizi*, *Euprognatha bifida*, *Pugettia dalli*, *Neorhynchus mexicanus*, *Lambrus exilipes*, *Mesorrhœa gilli*, *Lophozozymus frontalis*, *Cycloxanthus californiensis*, *Micropanope polita*, *Menippe convexa*, *Pilodius flavus*, *Pilumnus gonzalensis*, *Neptunus iridescens*, *Œdiplax granulatus*, *Speocarcinus granulimanus*, *Carcinoplax dentatus*, *Gelasimus gracilis*, *G. latimanus*, *G. coloradensis*, *Brachynotus jouyi*, *Pinnixa occidentalis*, *P. californiensis*, *Cryptophrys concharum*, *Scleroplax granulatus*, *Opisthopus transversus*, *Mursia hawaiiensis*, *Platymera californiensis*, *Ebalia americana*, *Myra townsendi*, *M. subovata*, *Nursia tuberculata*, *Randallia distincta*, *Ethusa lata*, *Cymopolia fragilis*, *C. zonata*, *Pachygrapsus longipes*, *Xanthodes minutus*.

119.

1894. RATHBUN, MARY J. Catalogue of the crabs of the family Maiidæ in the U. S. National Museum.

Proc. U. S. Nat. Mus. 1893, vol. 16, pp. 63-103, pls. III-VIII.

Based largely on *Albatross* collections. New genus and species described: *Lepteces*, *Chionœcetes tanneri*, *Cœlocerus grandis*, *Lepteces ornatus*, *Hyastirus caribbœus*.

120.

1894. MCMURRICH, J. PLAYFAIR. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXIII. Report on the Actiniæ collected by the *Albatross* during the winter of 1887-88.

Proc. U. S. Nat. Mus. 1893, vol. 16, pp. 119-216, 17 pls.

Chapters on the classification and geographical and bathymetrical distribution, with descriptions of 7 new genera and 28 new species: *Halcurias*, *Myonanthus*, *Pycnanthus*, *Cymbactis*, *Chitonanthus*, *Cradactis*, *Oractis*, *Edwardsia intermedia*, *Oractis diomedeæ*, *Halcurias pilatus*, *Peachia koreni*, *Anemonia variabilis*, *A. inequalis*, *Myonanthus ambiguus*, *Bolocera occidua*, *B. pannosa*, *B. brevicornis*, *Paractis vinosa*, *Actinernus plebeius*, *Actinostola excelsa*, *A. pergamentacea*, *Pycnanthus maliformis*, *Cymbactis fœculenta*, *Sagartia lactea*, *S. sancti-matthæi*, *S. paradoxa*, *Adamsia involvens*, *Stephanactis hyalonematis*, *Leiotealia badia*, *Oulactis californica*, *Cradactis digitata*, *Cerianthus vas*.

121.

1894. STUDER, THÉOPHILE. Reports on the dredging operations off the west coast of Central America, to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross* during 1891. X. Note préliminaire sur les Alcyonaires.

Bull. Mus. Comp. Zool. 1894, vol. 25, pp. 55–70.

The following species are described as new: *Clavularia gregaria*, *Vœringia pacifica*, *Pennatula alata*, *P. distorta pacifica*, *P. kœllikeri*, *Stachyptilum superbum*, *Kophobelemnon affine*, *Umbellula geniculata*, *Cladiscus agassizii*, *Distichoptilum verrillii*, *Anthothela argentea*, *Dasygorgia fruticosa*, *Lepidisis inermis*, *Calyptrophora agassizii*, *Stachyodes ambigua*, *Stenella ramosa*, *Amphilaphis abietina*, *Acanthogorgia brevispina*, *Psammogorgia variabilis*, *Callistephanus wrightii*.

122.

1894. CLARKE, SAMUEL F. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross* during 1891. XI. The Hydroids.

Bull. Mus. Comp. Zool. 1894, vol. 25, pp. 71–78, 5 pls.

The following species are described as new: *Obelia castellata*, *Lictorella geniculata*, *Sertularia variabilis*, *Halecium argenteum*.

123.

1894. WOODWORTH, W. McM. Reports on dredging operations off the west coast of Central America, to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross* during 1891. IX. Report on the Turbellaria.

Bull. Mus. Comp. Zool. 1894, vol. 25, pp. 49–52, 1 pl.

Stylochoplana californica and *Prosthecæus panamensis* described as new.

124.

1894. LUDWIG, HUBERT. Reports on an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, by the U. S. F. C. steamer *Albatross* during 1891. XII. The Holothurioidea.

Mem. Mus. Comp. Zool. 1894, vol. 17, No. 3, pp. 1-183, 19 pl.

A systematic arrangement of the species, with notes. The following genera and species are described as new: *Synallactes*, *Mesothuria*, *Scotodeima*, *Lætmophasma*, *Capheira*, *Pelagothuria*, *Sphærothuria*, *Pœlopatides suspecta*, *Synallactes alexandri*, *S. ænigma*. *Mesothuria multipes*, *Meseres macdonaldi*, *Euphronides tanneri*, *E. verrucosa*, *Psychropotes raripes*, *P. dubiosa*, *Benthodytes incerta*, *Deima pacificum*, *Oneirophanta affinis*, *Scotodeima setigerum*, *Lætmogone theeli*, *Lætmophasma fecundum*, *Capheira sulcata*, *Peniagone intermedia*, *Scotoanassa gracilis*, *Pelagothuria natatrix*, *Phyllophorus aculeatus*, *Psolidium panamense*, *P. gracile*, *Psolus diomedeæ*, *P. digitatus*, *P. pauper*, *Sphærothuria bitentaculata*, *Caudina californica*, *Trochostoma granulatum*, *T. intermedium*, *Ankyroderma spinosum*.

125.

1894. BERGH, RUDOLPH. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. F. C. steamer *Albatross* during 1891. XIII. Die Opisthobranchien.

Bull. Mus. Comp. Zool. 1894, vol. 25, pp. 125-233, 12 pl.

A systematic arrangement with descriptions of the following new genera and species: *Geitodoris*, *Gargamella*, *Æolidia herculea*, *Himatella trophina*, *Tritonia diomedea*, *T. exsulans*, *Geitodoris immunda*, *Gargamella immaculata*, *Chromodoris agassizii*, *Tridachia diomedea*, *Doridium purpureum*, *D. diomedeum*, *D. ocelligerum*, *Navarchus ænigmaticus*, *Thordisa dubia*, *Gastropteron pacificum*.

126.

1894. McDONALD, MARSHALL. The salmon fisheries of Alaska.

Bull. U. S. F. C. 1892, vol. 12, pp. 1-20, 9 pls.

Contains chapters on origin and development of Alaskan salmon fisheries, statistics, present condition, methods, regulations; life history of the salmon by Dr. T. H. Bean; bibliography, etc.

127.

1894. MANN, ALBERT. List of Diatomaceæ from a deep-sea dredging in the Atlantic Ocean off Delaware Bay, by the *Albatross*.

Proc. U. S. Nat. Mus. 1893, vol. 16, pp. 303-312.

128.

1894. EIGENMANN, CARL H., and C. H. BEESON. A revision of fishes of the subfamily Sebastinæ of the Pacific coast of America.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 375-407.

Refers to many species brought to light by *Albatross* explorations.

129.

1894. KNOWLTON, F. H. A review of the fossil flora of Alaska, with descriptions of new species.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 207-243, 1 pl.

Based in part on *Albatross* collections. New species described from *Albatross* collections are as follows: *Salix minuta*, *Juglans townsendi*, *Fraxinus herendeenensis*, *Rhus frigida*, *Zizyphus townsendi*, *Phyllites arctica*. An abstract from this paper, entitled "Fossil flora of Alaska," is contained in Bull. Geol. Soc. Am., vol. 5, 1893, pp. 573-590.

130.

1894. ORTMANN, ARNOLD. Reports on the dredging operations off the west coast of Central America, to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the steamer *Albatross* during 1891. XIV. The Pelagic Schizopoda.

Bull. Mus. Comp. Zool. 1894, vol. 25, pp. 99-110, 1 pl.

An annotated catalogue with the following species described as new: *Thysanopoda agassizi*, *Euphausia diomedeæ*, *Boreomysis californica*.

131.

1894. HICKSON, SYDNEY J. The fauna of the deep sea.

12mo, xvi+169 pp. 23 ills. Appleton's, N. Y. (Modern science series, edited by Sir John Lubbock.)

A condensed presentation of the more important facts respecting deep-sea life; contains references to investigations by steamship *Albatross*.

132.

1895. TANNER, Z. L. Report on the work of the steamer *Albatross* for the year ending June 30, 1893.

Rep. U. S. F. C. 1893, part 19, pp. 305-41, 4 pls.

General contents: Fur-seal investigations at Pribilof Islands; pelagic sealing inquiries and patrol of Bering sea; tabular records of operations.

133.

1895. TANNER, Z. L. On the appliances for collecting pelagic organisms, with special reference to those employed by the U. S. Fish Commission.

Bull. U. S. F. C. 1894, vol. 14, pp. 143-51, 4 pls.

Descriptions of surface and intermediate towing nets.

134.

1895. TANNER, Z. L. The U. S. Fish Commission and its relations with the U. S. Navy.

Proc. U. S. Naval Inst., 21, No. 1. Whole number 73.

135.

1895. BEAN, BARTON A. Scientific results of explorations by the *Albatross*. XXXIII.—Descriptions of two new flounders.

Proc. U. S. Nat. Mus. 1894, vol 17, pp. 633-36.

From *Albatross* dredging stations off Florida. The genus *Gastropsetta* and the species *G. frontalis* and *Cyclopsetta chittendeni* are described as new.

136.

1895. GOODE, G. BROWN, and TARLETON H. BEAN. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXVIII.—On *Cetomimidæ* and *Rondeletiidæ*, two new families of bathy-

186.

1895. GOODE, G. BROWN, and TARLETON H. BEAN—Continued.
bial fishes from the Northwestern Atlantic.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 451–54.

Descriptions of genera and species: *Cetomimus, Rondeletia, Cetomimus gillii, C. storeri, Rondeletia bicolor.*

187.

1895. GOODE, G. BROWN, and TARLETON H. BEAN. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXIX.—A revision of the order Heteromi, deep-sea fishes, with a description of the new generic types, Macdonaldia and Lipogenys.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 455–70.

Descriptions of new genera and species, with analytical keys: *Gigliolia, Macdonaldia, Lipogenys, Gigliolia moseleyi, Lipogenys gillii.*

188.

1895. GOODE, G. BROWN, and TARLETON H. BEAN. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXX.—On Harriotta, a new type of Chimæroid fish from the deep waters of the Northwestern Atlantic.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 471–73, 1 pl.

Description of a new genus and species: *Harriotta raleighana.*

189.

1895. GOODE, GEORGE BROWN, and TARLETON H. BEAN. Oceanic ichthyology, a treatise on the deep-sea and pelagic fishes of the world, based chiefly upon the collections made by the steamers *Blake*, *Albatross*, and *Fish Hawk*, in the northwestern Atlantic, with an atlas containing 417 figures.

Spec. Bull. U. S. Nat. Mus. XXXV+553 pp. Atlas, XXIII+26 pp., 123 pls.

An elaborate work, presenting a discussion of all deep-sea and pelagic fishes dwelling in the open ocean, either at the surface or at bottom, beyond a depth of 500 feet; separate volume of plates. List of genera and species here described as new: *Abyssicola, Æthoprora, Alcockia, Aldrovandia, Bathylaco, Benthocometes, Bonapartia, Caulophryne, Celema, Cetomimus, Collettia, Conocara, Dicromita, Electrona, Gigliolia, Gramatostomias, Harriotta, Helicolenus, Hypoclydonia, Lampadena, Mœbia, Moseleya, Penopus, Rondoletia, Steindachneria, Yarrella, Macdonaldia, Scyliorhinus profundorum, Harriotta raleighana, Conocara macdonaldi, Bathytroctes antillarum, B. æquatoris, Argentina striata, Bathylagus euryops, B. benedicti, Bathylaco nigricans, Chlorophthalmus truculentus, Rondeletia bicolor, Cetomimus gillii, C. storeri, Myctophum opalinum, M. remiger, Lampanyctus alatus, L. guntheri. L. gemmifer, L. lacerta, Notoscopelus quercinus, N. margaritiferus, N. castaneus, Lampadena speculigera, Æthoprora lucida, Æ. effulgens, Nannobrachium macdonaldi, Bonapartia pedaliota, Yarrella blackfordi, Astronesthes gemmifer, Echiostoma margarita, Grammatostomias dentatus, Photonectes gracilis, Halosaurus guntheri, Aldrovandia gracilis, A. pallida, Congermuræna flava, Hoplunnis diomedianus, Pisoodonophis cruentifer, Gigliolia moseleyi, Lipogenys gillii, Stephanoberyx gillii, Bathyclupea argentea, Dicrotus parvipinnis, Benthodesmus atlanticus, Cyttus hololepis, Epigonus occidentalis, Hypoclydonia bella, Scorpæna cristulata, S. agassizii, Helicolenus maderensis, Pontinus rathbuni, P. macrolepis, P. longispinis, Paraliparis copei, Callionymus himantophorus, Lycodes zoarchus, Dicromita agassizii, Bassogigas gillii, Penopus macdonaldi, Physis cirratus, Læmonema melanurum, Chalinura brevibarbis, Steindachneria argentea, Prionotus militaris, P. egretta, P. beanii, Peristedion gracile, Caulophrynejordani.*

189.

1895. The same. Smithsonian Contrib. to Knowl. Vol. XXX, pp. XXXV+553; Vol. XXXI, pp. XXII+26 pp., 123 pls.

This work was also published in the Memoirs of the Museum of Comparative Zoology as vol. 22, "in connection with the National Museum and the Smithsonian Institution," and dated September, 1896.

140.

1895. GOODE, G. BROWN, and TARLETON H. BEAN. New deep-sea fishes.

Am. Nat., vol. 29, pp. 281.

A notice of the author's paper in Proc. U. S. Nat. Mus., vol. 17, 1894.

140a.

1895. GOODE, G. BROWN, and TARLETON H. BEAN. More deep-sea fishes.

Am. Nat., vol 29, pp. 376, 3 pls.

A reference to the above, with plates and additional remarks.

141.

1895. GILBERT, CHARLES H. The ichthyological collections of the steamer *Albatross* during the years 1890 and 1891.

Rep. U. S. F. C. 1893, part 19, pp. 393–476, 16 pls.

The fishes were collected in Bering Sea and the North Pacific Ocean, along the coasts of Alaska, Washington, and California, and are from shore and dredging stations. A systematic arrangement of the species; the following genera and species described as new: *Elanura, Rhinoliparis, Gyrinichthys, Bathyphasma, Lethotremus, Lyconectes, Derepodichthys, Raja abyssicola, R. aleutica, Bathylagus borealis, Sebastolobus altivelis, Icelus vicinalis, I. canaliculatus, I. spiniger, Icelinus borealis, Artediellus pacificus, Cottus aleuticus, Acanthocottus sellaris, A. laticeps, A. profundorum, Triglops beani, T. scepticus, T. xenostethus, Elanura forficata, Oligocottus acuticeps, Paricelinus thoburni, Aspidophoroides bartoni, Odontopyxis frenatus, O. leptorhynchus, Xenochirus alascanus, Paraliparis holomelas, P. ulochir, Careproctus ectenes, C. colletti, C. phasma, C. ostentum, C. simus, Gyrinichthys minytremus, Rhinoliparis barbulifer, Liparis cyclostigma, L. fucensis, Leptoblennius mackayi, Bathyphasma ovigerum, Lethotremus muticus, Lyconectes aleutensis, Lycodes palearis, Lycodapus extensus, L. parviceps, Derepodichthys alepidotus, Nematonurus cyclolepis, Chalinura filifera, Limanda proboscidea.*

142.

1895. DALL, WILLIAM HEALEY. Scientific results of explorations by U. S. F. C. steamer *Albatross*. XXXIV. Report on Mollusca and Brachiopoda dredged in deep water, chiefly near the Hawaiian Islands, with illustrations of hitherto unfigured species from Northwest America.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 675–733, 10 pls.

Twenty-eight species are described as new, a few being discussed anatomically at considerable length. New species as follows: *Scaphander alatus, Sabatia pustulosa, Pleurotoma micros-*

142.

1895. DALL, WILLIAM HEALEY—Cont'd. *celida, Pleurotomella gypsina, Liothyrina clarkeana, P. hawaiiana, P. climacella, Spergo glandiniformis, S. daphnelloides, Lunatia sandwichensis, Solariella reticulina, Emarginula hawaiiensis, Dentalium phaneum, D. complexum, Euciroa pacifica, Lyonsiella alaskana, Pectunculus arcodentiens, Buccinum aleuticum, B. ovulum, Chrysodomus insularis, C. magnus, Beringius frielei, B. aleuticus, Frielela halli, Hemithyris beecheri, H. craneana, Macandrevia americana, M. craniella, M. diamantina.*

143.

1895. DALL, W. H. Synopsis of a review of the genera of recent and Tertiary Mactridæ and Mesodesmatidæ.

Proc. Malacological Soc. (Lond.), vol. 1, pt. 5, Mar., pp. 203–213.

Based in part on *Albatross* collections.

144.

1895. DALL, W. H. New species of land shells from Galapagos Islands.

The Nautilus, vol. 8, May, No. 11, pp. 126–127.

The following species from *Albatross* collections are described as new: *Bulimulus reibischii, B. tanneri.*

145.

1895. COPE, E. D. On some new North American snakes.

Am. Nat., vol. 29, pp. 676–680.

The following, derived partly from *Albatross* collections, are described as new: *Natrix compressicauda tæniata. N. fasciata pictiventris, Seminatrix pygæus, Zamenis stejnegerianus, Z. conirostris, Z. lateralis fuliginosus.*

146.

1895. BENEDICT, JAMES E. Scientific results of explorations by the steamer *Albatross*. XXXI. Descriptions of new genera and species of crabs of the family Lithodidæ, with notes on the young of Lithodes camtschaticus and Lithodes brevipes.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 478–88.

Collections from shore and dredging stations chiefly in the North Pacific Ocean and Bering Sea. Four genera and 11 species are described as new: *Leptolithodes, Pristopus, Œdignathus, Lepeopus, Lithodes goodei, L. diomedeæ, L. æquispinus, L. couesi, L. rathbuni, L. californiensis, Leptolithodes multispinus, L. papillatus, Pristopus verrilli, Œdignathus gilli, Lepeopus forcipatus.*

147.

1895. BIGELOW, ROBERT PAYNE. Scientific results of explorations by the U. S. F. C. steamer *Albatross*. XXXII. Report on the Crustacea of the order Stomatopoda collected by the steamer *Albatross* between 1885 and 1891, and on other specimens in the U. S. National Museum.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 489-550, 3 pls.

Collections from the Atlantic and Pacific shore and dredging stations. The paper contains classification, with analytical keys, bibliography, and descriptions of the genus *Odontodactylus* and 14 species originally described in Circ. Johns Hopk. Univ. 88, 1891: 106, 1893: *Gonodactylus spinosus*, *Odontodactylus havanensis*, *Pseudosquilla megalopthalma*, *Lysiosquilla biminiensis*, *Squilla quadridens*, *S. polita*, *S. parva*, *S. mantoidea*, *S. aculeata*, *S. panamensis*, *S. intermedia*, *S. biformis*, *S. alba*, *S. rugosa*.

148.

1895. GIESBRECHT, WILHELM. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, carried on by *Albatross*, during 1891. XVI. Die Pelagischen Copepoden.

Bull Mus. Comp. Zool. 1895, vol. 25, pp. 243-263, 4 pls.

The following genera and species are described as new: *Gaidius*, *Lopothrix*, *Gaidius pungens*, *Chirundina streetsii*, *Lopothrix frontalis*, *Centropages elegans*, *Euchæta tonsa*, *Scolecithrix cristata*, *S. persecans*, *Leuckartia grandis*, *Heterochæta tanneri*, *Pontella agassizii*.

149.

1895. FAXON, WALTER. Reports on an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands, by the steamer *Albatross*, during 1891. XV. The Stalk-eyed Crustacea.

Mem. Mus. Comp. Zool. 1895, vol. 18, pp. 1-292, 67 pls.

A systematic account of the species with special chapters on distribution, colors, bathymetric range, etc. Many of the plates are colored.

150.

1895. MULLER, G. W. Reports on the dredging operations off the west coast of Central America, to the Galapagos, to west coast of Mexico, and in the Gulf of California, carried on by U. S. F. C. steamer *Albatross*, during 1891. XIX. Die Ostracoden.

Bull. Mus. Comp. Zool. 1895, vol. 27, pp. 153-170, 3 pls.

The genus *Gigantocypris* and species *Gigantocypris pellucida*, *Conchœcia agassizii* described as new.

151.

1895. HARTLAUB, C. Reports on the dredging operations off the west coast of Central America, to the Galapagos, to the west coast of Mexico, and in the Gulf of California, carried on by the steamer *Albatross*, during 1891. XVIII. Die Comatuliden.

Bull. Mus. Comp. Zool. 1895, vol. 27, pp. 137-152, 4 pls.

The new species described are as follows: *Antedon agassizii*, *A. tanneri*, *A. parvula*, *A. brigadata*, *A. subtilis*.

152.

1895. TOWNSEND, C. H. Reports on the dredging operations off the west coast of Central America, to the Galapagos, to the west coast of Mexico, and in the Gulf of California, carried on by the U. S. F. C. steamer *Albatross*, during 1891. XVII. Birds from Cocos and Malpelo islands, with notes on petrels obtained at sea.

Bull. Mus. Comp. Zool. 1895, vol. 27, pp. 121-126, 2 pls.

The ornithological relationship of Cocos Island with the Galapagos and with the mainland is referred to. Eleven species are considered, and the following genera and species from Cocos Island are described as new; *Cocornis agassizi*, *Nesotriccus ridgwayi*.

152a.

1895. Fur Seal Arbitration. Proceedings of the Tribunal of Arbitration convened at Paris.

Sen. Ex. Doc. 177, 53d Cong., 2d sess., 15 vols.

Contains much matter based on *Albatross* investigations.

153.

1895. RATHBUN, MARY J. Descriptions of a new genus and four new species of crabs from the Antillean region.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 83–86.

Three species based on *Albatross* collections. The following are described as new: *Thyrolambrus*, *Thyrolambrus astroides*, *Solenolambrus decemspinosus*, *Pilumnus diomedeæ*, *Actæa palmeri*.

154.

1895. RATHBUN, MARY J. Notes on the crabs of the family Inachidæ in the U. S. National Museum.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 43–75, 1 pl.

Based largely on *Albatross* dredgings. New genera and species described: *Holoplites*, *Echinœcus*, *Achœus trituberculatus*, *Podichela spinifrons*, *Collodes leptocheles*, *Batrachonotus brasiliensis*, *B. nicholsi*, *Inachoides intermedius*, *Anasimus latus*, *Echinœcus pentagonus*.

155.

1895. RATHBUN, MARY J. The genus Callinectes.

Proc. U. S. Nat. Mus. 1895, vol. 18, pp. 349–375.

Based partly on *Albatross* collections. *Callinectes sapidus acutidens* described as new.

156.

1895. VERRILL, A. E. Descriptions of new species of starfishes and Ophiurans, with a revision of certain species formerly described; mostly from collections made by the U. S. Commission of Fish and Fisheries.

Proc. U. S. Nat. Mus. 1894, vol. 17, pp. 245–297.

Based chiefly on *Albatross* dredgings. New genera and species: *Isaster*, *Acantharchaster*, *Pseudarchaster concinnus*, *Isaster bairdii*, *Pentagonaster eximius*, *Neomorphaster forcipatus*, *Solaster syrtensis*, *S. benedicti*, *Crossaster helianthus*, *Pteraster hexactis*, *Cribrella pectinata*, *Brisinga multicostata*, *Freyella aspera*, *F. microspina*, *Ophioglypha saurura*, *O. tessellata*, *O. grandis*, *Astroschema clavigera*.

157.

1895. VERRILL, A. E. Distribution of the Echinoderms of Northeastern America. [Brief contributions to zoology from museum of Yale College, No. LVIII.]

Am. Jour. Sci. 1895, Third Series, vol. 49, No. 290, Feb., pp. 127–141. (Abstract of a paper read before the National Academy of Science, Dec. 31, 1894.)

The same (continuation).

Am. Jour. Sci., Third Series, vol. 49, No. 291, Mar., 1895, pp. 199–212.

Based in part on *Albatross* dredgings. Contains notes on bathymetric distribution. The genus *Lophopteraster* and the following species described as new: *Pentagonaster simplex*, *P. planus*, *Porania insignis*, *Rhegaster abyssicola*, *Lophopteraster abyssorum*, *Hymenaster regalis*, *Asterias enopla*, *A. austera*, *Leptasterias hispidella*.

158.

1895. VERRILL, A. E. Supplement to the Marine Nemerteans and Planarians of New England.

Trans. Conn. Acad. of Arts and Sciences 1895, vol. 9, pp. 523–534.

An annotated list, *Micrura cœca* described as a new species.

159.

1896. TANNER, Z. L., and F. J. DRAKE. Report upon the operations of the U. S. F. C. steamer *Albatross* for the year ending June 30, 1894.

Rep. U. S. F. C. 1894, part 20, pp. 197–278, 2 pls., cht.

Fur-seal investigations at Pribilof Islands; fishery investigations and the patrol of Bering Sea; fishery investigations in Puget Sound and off southern California; report of fishery expert; tabular records of hydrographic and other operations.

160.

1896. DRAKE, F. J., Lieut. Commander U. S. N. Report upon the investigations of the steamer *Albatross* for the year ending June 30, 1895. (Abstract.)

Rep. U. S. F. C. 1895, part 21, pp. 125–168.

General contents: Fur-seal investigations at Pribilof and Commander islands; pelagic sealing investigations and patrol of Bering Sea; report of fishery expert; records of operations.

161.

1896. DALL, W. H. Insular land-shell faunas, especially as illustrated by the data obtained by Dr. G. Baur in the Galapagos Islands.

Proc. Acad. Nat. Sci. Phil. 1896, Aug., pp. 395-459, 3 pls.

Based in part on *Albatross* collections. The following species are described as new: *Bulimulus nesioticus*, *B.* sp.

162.

1896. JORDAN, DAVID STARR, et al. Observations on the fur seals of the Pribilof Islands. Preliminary Report.

Treas. Dept. Doc. No. 1913, 69 pp., chart.

A preliminary report by the commission of investigation into the condition of the fur-seal fisheries. See Nos. 186, 187. The *Albatross* was detailed for this work.

163.

1896-1900. JORDAN, DAVID STARR, and BARTON WARREN EVERMANN. Fishes of North and Middle America. A descriptive catalogue of the species of fish-like vertebrates found in the waters of North America north of the Isthmus of Panama.

Bull. 47, U. S. Nat. Mus., Parts I-IV, lviii+3313 pp., 392 pls.

The most valuable representation of our knowledge of the fauna in question. Contains descriptions of nearly all fishes brought to light by the investigations of the steamship *Albatross*. Genera and species from *Albatross* collections here described as new are as follows: *Palometa*, *Enneistus*, *Xystroperca*, *Alcidea*, *Archistes*, *Stelgistrum*, *Sternias*, *Oxycottus*, *Nautiscus*, *Brysophilus*, *Embryx*, *Albatrossia*, *Bogoslovius*, *Verasper*, *Ramularia*, *Perissias*, *Crystallichthys*, *Prognurus*, *Leuresthes crameri*, *Mugil thoburni*, *Archistes plumarius*, *Radulinus boleoides*, *Stelgistrum stejnegeri*, *Nautiscus pribilovius*, *Podothecus hamlini*, *P. thompsoni*, *Averruncus sterletus*, *Gnathypops snyderi*, *Hippoglossoides hamiltoni*, *Verasper moseri*, *Osmerus albatrossis*, *Bathylagus milleri*, *Oligoplites mundus*, *Crystallichthys mirabilis*, *Prognurus cypselurus*, *Larimus acclivus*, *Iridio kirschii*, *Sebastodes aleutianus*.

164.

1896. TOWNSEND, C. H., F. W. TRUE, and A. B. ALEXANDER. Reports of agents, officers, and persons acting under the authority of the Secretary of the Treasury in relation to the condition of seal life on the rookeries of the Pribilof Islands, and to pelagic sealing in Bering Sea and the North Pacific Ocean, 1883-1895. Part II.—Condition of seal life on the rookeries of the Pribilof Islands, 1893-1895.

Senate Doc. No. 137, part 2, 54th Cong., 1st sess., 154 pp., 19 pls., 11 charts; atlas of 46 pls.

Reports on fur-seal fisheries, made in connection with the work of the steamship *Albatross*.

165.

1896. VERRILL, A. E. The Opisthoteuthidæ, a remarkable new family of deep-sea Cephalopoda, with remarks on some points in molluscan morphology.

Am. Jour. Sci. 1896, fourth series, vol. 2, No. 7—July, pp. 74-80, 7 figs.

A second specimen of *Opisthoteuthis agassizii* noted as dredged by the *Albatross*.

166.

1896. DALL, W. H. Diagnoses of new species of Mollusks from the west coast of America.

Proc. U. S. Nat. Mus. 1895, vol. 18, pp. 7-20.

Based on *Albatross* collections. New species here described: *Calliostoma iridium*, *C. turbinum*, *Anaplocamus borealis*, *Solariella nuda*, *S. ceratophora*, *Rimula expansa*, *Emarginula flabellum*, *Choristes carpenteri*, *Benthodolium pacificum*, *Phos cocosensis*, *Cominella brunneocincta*, *Fusus rufocaudatus*, *Tractolira sparta*, *Scaphella benthalis*, *Cancellaria centrota*, *C. io*, *Pleurotoma aulaca*, *Pleurotomella castanea*, *Nucula iphigenia*, *Limopsis compressus*, *Philobrya atlantica*, *Callocardia lepta*, *C. ovalis*, *C. gigas*, *Callogonia angulata*, *Periploma stearnsii*, *P. carpenteri*.

167.

1896. GOES, AXEL. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of

167.

1896. GOES, AXEL—Continued.

Mexico, and in the Gulf of California, carried on by the U. S. F. C. steamer *Albatross*, during 1891. XX. The Foraminifera.

Bull. Mus. Comp. Zool. 1896, vol. 29, pp. 1-103, 9 pls.

An annotated catalogue, with synonymy and descriptions of new species; a list of stations; a table showing bathymetric distribution and a comparison of the faunas on both sides of the Isthmus of Panama. The following are described as new: *Astrorhiza furcata*, *A. tenuis*, *A. vermiformis*, *Crithionina pisum*, *C. rugosa*, *C. lens*, *C. granum subsimplex*, *Thurammina erinacea*, *Reophax insectus*, *R. armatus*, *R. turbo*, *Haplophragmium helicoideum*, *H. obsoletum*, *H. lituolinoideum*, *Verneuilina pusilla*, *Textularia solita inflata*.

168.

1896. TOWNSEND, C. H. Description of a closing tow net for submarine use at all depths.

Rept. U. S. F. C. 1894, part 20, pp. 279-282, 2 pls.

A new and simple form of towing net for exploring at intermediate depths, the jaws of the net closing by means of a messenger.

168a.

1896. ELLIOTT, D. G. Descriptions of an apparently new species and subspecies of ptarmigan from the Aleutian Islands.

The Auk, vol. 13, pp. 24-29, 1 pl.

Based chiefly on *Albatross* collections. *Lagopus evermanni* and *L. rupestris townsendi* described as new.

169.

1897. TANNER, Z. L., Commander, U. S. Navy. Deep-sea exploration: A general description of the steamer *Albatross*, her appliances and methods.

Bull. U. S. F. C. 1896, vol. 16, pp. 257-424, 40 pls., 76 figs.

A valuable work, describing in detail the methods of operating the many appliances used in connection with deep-sea investigations. Contains chapters on the construction of the vessel, deep-sea sounding, thermometers, density of sea water, development of deep-sea exploration, navigation, the conduct of deep-sea work, marine deposits, preservation of collections, etc.

170.

1897. GILBERT, C. H., and FRANK CRAMER. Report on the fishes dredged in deep water near the Hawaiian Islands, with descriptions and figures of 23 new species.

Proc. U. S. Nat. Mus. 1896, vol. 19, pp. 403-435.

Includes a description of the remarkable genus *Pelecanichthys*. New genera and species: *Argyripnus*, *Cœlocephalus*, *Pelecanichthys*, *Promyllantor alcocki*, *Congermuræna æquorea*, *Chlorophthalmus proridens*, *Diaphus urolampus*, *D. chrysorhynchus*. *Myctophum fibulatum*, *Dasyscopelus pristilepis*, *Argyripnus ephippiatus*, *Melanostoma argyreum*, *Scorpœna remigera*, *Peristedion hians*, *Cœlorhynchus gladius*, *Macrourus ectenes*, *M. propinquus*, *M. holocentrus*, *M. gibber*, *Hymenocephalus antræus*, *Trachonurus scntipellis*, *Chalinura ctenomelas*, *Optonurus atherodon*, *Pelecanichthys crumenalis*, *Malthopsis mitriger*, *Cœlocephalus acipenserinus*.

171.

1897. GILBERT, CHARLES HENRY. Descriptions of 22 new species of fishes collected by the steamer *Albatross*.

Proc. U. S. Nat. Mus. 1896, vol. 19, pp. 437-457

Collections from the North Pacific Ocean between Panama and California. One species from Brazil. New genera and species: *Emmnion*. *Ulvicola*, *Tachysurus liropus*, *Netuma insularum*, *Mugil thoburni*, *Myripristis clarionensis*, *Epinephelus niphobles*, *Orthopristis forbesi*, *Ophioscion strabo*, *Holacanthus iodocus*, *Scorpœna pannosa*, *Sebastodes semicinctus*, *S. ayresii*, *S. crameri*, *Prionotus loxias*, *Astroscopus zephyrius*, *Emblemaria oculocirris*, *Lepidion verecundum*, *Paralichthys woolmani*, *Emmnion bristolæ*, *Leuresthes crameri*, *Centropomus constantinus*, *Ulvicola sanctæ-rosæ*.

172.

1897. BENEDICT, JAMES E. A revision of the genus Synidotea.

Proc. Acad. Nat. Sci. Phil. 1897, pp. 389-404, 13 cuts.

Based in part on *Albatross* collections. Contains an analytical key to species. The following are described as new: *Synidotea laticauda*, *S. nebulosa*, *S. angulata*, *S. pallida*, *S. erosa*, *S. lævis*, *S. picta*.

173.

1897. RICHARDSON, HARRIET. Description of a new genus and species of Sphæromidæ from Alaskan waters.

Proc. Biol. Soc. Wash. 1897, vol. 11, pp. 181-183.

Tecticeps alascensis, from *Albatross* collections, is described as new.

174.

1897. DALL, W. H. Notice of some new or interesting species of shells from British Columbia and the adjacent region.

Nat. Hist. Soc. B. C., Bull. No. 2, pp. 1-18, pl. 1-2.

Based in part on *Albatross* collections. The following described as new: *Crenella columbiana, C. leana, C. japonica, Modiolaria taylori, M. seminuda, Nucula carlottensis, Leda extenuata, Yoldia ensifera, Y. martyria, Malletia faba, M. gibbsii, M. pacifica, M. kennerlyi, Macoma inflatula, M. liotricha, Cadulus hepburni, C. tolmiei, Cythara victoriana, Mumiola tenuis, Rissoina newcombei, Molleria quadræ, Eucosmia lurida.*

175.

1897. MERRIAM, C. HART. A new fur seal or sea bear (*Arctocephalus townsendi*) from Guadalupe Island, off Lower California.

Proc. Biol. Soc. Wash. 1897, vol. 11, pp. 175-178.

This paper is based on collections and notes made by the resident naturalist of the *Albatross*, on a side trip, during the detail of the vessel for investigations of the seal fisheries.

176.

1897. GILL, THEO., and C. H. TOWNSEND. Diagnoses of new species of fishes found in Bering Sea.

Proc. Biol. Soc. Wash. 1897, vol. 11, pp. 231-234.

Descriptions of 14 new species and 1 new genus of fishes obtained by Mr. Townsend as naturalist of the *Albatross* in 1895. The new species are *Raia rosispinis, R. obtusa, R. interrupta, Macdonaldia alta, M. longa, Ericara salmonea, Lycodes digitatus, L. concolor, Macrurus lepturus, M. dorsalis, M. firmisquamis, M. magnus, M. suborbitalis, Hippoglossoides robustus.* The new genus described is *Ericara* of Alepocephalidæ.

177.

1897. VERRILL, A. E., and KATHARINE J. BUSH. Revision of the genera of Ledidæ and Nuculidæ of the Atlantic coast of the United States. [Brief contributions to zoology from the museum of Yale University, No. L.]

Am. Jour. Sci. 1891, 4th series, vol. 3, No. 13, Jan., pp. 51-63, 21 figs.

Based in part on *Albatross* collections. The new genera and species described are *Ledella, Megayoldia, Orthoyoldia, Yoldiella, Microyoldia, Tindariopsis; Ledella parva, Yoldiella inflata, Neilonella subovata, Tindaria callistiformis.*

178.

1897. RIDGWAY, ROBERT. Birds of the Galapagos Archipelago.

Proc. U. S. Nat. Mus. 1896, vol. 19, pp. 459-670.

Embodies practically all that is known of the avifauna of the Galapagos. Contains analytical keys, lists of species known to each island of the archipelago, maps showing distribution of species, bibliography, etc.

179.

1897. MAAS, OTTO. Reports on an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands, by the *Albatross*, in 1891. XXI. Die Medusen.

Mem. Mus. Comp. Zool. 1897, vol. 32, pp. 7-92, 14 pls., 1 map.

A systematic arrangement of the species, with notes. The genus *Chiarella* and the following species are described as new: *Stomotoca divisa, Chiarella centripetalis, Melicertum proboscifer, Homœonema typicum, Aglaura prismatica, Atolla gigantea, A. alexandri, Charybdea arborifera, Nauphanta albatrossi.*

180.

1897. HANSEN, H. J. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, carried on by the U. S. F. C. steamer *Albatross*, during 1891. XXII. The Isopoda.

Bull. Mus. Comp. Zool. 1897, vol. 31, pp. 93-130, 6 pls., chart.

The following genera and species are described as new: *Cryptione, Munidion,*

180.

1897. HANSEN, H. J.—Continued.

Parargeia, Bathygyge; Eurycope pulchra, E. scabra, Æga maxima, A. acuminata, A. plebeia, A. longicornis, Rocinela laticauda, R. modesta, Irona foveolata, Cryptione elongata, Munidion princeps, Pseudione galacanthæ, Parargeia ornata, Bathygyge grandis.

181.

1897. RATHBUN, MARY J. Synopsis of the American species of Ethusa, with description of a new species.

Proc. Biol. Soc. Wash. 1897, vol. 11, pp. 109-110.

Ethusa tenuipes is described as new.

182.

1897. RATHBUN, MARY J. Synopsis of the American species of *Palicus* Philippi (= *Cymopolia roux*), with descriptions of six new species.

Proc. Biol. Soc. Wash. 1897, vol. 11, pp. 93-99.

Based partly on *Albatross* collections. New species described: *Palicus alternatus, P. faxoni, P. isthmius, P. angustus, P. depressus, P. bahamensis.*

183.

1898. AGASSIZ, A. Reports on dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, carried on by the steamer *Albatross* during 1891. XXIII. Preliminary report on the Echini.

Bull. Mus. Comp. Zool. 1898, vol. 32, pp. 69-86, 13 pls., chart.

The following new genera and species are described: *Dialithocidaris, Dermatodiadema, Plexechinus, Phrissocystis, Spatagodesma; Dorocidaris panamensis, Goniocidaris doederleini, Porocidaris milleri, P. cobosi, Salenia miliaris, Dialithocidaris gemmifera, Dermatodiadema globulosum, D. horridum, Phormosoma panamensis, P. hispidum, Pourtalesia tanneri, Plexechinus cinctus, Echinocrepis setigera, Urechinus giganteus, Cystechinus loveni, C. rathbuni, Phrissocystis aculeata, Homolampas hastata, Aerope fulva, Schizaster latifrons, S. townsendi, Periaster tenuis, Brissopsis columbaris, Toxobrissus pacificus.*

184.

1898. BENEDICT, JAMES E. The Arcturidæ in the U. S. Nat. Mus.

Proc. Biol. Soc. Wash., vol. 12, pp. 41-51.

Based in part on *Albatross* collections. The following species are described as new: *Arcturus longispinis, A. glabrus, A. beringanus, A. tenuispinis, A. multispinis, A. murdochi, Astacilla diomedeæ, A. cæca.*

185.

1898. DRAKE, F. J. Records of observations made on board the U. S. F. C. steamer *Albatross* during the year ending June 30, 1896.

Rep. U. S. F. C. 1896, part 22, pp. 357-386.

An abstract from the report of the commanding officer. General contents: Fur-seal investigations at Pribilof and Commander islands; pelagic sealing inquiries and patrol of Bering Sea; fishery investigations in Puget Sound and off southern California; tabular records of dredging and other operations.

186.

1898. JORDAN, DAVID STARR, et al. Second preliminary report of the Bering Sea fur-seal investigations, 1897.

Treas. Dept. Doc. No. 1994, 48 pp.

A preliminary report. See No. 187. The *Albatross* was detailed for these investigations.

187.

1898-99. JORDAN, DAVID STARR, et al. The fur seals and fur-seal islands of the North Pacific Ocean. By D. S. Jordan, with the following official associates: Leonhard Stejneger, Frederic A. Lucas, Jefferson F. Moser, C. H. Townsend, G. A. Clark, Joseph Murray.

Treas. Dept. Doc. No. 2017, pts. 1 to 4; many illustrations; charts.

The report of an inquiry into the condition and needs of the fur-seal herds of North Pacific Ocean and Bering Sea. An exhaustive study of the fur seals and fur-seal fisheries. Part 3 contains many special papers on natural history, based on the investigations of the *Albatross*, which was detailed for the use of the commission. Those in which new marine species are described are:

The species of Callorhinus. By D. S.

187.

1898–99. JORDAN, DAVID S.—Cont'd.

Jordan and G. A. Clark. *C. alascanus* and *C. curilensis* are described as new.

Tunicates of the Pribilof Islands. By W. E. Ritter. New species: *Styela greeleyi, Dendrodoa tuberculata, D. subpedunculata, Polyclinum globosum, P. pannosum, Aplidiopsis jordani, Amaroucium kincaidi, A. pribilovense, A. snodgrassi, Synoicum irregulare.*

List of crustacea known to occur on or near the Pribilof Islands. By M. J. Rathbun. New species: *Crangon communis, Nectocrangon crassa, Spirontocaris barbata, S. avina.*

The fishes of Bering Sea. By D. S. Jordan and C. H. Gilbert. New genera and species: *Archistes, Stelgistrum, Crystallichthys, Prognurus, Verasper, Osmerus albatrossis, Therobromus callorhini, Sebastodes aleutianus, Archistes plumarius, Stelgistrum steinegeri, Ceratocottus lucasi, Myoxocephalus mednius, Nautiscus pribilovius, Podothecus hamlini, P. thompsoni, Crystallichthys mirabilis, Prognurus cypselurus, Bogoslovius clarki, Hippoglossoides hamiltoni, Verasper moseri.*

188.

1898. RATHBUN, MARY J. The Brachyura of the biological expedition to the Florida Keys and the Bahamas in 1893.

Bull. Lab. Nat. Hist. Univ. of Iowa, vol. 4, pp. 250–294, pls. 1–9.

Based in part on *Albatross* collections. The following genera and species are described as new: *Lophopanopeus, Eupanopeus, Tetraxanthus, Chasmocarcinus, Collodes armatus, Actæa bifrons, Pilumnus spinosissimus, P. andrewsii, P. holosericus, Xanthias nuttingi, Micropanope truncatifrons, Hypopeltarium dextrum, Trachycarcinus spinulifer, Pilumnoplax americanus, Chasmocarcinus typicus, C. obliquus, Frevillea quadridentata, Calappa sulcata, Spelœophorus elevatus, Iliacantha liodactylus, Cyclodorippe granulata.*

189.

1898. VERRILL, ADDISON E., and KATHARINE J. BUSH. Revision of the deep-water Mollusca of the Atlantic coast of North America, with descriptions of new genera and species. Part I. Bivalvia.

Proc. U. S. Nat. Mus., vol. 20, pp. 775–901.

Based largely on *Albatross* dredgings. The following described as new: *Kelli-*

189.

1898. VERRILL, ADDISON E., and KATHARINE J. BUSH—Continued.

opsis, Axinulus, Axinodon, Leptaxinus, Martesia fragilis, Abra longicallis americana, Montacuta bidentata tenuis, M. striatula, M. casta, M. cuneata, M. triquetra, M. bidentata fragilis, Cryptodon insignis, C. croulinensis altus, C. equalis, C. planus, C. obsoletus, C. brevis, C. inequalis, C. simplex, C. pygmæus, C. ovatus, Axinopsis cordata, A. orbiculata inequalis, Axinodon ellipticus, Leptaxinus minutus, Cuspidaria turgida, C. media, C. parva, C. ventricosa, C. formosa, C. fraterna, Cardiomya abyssicola, C. gemma, Halonympha striatella, Myonera pretiosa, Cetoconcha atypha, Lyonsiella cordata, Lyonsia granulifera, Cliodophora inornata, Kennerlia brevis, Periploma affinis, Limatula regularis, L. nodulosa, L. hyalina, Bathyarca abyssorum, B. anomala, Limopsis sulcata, L. profundicola, Nucula subovata, Yoldia casta, Yoldiella iris, Y. subangulata, Y. fraterna, Y. curta, Y. pachia, Y. inconspicua, Y. lenticula amblia, Y. minuscula, Y. dissimilis, Malletia abyssorum, M. polita, Tindaria lata, Solemya grandis, Ledella messanensis sublevis.

190.

1898. MOSER, J. F., Lieut. Comdr. U. S. N. Report on the work of the steamer *Albatross* (abstract).

Rep. U. S. F. C. 1897, part 23, pp. CXLVII–CLXXI.

An abstract from report of commanding officer. Voyage to Pribilof, Commander, Kuril, and Robben islands, with fur-seal investigation commission, returning via Japan and Hawaiian Islands; fishery investigations off southern California; notes on results of dredge hauls; tabular records of dredging, and other operations.

191.

1898. MARK, E. L. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, carried on by the U. S. F. C. steamer *Albatross*, during 1891. XXIV.—Preliminary report on Branchiocerianthus urceolus, a new type of Actinian.

Bull. Mus. Comp. Zool. 1890, vol. 32, pp. 147–154, 3 pls.

192.

1898. RICHARDSON, HARRIET. Description of a new parasitic Isopod of the genus Æga, from the southern coast of the United States.

Proc. Biol. Soc. Wash. 1898, vol. 12, pp. 39-40.

Æga ecarinata from *Albatross* dredging is described as new.

193.

1899. FLINT, JAMES M. Recent Foraminifera. A descriptive catalogue of specimens dredged by the U. S. F. C. steamer *Albatross*.

Ann. Rep. Smith. Institution 1897; Rep. U. S. Nat. Mus., Part I, pp. 249-350, 80 pls.

A systematic discussion of the species, with analytical keys. Contains chapter on the structure and character of the Foraminifera. The following are described as new species: *Crithionina pisum hispida, Psammosphæra fusca testacea, Saccammina consociata, Reophax difflugiformis testacea, R. bilocularis, Thurammina favosa, T. cariosa, Biloculina dehiscens, Miliolina angularis, Peneroplis pertusus discoideus, Lagena castanea, Cristellaria limbata, Ramulina proteiformis.*

194.

1899. DALL, W. H. Synopsis of the American species of the family Diplodontidæ.

Jour. of Conch. (Brit.), Oct., pp. 244-246.

Diplodonta platensis from *Albatross* collections is described as new.

195.

1899. DALL, WILLIAM H. Synopsis of the recent and Tertiary Leptonacea of North America and the West Indies.

Proc. U. S. Nat. Mus., vol. 21, pp. 874-897, 2 pls.

Based in part on *Albatross* collections. The following species are described as new: *Sportella pilsbryi, S. californica, S. stearnsii, Anisodonta corbuloidea, Erycina linella, E. emmonsi, E. periscopiana, E. fernandina, E. compressa, Bornia barbadensis, B. retifera, Mysella barbadensis, M. aleutica, M. pedroana, Montacuta floridana, M. minuscula, M. limpida, M. percompressa.*

196.

1899. BUSH, KATHERINE J. Revision of the marine Gastropods referred to Cyclostrema, Adeorbis, Vitrinella, and related genera, with descriptions of some new genera and species belonging to the Atlantic fauna of America.

Trans. Conn. Acad. Arts and Sciences 1899, vol. 10, pp. 97-143.

Based in part on *Albatross* collections. New genera and species described are as follows: *Lissospira, Leptogyra, Mölleriopsis, Choristella, Cyclostremella, Pseudorotella minuscula, Vitrinella tryoni, Circulus dalli, Lissospira striata, L. (?) convexa, L. (Ganesa) abyssicola, L. (Ganesa?) rarinota, Granigyra spinulosa, Leptogyra verrilli, L. inconspicua, L. eritmeta, Mölleriopsis abyssicola, Choristella leptalea, C. brychia, Cyclostremella humilis.*

197.

1899. LÜTKEN, C. F., and TH. MORTENSEN. Reports of an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, by the steamer *Albatross*, during 1891. XXV.—The Ophiuridæ.

Mems. Mus. Comp. Zool. 1899, vol. 23, pp. 93-208, 22 pls., chart.

Contains a systematic account of the species, bibliography, etc. The genus *Gymnophiura* and the following species are described as new: *Ophiozona contigua, O. alba, Ophiernus seminudus, O. annectens, O. polyporus, Gymnophiura mollis, G. cærulescens, Ophioglypha superba, O. abcisa, O. obtecta, O. tumulosa, O. plana, O. scutellata, O. nana, O. divisa, Ophiocten pacificum, Ophiomusium glabrum, O. diomedeæ, O. variabile, Ophiactis profundi, Amphiura serpentina, A. gymnogastra, A. polyacantha, A. seminuda, A. brevipes, A. gymnopora, A. diomedeæ, A. assimilis, A. granulata, A. gastracantha, A. notacantha, A. papillata, Ophionereis nuda, Ophiochiton carinatus, Ophiacantha pacifica, O. inconspicua, O. spinifera, O. mondiformis, O. costata, O. contigua, O. hirta, O. paucispina, Ophiomitra granifera, O. partita, O. lævis, Ophiothrix galapagensis, Ophiomyxa panamensis, Sigsbeia lineata, Asteronyx dispar, A. excavata, A. plana, Astroschema sublæve, Gorgonocephalus diomedeæ.*

198.

1899. GARMAN, S. Reports of an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, by the *Albatross* during 1891. XXVI. The Fishes.

Mems. Mus. Comp. Zool. 1899, vol. 24, 431 pp., 97 pls., chart.

An important report with a separate volume of plates, many of which are colored. Contains a general discussion of deep-sea fishes, special discussions and descriptions, chapters on lateral canal system, distribution of genera, lists of species and stations, bibliography, etc. New genera and species described are as follows: *Centristhmus*, *Leucicorus*, *Bothrocaropsis*, *Ectreposebastes*, *Dolopicthhys*, *Dibranchopsis*, *Dibranchichthys*, *Eretmichthys*, *Monomeropus*, *Pseudonus*, *Holcomycteronus*, *Sciadonus*, *Microlepidium*, *Leptophycis*, *Lychnopoles*, *Dactylostomias*, *Leptochilichthys*, *Congrosoma*, *Halieutopsis*, *Raja badia*, *Centroscyllium nigrum*, *Liopropoma longilepis*, *Centristhmus signifer*, *Pontinus furcirhinus*, *Ectreposebastes imus*, *Hoplostethus pacificus*, *Trachichthys mento*, *Caulolepis subulidens*, *Melamphaes nigrofulvus*, *M. maxillaris*, *M. frontosus*, *Trichiurus nitens*, *Teuthis elegans*, *Chiasmodon subniger*, *Lophiomus spilurus*, *L. caulinaris*, *Dolopichthys allector*, *Chaunax coloratus*, *Oncocephalus porrectus*, *Halieutopsis tumifrons*, *Dibranchus hystrix*, *D. scaber*, *D. asper*, *Dibranchichthys nudivomer*, *Malthopsis sparsa*. *M. erinacea*, *M. spinosa*, *M. spinulosa*, *Prionotus frontalis*, *Peristedium barbiger*, *P. crustosum*, *Paraliparis grandiceps*, *P. attenuatus*, *P. angustifrons*, *P. latifrons*, *Callionymus atrilabiatus*, *Entomacrodus cruentatus*, *Bothrocaropsis alalonga*, *B. rictolata*, *B. elongata*, *Gymnelis conorhynchus*, *Lycodopsis scaurus*, *Lycodes anguis*, *L. serpens*, *L. incisus*, *L. cicatrifer*, *Phucocœtes suspectus*, *Maynea bulbiceps*, *Leucicorus lusciosus*, *Mixonus caudalis*, *Dicrolene filamentosa*, *D. nigra*, *D. pullata*, *Porogadus longiceps*, *P. atripectus*, *P. breviceps*, *Monomitopus torvus*, *Monomeropus malispinosus*, *Bassozetus nasus*, *Diplacanthopoma jordani*, *Holcomycteronus digittatus*, *Eretmichthys pinnatus*, *E. ocella*, *Catœtyx simus*, *Pseudonus acutus*, *Acanthonus spinifer*, *Sciadonus pedicellaris*, *Lamprogrammus illustris*, *Microlepidium grandiceps*, *Leptophycis filifer*, *Merluccius angustimanus*, *Antimora rhina*. *Lœmonema gracillipes*, *Physiculus longipes*, *P. rastrelliger*, *Bregmaceros longipes*, *Macrurus bulbiceps*, *M. bucephalus*, *M. liraticeps*, *M. barbiger*, *M. capito*, *M. leucophœus*, *M. boops*, *M. fragilis*, *M. carminifer*, *M. convergens*, *M. orbitalis*, *M. loricatus*, *M. cuspidatus*, *M. gracillicauda*, *M. latirostratus*, *M. anguliceps*, *M. latinasutus*, *M. trichiurus*, *M. tenuicauda*, *M. canus*, *Hippoglossina vagrans*, *Citharichthys maculifer*, *Monolene maculipinna*, *M. dubiosa*, *Symphurus varius*, *S. microlepis*, *Sternoptyx obscura*, *Argyropelecus lychnus*, *A. caninus*, *A. affinis*, *Polyipnus laternatus*, *Valenciennellus stellatus*, *Maurolicus oculatus*, *M. lucetius*, *Lychnopoles argenteolus*, *Cyclothone signata*, *C. acclinidens*, *Synodus simulans*, *S. acutus*, *Chlorophthalmus mento*, *Scopelengys dispar*, *Bathypterois ventralis*, *B. pectoralis*, *Ipnops agassizii*, *Myctophum oculeum*, *M. tenuiculum*, *M. luminosum*, *M. aurolaternatum*, *M. nitidulum*, *M. laternatum*, *M. atratum*, *Chauliodus barbatus*, *C. dentatus*, *Stomias colubrinus*, *S. hexagonatus*, *S. atriventer*, *Dactylostomias filifer*, *Leptochilichthys agassizi*, *Bathytroctes alvifrons*, *B. alveatus*, *B. inspector*, *Narcetes pluriserialis*, *Alepocephalus convexifrons*, *A. asperifrons*, *A. fundulus*, *Halosaurus attenuatus*, *H. radiatus*, *Notacanthus spinosus*, *Uroconger viridens*, *Congermurœna caudalis*, *Congrosoma evermanni Ophichthys frontalis*, *O. biserialis*, *Echidna cocosa*, *E. scabra*, *Xenomystax rictus*, *Chlopsis gilbertii*, *Venefica ocella*, *V. tentaculata*, *Serrivomer sector*, *Labichthys bowersii*, *Nemichthys fronto*, *Atopichthys esunculus*, *A. sicarius*, *A. cinctus*, *A. dentatus*, *A. falcidens*, *A. acus*, *A. ophichthys*, *A. cingulus*, *A. lychnus*, *A. obtusus*, *A. longidens*, *Myxine circifrons*, *M. tridentiger*, *M. acutifrons*.

199.

1899. BEAN, BARTON A. Notes on the capture of rare fishes.

Proc. U. S. Nat. Mus., vol. 21, pp. 639, 640.

This paper contains a reference to the capture by the *Albatross* of a second specimen of *Caulolepis longidens*.

200.

1899. RATHBUN, MARY J. The Brachyura collected by the U. S. F. C. steamer *Albatross* on the voyage from Norfolk, Va., to San Francisco, Cal., 1887–88.

Proc. U. S. Nat. Mus., vol. 21, pp. 567–616.

200.

1899. RATHBUN, MARY J.—Continued.

Descriptions of 4 new genera and 31 new species: *Lipœsthesius, Ectœsthesius, Ovalipes, Tetrias, Collodes tumidus, Anamathia cornuta, Hemus analogus, Lissa tuberosa, L. aurivilliusi, Microphrys branchialis, Thyrolambrus erosus, Actœa angusta, A. inornata, Medœus lobipes, Lipœsthesius leeanus, Pilumnus spinulifer, Micropanope nitida, M. areolata, Lophopanopeus maculatus, Ectœsthesius bifrons, Portunus angustus, P. minimus, Acanthocyclus hassleri, Palicus lucasii, Eucratopsis macrophthalma, Chasmocarcinus latipes, Pinnixa brevipollex, P. affinis, Tetrias scabripes, Calappa saussurei, Hepatus lineatus, Osachila levis, Ebalia cristata, Randallia bulligera, R. agaricias.*

201.

1899. STEJNEGER, LEONHARD. Birds of the Kuril Islands.

Proc. U. S. Nat. Mus., vol. 21, pp. 269-296.

A part of the material upon which this paper is based was collected during the writer's voyage among the Kurils on the steamship *Albatross; Cepphus snowi* is described as new.

202.

1899. RICHARDSON, HARRIET. Key to the Isopods of the Pacific coast of North America, with descriptions of 22 new species.

Proc. U. S. Nat. Mus., vol. 21, pp. 815-869.

Based in part on *Albatross* collections. New genera and species: *Colidotea, Eusymmerus, Tanais alascensis, Cirolana linguifrons, Eurydice caudata, Corallana truncata, Anilocra occidentalis, Dynamene dilatata, D. tuberculosa, D. benedicti, D. glabra, Sphœroma rhomburum, S. octoneum, Tecticeps convexus, Cilicœa cordata, C. caudata gilliana, C. granulosa, Cleantis occidentalis, C. heathii, Eusymmerus antennatus, Arcturus intermedius, Ianthe triangulata, I. erostrata, Jœropsis lobata.*

203.

1899. LINNELL, MARTIN E. On the Coleopterous insects of Galapagos Islands.

Proc. U. S. Nat. Mus., vol. 21, pp. 249-268.

Based largely on *Albatross* collections. The genus *Pseudoryctes* and the following species described as new: *Calosoma howardi, Scarites galapagoensis, Distichus smithi, Amphicerus frontalis, Achryson galapagoensis, Eburia lanigera, E. bauri, Acanthoderes galapagoensis, Stomion carinipenne, S. piceum, S. bauri, Ammophorus caroli, Pedonoeces bauri, Lobopoda galapagoensis, Oxacis galapagoensis, Pantomorus galapagoensis.*

204.

1899. GILBERT, CHARLES H. Report on fishes obtained by the steamer *Albatross* in the vicinity of Santa Catalina Island and Monterey Bay.

Rep. U. S. F. C. 1898, part 24, pp. 25-29, 2 pls.

Collections from shore and dredging stations; the following species described as new: *Radulinus boleoides, Averruncus sterletus.*

205.

1899. GILBERT, CHARLES HENRY. On the occurrence of Caulolepis longidens Gill, on the coast of California.

Proc. U. S. Nat. Mus., vol. 21, pp. 565, 566.

The species was originally taken by the *Albatross* off the coast of New Jersey.

206.

1899. WOODWORTH, W. McM. Reports on the dredging operations off the west coast of Central America, to the Galapagos, to west coast of Mexico, and in the Gulf of California, carried on by the steamer *Albatross* during 1891. XXVII. Preliminary account of Planktonemertes agassizii, a new pelagic Nemertean.

Bull. Mus. Comp. Zool. 1899, vol. 35, pp. 1-4, 1 pl.

207.

1899. MOSER, Commander JEFFERSON F. The salmon and salmon fisheries of Alaska. Report of the operations of the *Albatross* for the year ending June 30, 1898.

Bull. U. S. F. C. 1898, part 18, pp. 1-178, 63 pls., 26 figs., cht.

An investigation of the condition and needs of the Alaskan salmon fishery;

207.

1899. MOSER, Commander JEFFERSON F.—Continued.

contains chapters on the salmon of Alaska, fishery and cannery methods, depletion of streams, statistics of salmon industry, etc.

208.

1899. SMITH, HUGH M. Exploring expedition to the mid-Pacific Ocean.

Science (U. S.), June 9, pp. 796-798.

An outline of the proposed voyage of the steamship *Albatross* under direction of Alexander Agassiz, with a list of officers.

209.

1899. SMITH, HUGH M. The deep-sea exploring expedition of the steamer *Albatross*.

Nat. Geog. Mag., vol. 10, No. 8, pp. 290-296, 3 ills.

An outline of the proposed voyage to the tropical Pacific under the direction of Alexander Agassiz.

210.

1899. VERRILL, A. E. Descriptions of imperfectly known and new Actinians, with critical notes on other species. III. [Brief Contributions to Zoology from the Museum of Yale College, No. LX.]

Am. Jour. Sci., fourth series, vol. 7, 1899, pp. 143-146, 20 figs.

Raphactis nitida, from *Albatross* dredgings, is described as new genus and species.

211.

1899. VERRILL, A. E. Revision of certain genera and species of starfishes, with descriptions of new forms.

Trans. Conn. Acad. Arts and Sciences 1899, vol. 10, pp. 145-234, 8 pls.

Based in part on *Albatross* collections. The new genera and species described are as follows: *Pyrenaster*, *Peltaster*, *Litonotaster*, *Eugoniaster*, *Antheniaster*, *Cladaster*, *Acodonaster*, *Prionaster*, *Sideriaster*, *Tosia* (*Plinthaster*) *compta*, *T.* (*Plinthaster*) *nitida*, *Peltaster hebes*, *Hippasteria caribœa*, *Cladaster rudis*, *Mediaster agassizii*, *Pseudarchaster* (?) *hispidus*, *P. granuliferus*, *P. ordinatus*, *Odontaster setosus*, *O. robustus*, *Prionaster elegans*, *Sideriaster grandis*, *Margi naster austerus*.

212.

1899. VERRILL, A. E. North American Ophiuroidea. I. Revision of certain families and genera of West Indian Ophiurans. II. A faunal catalogue of the known species of West Indian Ophiurans.

Trans. Conn. Acad. Arts and Sciences 1899, vol. 10, pp. 301-386, 2 pls.

Based in part on *Albatross* collections. New genera and species: *Amphioplus*, *Ophiochondrella*, *Ophiobyrsella*, *Astrogeron*, *Amphiocnida*, *Astrocladus*, *Amphioplus agassizii*, *Ophiacantha* (*Ophiectodia*) *pectinula*, *Ophioscolex fragilis*.

212a.

1899–1900. AGASSIZ, A. Explorations of the *Albatross* in the Pacific Ocean. Letters to U. S. Commissioner of Fisheries.

Science, Dec., 1899; Jan. and April, 1900.

Preliminary reports submitted during the voyage. See No. 213.

213.

1900. AGASSIZ, A. Explorations of the *Albatross* in the Pacific Ocean. [Extract from a letter to Hon. George M. Bowers, U. S. Commissioner of Fish and Fisheries, dated Papeete Harbor, Tahiti Island, Sept. 30, 1899, on the trip of the *Albatross* from San Francisco to Papeete.]

Am. Jour. Sci. 1900, fourth series, vol. 9, No. 49, Jan., pp. 33-43.

The same. II. The Paumotus. [Letter No. 2, dated Papeete Harbor, Nov. 6, 1899, etc.]

Am. Jour. Sci. 1900, fourth series, vol. 9, No. 50, Feb., pp. 109-116.

The same. III. [Letter No. 3, dated Suva Harbor, Fiji Islands, Dec. 11, 1899, etc.]

Am. Jour. Sci., fourth series, vol. 9, No. 51, Mar., 1900, pp. 193-198.

The same. IV. [Letter No. 4, Yokohama, Japan, Mar. 5, 1900, etc.]

Am. Jour. Sci., fourth series, vol. 9, No. 53, May, 1900, pp. 369-374.

Preliminary reports submitted during the voyage. The same series was

213.

1900. AGASSIZ, A.—Continued.
published in Science (U. S.) for Dec., 1899, Jan., and April, 1900. Letter No. 3 describes successful haul of the dredge 75 miles to the eastward of Tongatabu, in 4,173 fathoms, the deepest haul ever made. The net contained silicious sponges and brown volcanic mud, with radiolarians. Letter No. 4 records the deepest sounding of the *Albatross*, near Guam, in 4,813 fathoms.

214.

1900. MOORE, H. F. The *Albatross* South Sea Expedition.

Rep. U. S. F. C. 1900, part 26, pp. 137-161.

An account of the expedition, in charge of Alexander Agassiz, for deep-sea investigations and the study of coral reefs. Sketch of the voyage from San Francisco, Cal., to Yokohama, Japan, via the Marquesas, Paumotus, Society, Cook, Tonga, Fiji, Gilbert, Marshall, Caroline, and Ladrone islands.

215.

1900. BAKER, RAY STANNARD. The Bottom of the Sea.

McClure's Mag., Dec., pp. 160-170, 8 cuts.

An authorized account of the researches of Sir John Murray, in the Science of Oceanography. Contains references to the work of the *Albatross* in the Pacific Ocean.

216.

1900. DALL, WILLIAM H. Synopsis of the Solenidæ of North America and the Antilles.

Proc. U. S. Nat. Mus., vol. 22, pp. 107, 112.

Based in part on *Albatross* collections. New species here described: *Solen mexicanus*, *Ensis californicus*, *Tagelus poeyi*.

217.

1900. RATHBUN, MARY J. Synopsis of North American Invertebrates. VII. The cyclometopous or cancroid crabs of North America.

Am. Nat., vol. 34, Feb., pp. 131-143.

Based in part on *Albatross* collections. Contains analytical keys and bibliography.

218.

1900. NUTTING, CHARLES CLEVELAND. American Hydroids. Part I. The Plumularidæ.

U. S. Nat. Mus. Special Bulletin, 285 pp., 34 pls.

Contains morphology of the Plumularidæ; systematic discussion; bibliography. Based largely on the dredgings of the *Albatross*. New genera and species described are as follows: *Monotheca*, *Calvinia*, *Thecocarpus*, *Nuditheca*, *Plumularia altitheca*, *P. floridana*, *P. alternata*, *P. inermis*, *P. goodei*, *P. corrugata*, *P. palmeri*, *P. virginiæ*, *P. profunda*, *P. dendritica*, *P. paucinoda*, *Antennularia americana*, *A. rugosa*, *A. geniculata*, *A. pinnata*, *Monotheca margaretta*, *Antennopsis distans*, *A. longicorna*, *A. nigra*, *Schizotricha dichotoma*, *S. parvula*, *Diplopteron quadricorne*, *D. grande*, *D. longipinna*, *Polyplumularia armata*, *Aglaophenia flowersi*, *A. elegans*, *A. aperta*, *A. cristifrons*, *A. contorta*, *A. mammillata*, *A. minima*, *A. rathbuni*, *A. latirostris*, *A. octocarpa*, *A. bicornuta*, *Calvinia mirabilis*, *Thecocarpus normani*, *T. benedicti*, *Cladocarpus obliquus*, *C. septatus*, *C. flexuosus*, *C. grandis*, *C. carinatus*, *Aglaophenopsis distans*, *A. verrilli*, *Lytocarpus clarkei*, *L. curtus*, *L. furcatus*, *Halicornaria longicauda*, *H. variabilis*.

219.

1900. STEJNEGER, LEONHARD. Reports on dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the *Albatross*, during 1891. XXVIII. Description of two new lizards of the genus Anolis, from Cocos and Malpelo islands.

Bull. Mus. Comp. Zool. 1900, vol. 36, pp. 161-164, 1 plate.

Anolis agassizi from Malpelo and *A. townsendi* from Cocos are described as new species.

220.

1901. BENEDICT, JAMES E. The hermit crabs of the *Pagurus bernhardus* type.

Proc. U. S. Nat. Mus. vol. 23, pp. 451-466.

Based in part on *Albatross* collections.

221.

1901. DALL, WILLIAM H. Synopsis of the family Tellinidæ and of the North American species.

Proc. U. S. Nat. Mus., vol. 23, pp. 285–326.

Based in part on *Albatross* collections. New species described: *Tellina georgiana, T. iheringi, T. americana, T. promera, T. flagellum, T. colorata, T. texana, T. reclusa, T. pacifica, T. pristiphora, T. leucogonia, T. meropsis, T. amianta, T. paziana, T. macneilii, T. suffusa, T. cerrosiana, T. panamensis, T. recurva, T. santarosæ, Macoma phenax, M. extenuata, M. tageliformis, M. krausei, M. sitkana, M. alaskana, M. panamensis.*

222.

1901. DALL, WILLIAM H. Synopsis of the family Cardiidæ and of the North American species.

Proc. U. S. Nat. Mus., vol. 23, pp. 381–392.

Based in part on *Albatross* collections.

223.

1901. RICHARDSON, HARRIET. Key to the Isopods of the Atlantic coast of North America, with descriptions of new and little-known species.

Proc. U. S. Nat. Mus., vol. 23, pp. 493–579.

Based in part on *Albatross* collections. The genus *Synurops* and the following species described as new: *Calathura crenulata, Cirolana obtruncata, C. albida, Corallana sexticornis, Ægathoa linguifrons, Sphæroma yucatanum, Dynamene angulata, Cilicæa linguicauda, Erichsonella floridana, Arcturus caribbæus, Eurycope caribbea, Synuropus granulatus, Philoscia richmondi, Sphæroniscus portoricensis.*

224.

1901. JORDAN, DAVID STARR, and JOHN OTTERBEIN SNYDER. A list of fishes collected in Japan by Keinosuke Otaki and by the U. S. F. C. steamer *Albatross*, with descriptions of 14 new species.

Proc. U. S. Nat. Mus., vol. 23, pp. 335–380, 12 pls.

The following genera and species are described as new: *Ishikauia, Otakia, Konosirus, Bryttosus, Eteliscus, Trifissus, Rhombiscus, Kareius, Usinosita, Zebrias, Areliscus, Insidiator, Chimæra*

224.

1901. JORDAN, DAVID STARR, and JOHN OTTERBEIN SNYDER—Cont'd.

phantasma, Gobio biwæ, G. mayedæ, Otakia rasborina, Congrellus meeki, Pseudotolithus mitsukurii, Sebastodes hakodatis, S. scythropus, Scorpæna onaria, Callionymus beniteguri, Trifissus ioturus, Blennius yatebei, Cœlorhynchus kishinouyei, Verasper otakii.

225.

1901. Cruise of the U. S. F. C. steamer *Albatross* in the Tropical Pacific, August 1899–March 1900, and list of the stations occupied.

Printed by Mus. Comp. Zool., 1901, pp. 45–64.

Abstract from log of steamer *Albatross*. The first part gives daily positions of the ship; the second, positions of stations with temperature observations, depth, nature of bottom, etc. Total distance run, San Francisco to Yokohama, 15,122 miles.

226.

1901. JORDAN, DAVID STARR, and JOHN OTTERBEIN SNYDER. A review of the lancelets, hag-fishes, and lampreys of Japan, with a description of two new species.

Proc. U. S. Nat. Mus., vol. 23, pp. 725–734, 1 pl.

Based in part on *Albatross* collections. *Branchiostoma nakagawæ* and *Myxine garmani* described as new.

227.

1901. BENEDICT, JAMES E. Four new symmetrical hermit crabs (Pagurids) from the West India region.

Proc. U. S. Nat. Mus., vol. 23, pp. 771–776.

Based on *Albatross* dredgings. Species described: *Cancellus ornatus, C. spongicola, Pylocheles partitus, Mixtopagurus gilli.*

228.

1901. RIDGWAY, ROBERT. The birds of North and Middle America. Part I. Fringillidæ.

Bull. U. S. Nat. Mus. No. 50, 1901, pp. XXXI, 715, 20 pls.

Contains descriptions of all North American Fringillidæ from *Albatross* collections, including those of the Galapagos and West Indian islands.

228a.

1901. DALL, WILLIAM HEALEY. Synopsis of the Lucinacea and of the American species.

Proc. U. S. Nat. Mus., vol. 23, pp. 779–833, 4 pls.

Based in part on *Albatross* collections. The following species, chiefly from *Albatross* and *Fish Hawk* dredgings, described as new: *Thyasira excavata, T. tomeana, T. magellanica, Axinopsis viridis, Diplodonta aleutica, Codakia colpoica, C. cubana, C. portoricana, C. mexicana, C. galapagana, C. chiquita, Phacoides bermudensis, P. crenella, P. amiantus, P. lamprus, P. heroicus, P. approximatus.*

229.

1901. COCKERELL, T. D. A. On a slug of the genus Veronicella from Tahiti.

Proc. U. S. Nat. Mus., vol. 23, pp. 835–836.

Veronicella agassizi from *Albatross* collections described as new, with list of recently described Pacific species.

229a.

1901. JORDAN, DAVID STARR, and JOHN OTTERBEIN SNYDER. A review of the apodal fishes or eels of Japan, with descriptions of 19 new species.

Proc. U. S. Nat. Mus., vol. 23, pp. 837–890, 22 figs.

Based in part on *Albatross* collections. New genera: *Xyrias, Æmasia.* New species: *Synaphobranchus iraconis, S. jenkinsi, Leptocephalus crebennus, L. kiusiuanus, L. riukiuanus, L. mystromi, L. retrotinctus, Chlopsis flerasfer, Muræniehthys owstoni, M. hattœ, M. aoki, Sphagebranchus moseri, Pisoodonophis zophistius, Xyrias revulsus, Microdonophis erabo, Ophichthus asakusœ, O. tsuchidœ, Æmasia lichenosa, Echidna kishinouyei, Uropterygius okinawœ.*

229b.

1901. STEJNEGER, LEONHARD. Diagnosis of a new species of Iguanoid lizard from Green Cay, Bahama Islands.

Proc. U. S. Nat. Mus., vol. 23, p. 471.

Leiocephalus virescens from *Albatross* collections described as new.

[NOTE.—The preceding are all American publications. The few titles of European publications which follow either relate directly to the work of the *Albatross* or are of special interest in this connection.]

230.

GILL, THEODORE, and JOHN A. RYDER. Note on Eurypharynx and an allied new genus.

Zool. Anz. 1884, 7, pp. 119–123.

Based on *Albatross* dredgings. Comments on the relationships and characters of Gastrostomus and Eurypharynx.

231.

GILL, THEODORE. What are the Saccopharyngoid fishes?

Nature, 1884, vol. 29, Jan. 10, p. 236.

Based on *Albatross* dredgings. A discussion of the relationships and characters of the Lyomeri.

232.

SCHULZE, FRZ. EILHARD. Amerikanische Hexactinelliden nach dem Materiale der Albatross-Expedition. Herausgegeben mit Unterstützung d. kgl. preuss. Akademie der Wissenschaften, 1899. Jena, Gust. Fischer. 4°, 126 pp. Atlas von 19 Taf.

The following genera and species are described as new: *Calycosoma, Calycosaccus, Aphorme, Acanthosaccus, Claviscopulia, Bathyxiphus, Hyalonema schmidti, H. hercules, H. populiferum, H. ovuliferum, Holascus undulatus, Calycosoma validum, Calycosaccus ijimai, Caulophacus agassizii, Aphorme horrida, Bathydorus uncifer, Acanthascus plutei, Staurocalyptus solidus, S. fasciculatus, Rhabdocalyptus tener, R. nodulosus, R. asper, R. mirabilis, Acanthosaccus tenuis, Farrea aculeata, F. convolvulus, Eurete erectum, claviscopulia intermedia, Chonelasma tenerum, Bathyxiphus subtilis.*

233.

MURRAY, Sir JOHN. Address to the geographical section of the British association.

Scottish Geog. Mag., 1899, vol. 15, Oct., pp. 505–522, map.

An important summary of the state of oceanographic science. Contains a reference to the investigations of the *Albatross* in the Pacific Ocean.

PAPERS IN PREPARATION RELATING TO WORK OF THE ALBATROSS.

In preparation for the Bulletin of the U. S. Fish Commission:

Alaska Salmon Investigations in 1900. Commander J. F. Moser.
Alaska Salmon Investigations in 1901. Commander J. F. Moser.
Report on the cruise of the U. S. Fish Commission steamer *Albatross*, in the South Seas, 1899-1900. Commander J. F. Moser.

The following are in preparation for publication by the Museum of Comparative Zoology, Cambridge:

Reports on the Results of the Expedition of 1891 of the U. S. F. C. steamer *Albatross*, Lieut. Commander Z. L. Tanner, U. S. N., commanding, in charge of Alexander Agassiz:

Pelagic Fauna. A. Agassiz.
Echini. A. Agassiz.
Panamic Deep-Sea Fauna. A. Agassiz.
Sagittæ. K. Brandt.
Thalassicolæ. K. Brandt.
Siphonophores. C. Chun.
Eyes of Deep-Sea Crustacea. C. Chun.
Mollusks. W. H. Dall.
Cirripeds. H. J. Hansen.
Ascidians. W. A. Herdman.
Antipathids. S. J. Hickson.
Cephalopods. W. E. Hoyle.
Deep-Sea Corals. G. von Koch.
Solenogaster. C. A. Kofoid.
Phosphorescent Organs of Fishes. R. von Lendenfeld.
Branchiocerianthus. E. L. Mark.
Bottom Specimens. John Murray.
Alcoholic Birds. Robert Ridgway.
Pteropods and Heteropods. P. Schiemenz.
Starfishes. H. Ludwig.
Alcyonarians. Theo. Studer.
Salpidæ and Doliolidæ. M. P. A. Traüstedt.
Halobatidæ. E. P. Van Duzee.
Sipunculids. H. B. Ward.
Sponges. H. V Wilson.
Nemerteans and Annelids. W. McM. Woodworth.

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of Alexander Agassiz, on the U. S. F. C. steamer *Albatross*, from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., commanding:

General Report of the Expedition. A. Agassiz.
Coral Reefs of the Tropical Pacific. A. Agassiz.
Echini. A. Agassiz.
Acalephs. A. Agassiz and A. G. Mayer.
Earthworms. F. E. Beddard.
Mollus s. W. H. Dall.
Volcanic Rocks. Reginald A. Daly.
Sharks' Teeth from the Red Clay. C. R. Eastman.
Coralliferous Limestones.
Crustacea. Walter Faxon.
Foraminitera and Radiolaria. James M. Flint.
Insects. S. Henshaw and A. G. Mayer.
Cephalopods. W. E. Hoyle.
Copepods. A. Kramer.
Starfishes and Ophiurans. H. Ludwig.
Genus Partula. A. G. Mayer.
Holothurians. K. Mitsukuri.
Pelagic Crustacea. H. F. Moore.
Ostracods. G. W. Müller.
Bottom Specimens. Sir John Murray.
Hydrocorallidæ. R. Rathbun.
Ascidians. W. E. Ritter.
Siliceous Sponges. F. E. Schulze.
Reptiles. L. Stejneger.
Mammals, Birds, and Fishes. C. H. Townsend.
Corals Recent, and Fossil. T. W. Vaughan.
Nullipores and Corallines. Mrs. Max Weber.
Annelids. W. McM. Woodworth.

In preparation for the Bulletin and the Report of the U. S. National Museum:

A review of the Gobiidæ of Japan. D. S. Jordan and J. O. Snyder.
Aboriginal American Harpoons. O. T. Mason.
Aboriginal American Basketry. O. T. Mason.

LIST OF PUBLICATIONS SHOWING THE TITLES OF ALBATROSS PAPERS CONTAINED IN EACH.

NOTE.—The numbers at ends of references are those of the chronological list.

In the Reports of the United States Commission of Fish and Fisheries:

Report on work of the U. S. F. C. steamer *Fish Hawk* for the year ending Dec. 31, 1882, and on the construction of the steamer *Albatross*. Tanner. 4.
Report on the construction and outfit of the *Albatross*. Tanner. 13.
Report on the work of the *Albatross*, 1883. Tanner. 14.
Report on the work of the *Albatross*, 1884. Tanner. 35.
Report on the work of the *Albatross*, 1885. Tanner. 45.
Report on the work of the *Albatross*, 1886. Tanner. 52.
Report on the work of the *Albatross*, 1887, 1888. Tanner. 70.
Report upon the investigations of the *Albatross*, 1889. Tanner. 87.
Report upon the investigations of the *Albatross*, 1889–1891. Tanner. 99.
Report upon the investigations of the *Albatross*, 1892. Tanner. 111.
Report on the work of the *Albatross*, 1893. Tanner. 132.
Report upon the operations of the *Albatross*, 1894. Tanner and Drake. 159.
Report upon the investigations of the *Albatross*, 1895. Drake. 160.
Records of observations made on board the *Albatross*, 1896. Drake. 185.
Report on the work of the *Albatross*, 1897. (Abstract.) Moser. 190.
The *Albatross* South Sea expedition. Moore. 214.
Ichthyological collections of the *Albatross*, 1890–1891. Gilbert. 141.
Report on the fishes obtained by the *Albatross* in the vicinity of Santa Catalina Island and Monterey Bay. Gilbert. 204.
Report on the Decapod Crustacea of the *Albatross* dredgings off the east coast of the United States in 1883. Smith (S. I.). 10.
Report on the Decapod Crustacea of the *Albatross* dredgings off east coast of United States during summer and autumn of 1884. Smith (S. I.). 47.
Lists of dredging stations of the U. S. Fish Commission, U. S. Coast Survey, and the British steamer *Challenger*, in North American waters, from 1867 to 1887, with those of the principal European government expeditions in the Atlantic and Arctic oceans. Smith (Sanderson). 58.
Report on the medusæ collected by the *Albatross* in the region of the Gulf Stream in 1883–84. Fewkes. 30.
Report on the medusæ collected by the *Albatross* in the region of the Gulf Stream in 1885–86. Fewkes. 55.
Report on the discovery and investigation of fishing grounds made by the *Albatross* during a cruise along the Atlantic coast and in the Gulf of Mexico, with notes on the Gulf fisheries. Collins. 44.
Results of the explorations made by the *Albatross* off the northern coast of the United States in 1883. Verrill. 16.
Closing tow net for submarine use at all depths. Townsend. 165.

In the Bulletins of the U. S. Fish Commission:

The fishing grounds of Bristol Bay, Alaska. Tanner. 71.
On the appliances for collecting pelagic organisms. Tanner. 133.
Deep-sea exploration. Tanner. 169.
Fishing-grounds of Alaska, Washington Territory, and Oregon. Tanner. 59.
Report of the movements and operations of the *Albatross* from September 15 to 20, 1887. Tanner. 53.
Record of hydrographic soundings and dredging stations. Tanner. 46.
The salmon and salmon fisheries of Alaska. Moser. 207.
Report on the salmon fisheries of Alaska. McDonald. 126.
A summary of the fishery investigations. Rathbun. 117.
Notes on fishes collected at Cozumel, Yucatan. Bean. 60.
Notes upon octopus, flying-fish, etc. Nye. 25.
Notes taken during cruise of the *Albatross* to Grand Banks. Nye. 24.
Hydrographic work of the *Albatross* in 1884. Schroeder. 15.
Report on the working of the boilers and engine of the *Albatross*. Baird. 9.
Annual report on the electric lighting of the *Albatross*. Baird. 8.
Report upon the pearl fishery of the Gulf of California. Townsend. 84.
Investigation of fishing banks. Collins. 48.

In the Proceedings of the U. S. National Museum:

Scientific results of explorations by the U. S. F. C. steamer *Albatross:*

I. Birds collected in Galapagos Islands in 1888. Ridgway. 57.
II. Birds collected on the island of Santa Lucia, West Indies, Abrolhos Islands, Brazil, and at the Straits of Magellan in 1887–88. Ridgway. 56.

In the Proceedings of the U. S. National Museum—Continued.

Scientific results of explorations by the U. S. F. C. steamer *Albatross*—Cont'd.

III. Batrachians and reptiles collected in 1887-88. Cope. 62.

IV. Descriptions of new species of fishes collected at the Galapagos Islands and along the coast of the United States of Colombia, 1887-88. Jordan & Bollman. 66.

V. Annotated catalogue of insects collected in 1887-88. Howard. 67.

VI. List of the plants collected in Alaska in 1888. Vasey. 69.

VII. Preliminary report on the collection of Mollusca and Brachiopoda obtained in 1887-88. Dall. 63.

VIII. Description of a new Cottoid fish from British Columbia. Bean. 61.

IX. Catalogue of fishes collected at Port Castries, St. Lucia, by the *Albatross*, November, 1888. Jordan. 65.

X. On certain Mesozoic fossils from the islands of St. Paul and St. Peter in the Straits of Magellan. White. 79.

XI. New fishes collected off the coast of Alaska and the adjacent region southward. Bean. 75.

XII. A preliminary report on fishes collected by the *Albatross* on the Pacific coast of North America during 1889. Gilbert. 72.

XIII. Catalogue of skeletons of birds collected at Abrolhos Islands, Brazil, the Straits of Magellan, and the Galapagos Islands, in 1887-88. Lucas. 78.

XIV. Birds from the coasts of western North America and adjacent islands, collected in 1888-89. Townsend. 82.

XV. Reptiles from Clarion and Socorro islands and the Gulf of California. Townsend. 83.

XVI. Plants collected in 1889 at Socorro and Clarion islands, Pacific Ocean. Vasey. 77.

XVII. Descriptions of new West American land, fresh-water, and marine shells. Stearns. 68.

XVIII. List of fishes obtained in the harbor of Bahia, Brazil, and in adjacent waters. Jordan. 76.

XIX. A supplementary list of fishes collected at the Galapagos Islands and Panama. Gilbert. 73.

XX. On some new or interesting west American shells obtained from the dredgings of the *Albatross* in 1888. Dall. 95.

XXI. Apodal fishes from the tropical Pacific. Gilbert. 92.

XXII. Descriptions of 34 new species of fishes collected in 1888 and 1889, principally among the Santa Barbara Islands and in the Gulf of California. Gilbert. 93.

XXIII. Report on the Actiniæ collected by the *Albatross* during the winter of 1887-88. McMurrich. 120.

XXIV. Descriptions of new genera and species of crabs from the west coast of North America and the Sandwich Islands. Rathbun (M. J.). 118.

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Prepared under the direction of C.H. Townsend

UNITED STATES

CANADA

NEWFOUNDLAND

GULF OF ST. LAWRENCE

NEW BRUNSWICK

NOVA SCOTIA

PRINCE EDWARD ISLAND

GREAT BANK OF NEWFOUNDLAND

MEXICO

GULF OF MEXICO

CUBA

HAITI OR SANTO DOMINGO

JAMAICA

CARIBBEAN SEA

COLOMBIA

VENEZUELA

BRITISH

Bermuda Is

NOTE:

The numbers designate the Dredging Stations as entered on the records of the U.S. Fish Commission

All Dredging data shown in red

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

CHART SHOWING THE POSITIONS OF THE DREDGINGS DEEPER THAN 100 FATHOMS MADE BY THE U.S. FISH COMMISSION STEAMSHIP ALBATROSS IN THE PACIFIC OCEAN AND BERING SEA FROM 1888 TO 1900

Prepared under the direction of C.H. Townsend

NOTE:

The numbers designate the Dredging Stations as entered on the records of the U.S. Fish Commission. Stations 3681-94 have received additional numbers marked a.a. All Dredging data shown in red

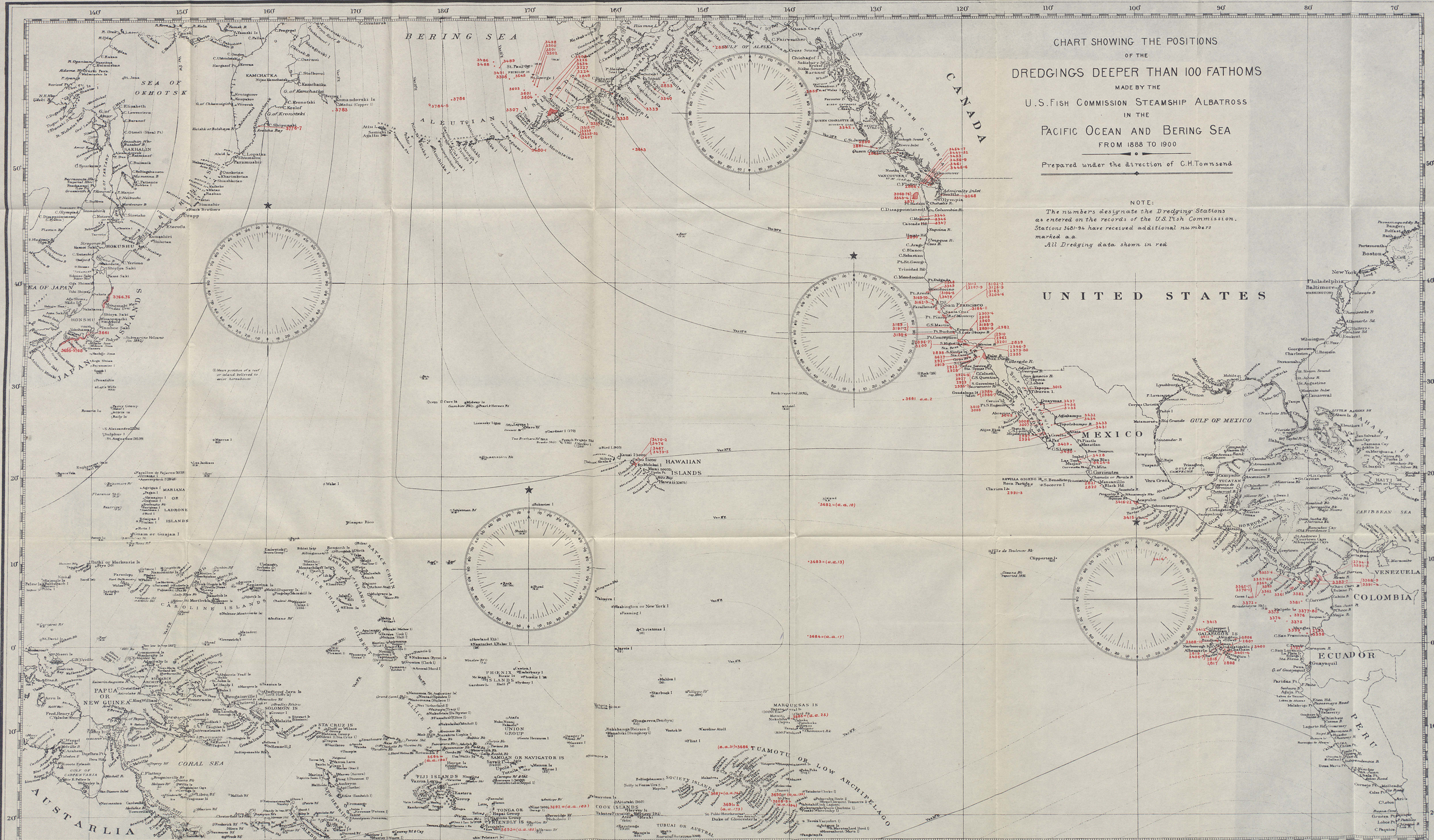

CHART SHOWING THE LOCATIONS OF THE DREDGINGS IN LESS THAN 100 FATHOMS MADE BY THE U. S. FISH COMMISSION STEAMSHIP ALBATROSS IN THE ATLANTIC AND PACIFIC OCEANS FROM 1883 TO 1900

Prepared under the direction of C.H. Townsend

NOTE

The numbers designate the Dredging Stations as entered on the records of the U.S. Fish Commission
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