

Chesapeake Executive Council

Chesapeake Bay
Blue Crab
Management Plan

Chesapeake
Bay
Program

Agreement Commitment Report

HD
9472
.C73
C45
1989

July 1989

Chesapeake Bay Blue Crab Management Plan

An Agreement Commitment Report from
the Chesapeake Executive Council

HD9472.C73C45 1989

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Annapolis, Maryland
July 1989

ADOPTION STATEMENT

We, the undersigned, adopt the **Chesapeake Bay Blue Crab Management Plan**, in fulfillment of Living Resources Commitment Number 4 of the 1987 Chesapeake Bay Agreement:

"...by July 1989, to develop, adopt, and begin to implement Bay-wide management plans for oysters, blue crabs, and American shad."

We agree to accept the Plan as a guide to conserving and protecting the blue crab resource for long-term ecological, economic, and social benefits. We further agree to work together to implement, by the dates set forth in the Plan, the management actions recommended to address: (1) increased fishing effort; (2) wasteful harvesting practices; (3) stock assessment deficiencies; (4) regulatory issues; and (5) habitat degradation.

We recognize the need to commit long-term, stable financial support and human resources to the task of conserving and protecting the blue crab fishery. In addition, we direct the Living Resources Subcommittee to review and update the Plan yearly and to prepare an annual report addressing the progress made in achieving the Plan's management recommendations.

Date

July 31, 1989

For the Commonwealth of Virginia

James L. Salib

For the State of Maryland

William Donald Scheyer

For the Commonwealth of Pennsylvania

Robert P. Casey

For the United States of America

William F. Kelly

For the District of Columbia

M. J. Bann

For the Chesapeake Bay Commission

James E. McClellan

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Preparation of this document was funded in part by the Coastal Resources Division, Tidewater Administration, Maryland Department of Natural Resources, through a grant from the Office of Ocean and Coastal Resources Management, National Oceanic and Atmospheric Administration.

ACKNOWLEDGEMENTS

Development of this management plan is the result of concerted efforts by members of the Fisheries Management Plan Workgroup (FMPW), particularly by providing direction for and review of the plan. Staff from the Maryland Department of Natural Resources (DNR), Tidewater Administration, and the Virginia Marine Resources Commission (VRMC) authored the plan and addressed comments on the draft versions. Contributing DNR staff included Nancy Butowski, Harry T. Hornick, Phil Jones, Randy Schneider, and Harley Speir. Mark Bundy provided assistance with economic aspects of the fishery. VRMC staff included Erik Barth, Lewis Gillingham, Roy Insley, Robert O'Reilly, Randy Owens, Ellen Smoller, Jack Travelstead, and Lyle Varnell. Thanks are also due to Verna Harrison and Ed Christoffers for guiding the plan through the development and adoption process. Finally, we are grateful to members of other committees and workgroups associated with the Chesapeake Bay Program and the public who commented on the plan.

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EXECUTIVE SUMMARY

Introduction

One of the strategies for implementing the Living Resources Commitments of the 1987 Chesapeake Bay Agreement is to develop and adopt a series of Bay-wide fishery management plans (FMPs) for commercially, recreationally, and selected ecologically valuable species. The FMPs are to be implemented by the Commonwealth of Pennsylvania, State of Maryland, Commonwealth of Virginia, District of Columbia, and Potomac River Fisheries Commission as appropriate. Under this strategy, a timetable was developed for completion of fishery management plans for several important species. Oysters, blue crabs, and American shad were given highest priority, with plans due for these species in July 1989.

A comprehensive approach to managing Chesapeake Bay fisheries is needed because biological, physical, economic, and social aspects of the fisheries are shared among the Bay's jurisdictions. A Fisheries Management Plan Workgroup (FMPW), under the Chesapeake Bay Program's Living Resources Subcommittee, was formed to address the commitment in the Bay Agreement for Bay-wide management plans. The FMPW is composed of members from government agencies, the academic community, and public interest groups from Pennsylvania, Maryland, Virginia, and the District of Columbia.

Development of Fishery Management Plans

A fishery management plan is a dynamic, ongoing process to wisely use a fishery resource. Each of the fishery management plans prepared under the 1987 Chesapeake Bay Agreement is a concise summary of the fishery under consideration, problems and issues that have arisen, and recommended management actions.

The process of developing a management plan incorporates public and scientific evaluation, and appropriate governmental approvals. After an FMP is adopted by the Executive Committee, an implementation plan will be developed to provide more detail on actions that participating jurisdictions will take and the mechanisms for taking these actions. In some cases, regulatory and legislative action will have to be initiated, while in still others, additional funding will be required. An annual review of each FMP will be conducted, under the auspices of the Living Resources Subcommittee, to incorporate new information and to update management strategies.

Goal of the Chesapeake Bay Blue Crab Management Plan

The goal of the Chesapeake Bay Blue Crab Management Plan is to manage blue crabs in Chesapeake Bay to conserve and protect the ecological value of the stock and concurrently generate the greatest long-term economic and social benefit from using the resource.

Problem Areas and Management Strategies

Problem 1: Fishing Effort is Increasing. The total amount of gear used in the crab fishery is increasing over time and, as a result, an increasing fraction of the crab stock can be harvested each year. Escalating fishing effort is also increasing competition among commercial and recreational crabbers both within and between the states of Maryland and Virginia.

Strategy 1: The number of young produced (recruitment) is influenced by the number of adult spawners and by environmental factors. "Good" recruitment requires optimum spawning stock size and favorable environmental conditions. To protect the reproductive potential of the blue crab stock, appropriate fishing levels are needed. Specific levels of fishing effort for both the commercial and recreational fisheries are currently being determined. Commercial blue crab harvests are being analyzed to determine safe levels of harvest. Possible management actions to be considered include changes in harvest season, gear restrictions, catch limits and size limits.

Problem 2: Wasteful Harvesting Practices. Harvesting small crabs or crabs of poor quality precludes maximizing the best economic value of the resource. Other marginal harvesting practices include taking egg-bearing females which decreases the reproductive potential of the population and green crabs (any peeler crab without red or pink coloration in the swim fin).

Strategy 2: Optimum use of the blue crab resource can be promoted by eliminating and/or minimizing wasteful harvest practices. This will be accomplished by protecting the reproductive potential of blue crabs and reducing the harvest of sublegal and poor quality crabs.

Problem 3: Additional Stock Assessment Information Is Needed.

There has been a considerable amount of blue crab data collected in recent years. The information derived from these data have significantly improved our understanding of blue crab biology. These studies have also been valuable in providing direction as to the kinds of information needed to manage the blue crab fishery. There still are specific areas where information is lacking.

Strategy 3: Accurate catch and effort data from both the recreational and commercial fishery is fundamental for stock assessment. Several issues concerning blue crab population dynamics require further research. There will be a baywide effort to research specific topics such as blue crab stock abundance, population dynamics and recreational catch and effort to aid management decisions.

Problem 4: Regulatory Issues. The blue crab regulatory process in Chesapeake Bay is based on biological and conservation concerns as well as long standing social, economic and political considerations.

Strategy 4: The blue crab fishery consists of recreational, commercial, and non-commercial fractions which provide economic, social, and recreational benefits to the community. Conflicts among crab harvesting user groups and the general boating public can be minimized by rational application of time, area, and gear restrictions to allocate space and harvest of the resource. Coordinated interstate management and standardized regulations are necessary to insure optimal baywide usage. Protecting any living resource also requires educational programs to increase public awareness of its potentials and problems.

Problem 5: Habitat Degradation. Crabs appear to be one of the more resilient species in the Bay, however the loss of habitat, including submerged aquatic vegetation (SAV) and intertidal wetlands, and periodic anoxia in deeper water do have an impact on the species.

Strategy 5: By maintaining strict environmental standards and protecting prime habitats, the blue crab population will benefit. This will be accomplished by following the Chesapeake Bay Agreement plans for improving water quality in spawning and hatchery areas and by protecting prime habitat areas.

INTRODUCTION

MANAGEMENT PLAN BACKGROUND

To protect and manage the natural resources of Chesapeake Bay, the jurisdictions are developing and will implement a series of fishery management plans under the Chesapeake Bay Agreement. This agreement adopted a schedule for the development of Bay-wide fishery management plans for commercially, recreationally, and selected ecologically valuable species. The strategy for implementing the Living Resources Commitments in the 1987 Agreement listed the priority of each species and a timetable for completion of fishery management plans:

- o oysters, blue crabs and American shad by July 1989
- o striped bass, white perch, bluefish, weakfish, and spotted trout by 1990
- o croaker, spot, summer flounder and American eel by 1991
- o red and black drum by 1992

A comprehensive approach to Bay problems and a means to coordinate the various state and federal groups was also necessary. Bay fisheries are managed separately by the States of Pennsylvania, Maryland, and Virginia, the District of Columbia, and the Potomac River Fisheries Commission. There is also a federal Mid-Atlantic Fishery Management Council (MAFMC) which has jurisdiction for management planning over offshore fisheries (3-200 miles), and a coast-wide organization, the Atlantic States Marine Fisheries Commission (ASMFC), which coordinates the preparation of plans for migratory species in state coastal waters from Maine to Florida. The state/federal Chesapeake Bay Stock Assessment Committee (CBSAC) is responsible for developing a Bay-wide Stock Assessment Plan which includes collection and analysis of fisheries information but does not include the development of fishery management plans. Consequently, a Bay-wide Fisheries Management group, under the Living Resources Subcommittee of the Chesapeake Bay Program, was formed to address the commitment in the Bay Agreement for management plans.

The Fisheries Management group is responsible for developing and writing the fishery management plans and includes: Maryland Department of Natural Resources, Fisheries Division; Pennsylvania Fish Commission, Office of Chief Counsel, Planning and Environmental; Potomac River Fisheries Commission; Virginia Marine Resources Commission, Fisheries Management Division; and Washington, D.C. Department of Consumer and Regulatory Affairs, Fisheries Management Division. The management workgroup also included representatives from the Chesapeake Bay Foundation,

Chesapeake Bay Commission, University of Maryland, College of William and Mary/Virginia Institute of Marine Science, Maryland Watermen's Association, Virginia Watermen's Association, Charter Boat Association, and Maryland Saltwater Sportsfishermen's Association. Plans developed by this group reflect the multijurisdictional management requirements appropriate to the species.

WHAT IS A FISHERY MANAGEMENT PLAN?

A management plan is a dynamic process of analyzing the complex biological, economic and social components of a particular finfish or shellfish fishery, defining problems, identifying solutions, and implementing decisions regarding habitat problems and human usage of the resource.

GOALS AND OBJECTIVES FOR FISHERY MANAGEMENT PLANS

The goal of fisheries management is to protect the reproductive capability of the resource and provide for optimal harvests. Fisheries management must include biological, economic and sociological considerations in order to be effective. It requires an adaptive management scheme which responds to the most current status of the stock, therefore, it is of primary importance to prepare a plan which provides a means of regular review and reevaluation of current management actions. Three simply stated objectives to protect the reproductive capabilities of the resource while allowing optimal harvest include:

- o quantify biologically appropriate levels of harvest
- o monitor current and future resource status to ensure harvest levels are conserving the species while maintaining an economically viable fishery, and
- o adjust resource status if necessary through management efforts.

MANAGEMENT PLAN FORMAT

The background section for each management plan summarizes:

- o biological profile
- o habitat requirements
- o historical fishery trends
- o economic profile

- o current stock status
- o current regulations (in effect as of September 1988), and
- o data needs

This information was modified from the Chesapeake Bay Fisheries: Status, Trends, Priorities and Data Needs document. Including this section as part of the management plan provides historical background and basic biological information for each of the species.

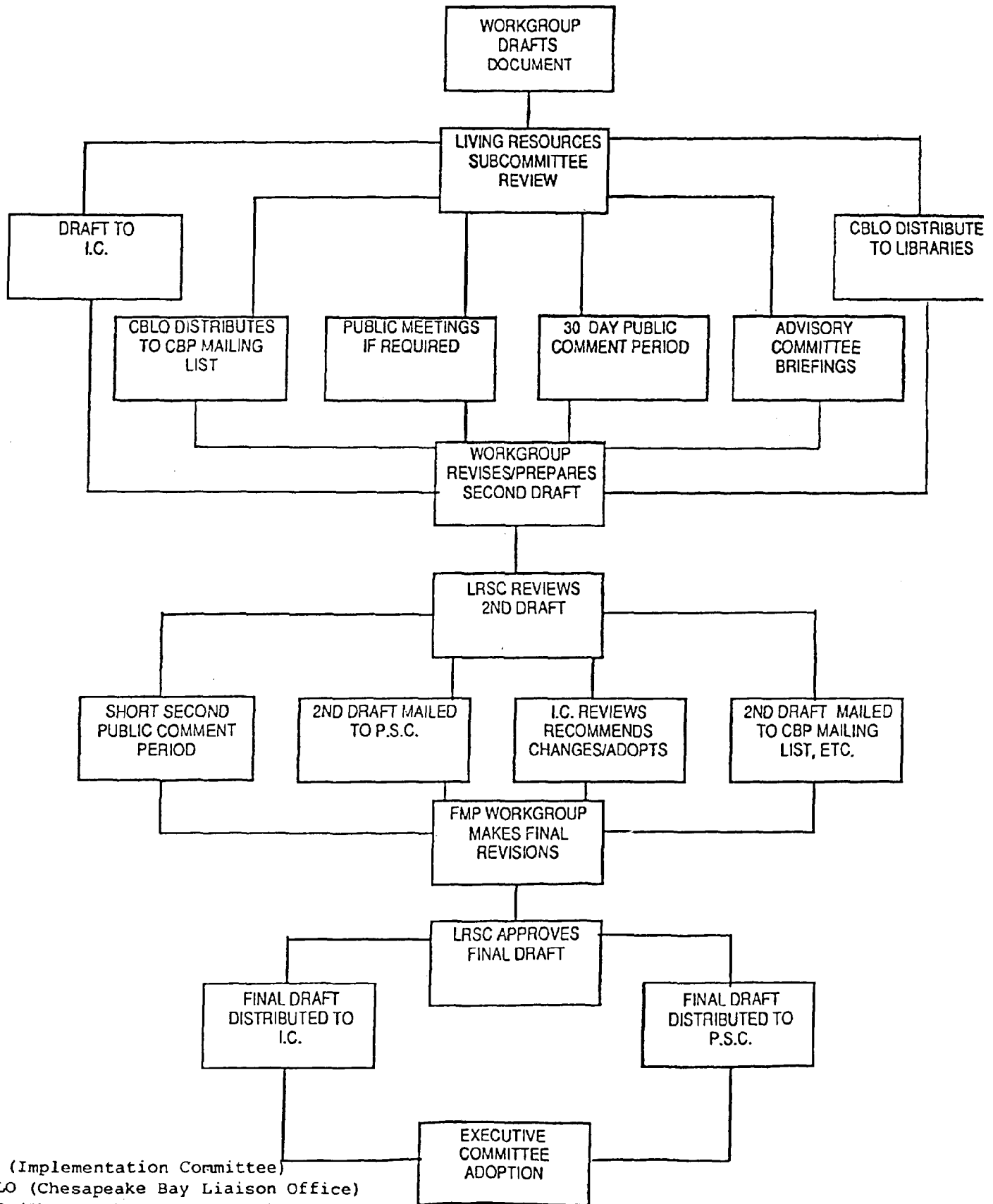
The management section of the plan defines:

- o specific goals and objectives for each species
- o problem areas for each species
- o management strategies to address each problem area, and
- o action items with a schedule of implementation.

These plans are concise summaries that consider interjurisdictional issues and recommend regulations which will be subject to public review and appropriate approvals. Management planning provides the opportunity for public and scientific evaluation, and debate of management options and regulation strategies prior to actual regulatory proposals. As the management plan review process continues, changes will be necessary. The strategies will be further defined as new information becomes available and, therefore, must reflect some flexibility.

Once the plan has been adopted by the Executive Committee, appropriate regulatory and legislative action will be initiated. An annual review of the management plans will be required to continually update management strategies and actions. A workgroup will be established to annually review the plan. Completed management plans will follow the schedule set forth by the Chesapeake Bay Agreement. The process of fishery management plan review and acceptance is presented in the flow chart below.

COMMITMENT PREPARATION AND ADOPTION FLOW CHART



IC (Implementation Committee)
 CBLO (Chesapeake Bay Liaison Office)
 CBP (Chesapeake Bay Program)
 LRSC (Living Resources Subcommittee)
 PSC (Principal Staff Committee)

SECTION 1. BACKGROUND

Blue Crab Introduction

Blue crabs occur from Nova Scotia to Uruguay and are commonly found in rivers, estuaries, sounds and near-shore waters of the Atlantic. A commercial fishery for this species exists from New Jersey to Florida and along the Gulf Coast of Mexico.

Blue crabs are distributed throughout the Chesapeake Bay and its tributaries and are managed as a distinct stock, separate from other Atlantic coast populations. Male blue crabs are found in lower salinity than females. Most mating occurs in mid-Bay where salinity preferences overlap. Mature female blue crabs migrate down the Bay, and spawning occurs around the mouth of the Bay from May to September. Larval transport occurs from the Bay mouth out over the coastal shelf waters, and then back into the Bay. The larval phase of blue crab is subjected to a host of environmental pressures such as wind driven circulation patterns, tidal currents, temperature, salinity and extensive predation. These factors affect how young crabs recruit or reenter the Chesapeake Bay fishery.

Blue crabs are currently the most valuable commercial species in Chesapeake Bay. The reported 1988 commercial harvest of about 82.7 million pounds was worth approximately 38.5 million dollars at dockside, and several times that amount to retailers. These values include both hard crab and soft/peeler crab harvests. The recreational blue crab harvest from the Chesapeake Bay is not well known. In Maryland, the recreational harvest has been estimated for two years, 1983 and 1988, and represented a large portion of the total Maryland blue crab harvest. In 1983, the estimated commercial blue crab harvest in Maryland was 52.5 million pounds. The total estimated recreational harvest was 41.2 million pounds or 44% of the combined harvest of 93.7 million pounds. In 1988, the estimated commercial catch was 45.4 million pounds. The total estimated recreational catch was 21.5 million pounds or 32.1% of the combined harvest of 66.9 million pounds. The recreational blue crab fishery appears to be a very important component of the total blue crab harvest from Maryland and probably for all of the Chesapeake Bay.

Commercial catch statistics and fishery independent data indicate that the blue crab population has not declined significantly and consistently over recent years and appears to be cyclic. When such cyclic populations are harvested, there is the potential for overexploitation during any year of low relative abundance. There has been growing concern in recent years that declines of the magnitude witnessed in other important Chesapeake Bay resources (e.g. oysters, striped bass and American shad) will also occur in blue crabs due to fluctuations in blue crab abundance.

FMP Status and Management Unit

The 1987 Chesapeake Bay agreement contains a commitment to develop, adopt and begin to implement this Baywide FMP for blue crabs by July 1989.

The management unit is defined as all blue crabs (Callinectes sapidus) in Chesapeake Bay waters.

Fishery Parameters

Status of exploitation: Appears to be fully exploited.

Long term potential catch: First approximations of MSY indicate that the long term potential catch is in the range of 69 -77 million pounds.

Importance of recreational fishery: Apparently significant however, harvest statistics have not yet been analyzed for the fishery.

Importance of commercial fishery: Currently the most valuable fishery in the Chesapeake Bay.

Fishing mortality rates: Unknown.

Biological Profile

Natural mortality rate: Currently unknown.

Fecundity: Females produce 0.5 to 3.3 million eggs per sponge. Nearly all females are capable of spawning two to three times.

Longevity: 3 or 4 years.

Spawning and larval development

Spawning season: May to September.

Spawning area: Principally, Virginia bay; also ocean waters near the Virginia Capes.

Location: Based on the distribution of early stage zoeae, spawning appears to be

concentrated in the channel region between Cape Henry and Cape Charles. A substantial amount of spawning may also occur outside the Bay. Late stage zoeae and megalopae are abundant in the lower Bay and coastal shelf waters up to 40 miles from the mouth of Chesapeake Bay.

Salinity: 23-33 ppt.

Temperature: 66°-84° F.

Young-of-year

Location: Lower and central Chesapeake Bay and coastal shelf waters up to 30-40 miles seaward of the bay mouth. Megalopae and young juveniles enter the lower Bay from August through November. Migration to the upper Chesapeake Bay may begin as early as October and November. In most years, many juveniles overwinter south of the Potomac River. During the next spring and summer, these juveniles continue their northern migration, concentrating in lower and mid-Bay nursery areas.

Subadults and adults

Location: Chesapeake Bay from the Virginia Capes to tidal freshwater.

Salinity: 0 to 33 ppt; males are most abundant in waters of 3 to 15 ppt salinity, while females are most often found in salinities above 10 ppt. Most mating occurs in mid-Bay where the salinity preferences of males and females overlap.

Temperature: Upper limit - approximately 90° F.

Dissolved oxygen: The critical lower limit is about 2.5 ppm. At less than 1 ppm, death occurs in 12 to 24 hours.

Habitat Issues

Blue crabs appear to be one of the more resilient Bay species. However, they are not immune to the effects of habitat loss and degradation. The widespread loss of submerged aquatic vegetation has resulted in a loss of important crab habitat, particularly during the juvenile and molting stages. In addition, the loss of wetlands has reduced the maximum potential size of the blue crab population. The continued alteration and removal of shoreline vegetation in the Bay and destruction of marshlands impacts the blue crab population by removing important blue crab feeding and molting areas. Habitat loss caused by low dissolved oxygen levels sometimes results in direct mortality and increases interspecies and intraspecies competition in areas of suitable habitat. In some areas of the bay, hypoxic and anoxic events are a major cause of mortality of crabs captured in pots.

The Fisheries

Blue crabs are harvested as hard crabs, peelers and soft crabs. The principal commercial hard crab gears include trotlines, crab pots and dredges. Trotlines are an important gear in Maryland but are not commonly used in Virginia; crab pots are widely used in both states, and dredging is restricted to Virginia waters. The major soft crab and peeler gears include scrapes, peeler pots and crab pound nets. Scrapes and peeler pots are fished extensively in Tangier and Pocomoke Sounds and crab pound nets are most common in the lower Maryland bay and in Virginia waters.

Blue crab landings in Chesapeake Bay have increased from the 1930s to the present (Figures 1 and 2). Beginning in 1981, Maryland changed its method of blue crab data collection. Data prior to 1981 are not directly comparable to data after that date. Although the long term trend in landings has been one of general increase, harvests have been subject to extensive fluctuations over short and long periods of time. Both short term fluctuations and long term trends in landings are similar for Maryland and Virginia.

Economic Perspective

The total dockside value of the 1987 hard crab harvest in Maryland was \$20.5 million. An additional \$3.14 million worth of production from all industries in the State was generated from the blue crab industry. This amount of activity associated with the harvesting of hard crabs in Maryland produced \$0.112 million worth of indirect taxes to local, State and Federal governments. Maryland's soft crab harvest, worth \$5.8 million generated \$0.73 million worth of production from all industries and \$0.222 million in wages to all employees. The processing of crabs in Maryland, valued at \$47.378 million produced an additional \$27.7 million of output and \$8.7 million of employee wages from all industries within the State.

Figure 1. Maryland commercial landings for blue crabs from the Chesapeake Bay

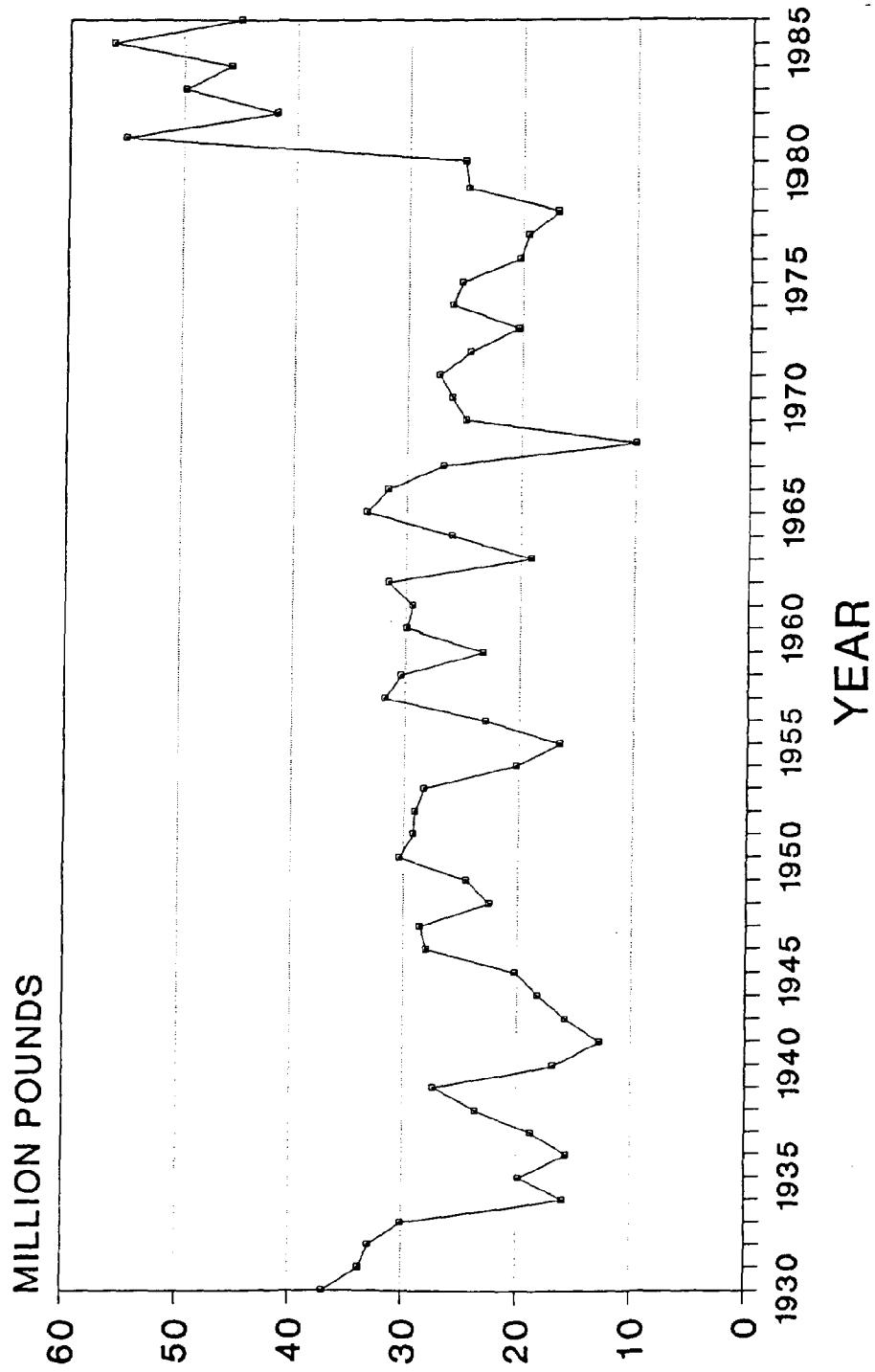
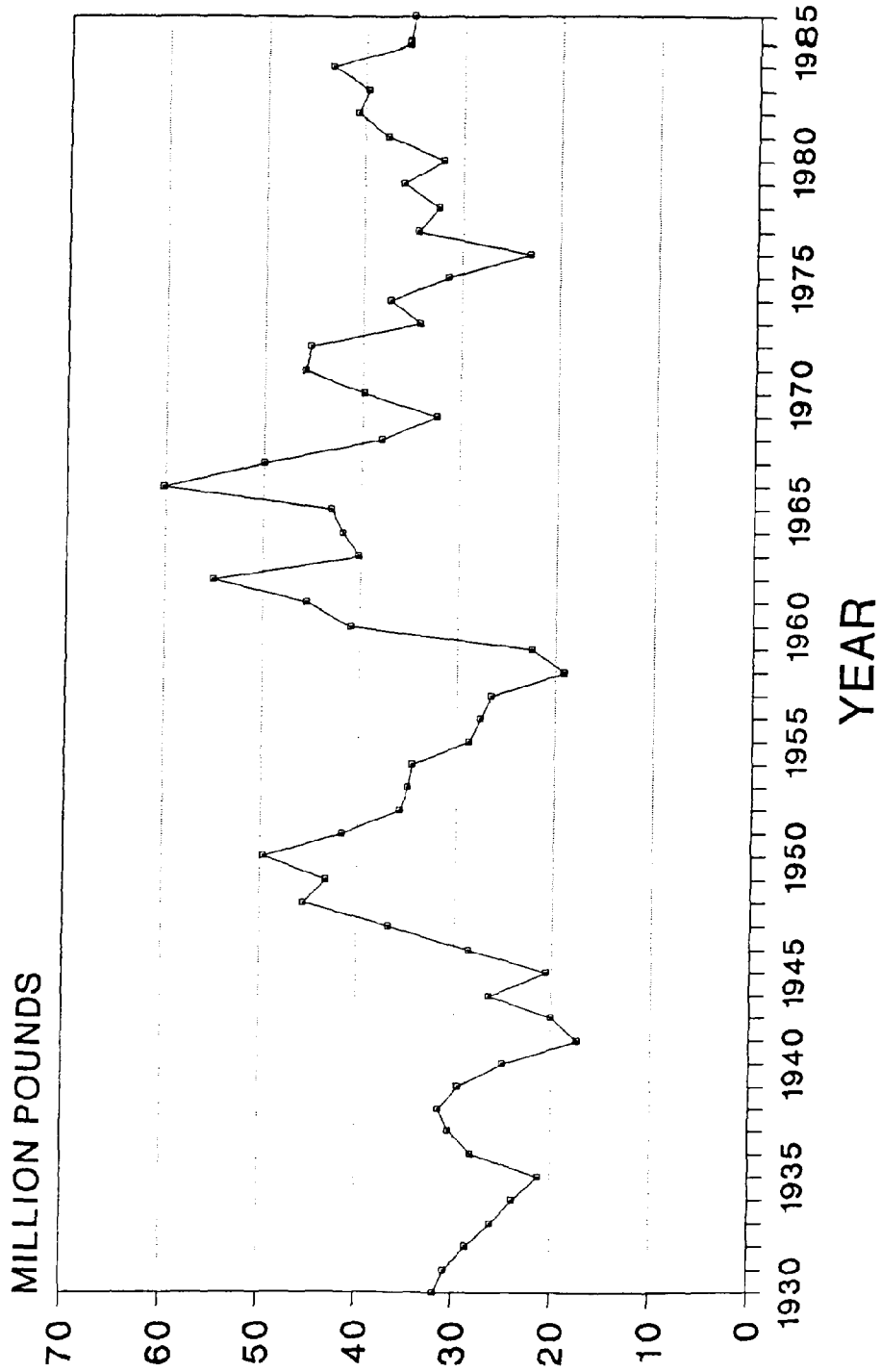


Figure 2. Virginia commercial landings for blue crabs from Chesapeake Bay



Indirect taxes to local, State and Federal governments totaled \$1.75 million.

Harvesting of blue crab in Virginia, valued at \$33.6 million generated gross output from all industries worth \$1.5 million and employee wages of \$.5 million. Processing activities of blue crab, worth \$37.5 million produced an additional \$25.8 million worth of products and employee wages of \$8.1 million throughout the State. Indirect taxes to local, State and Federal governments for Virginia blue crab harvesting and processing totaled \$1.7 million.

Total landings and dollar value for blue crabs are not the best indicators of economic health for the blue crab industry. Economists have developed several indices related to profits which are a good measure of economic health. It has been determined that low costs of production coupled with higher prices for crabs has resulted in high profitability for this fishery. It is estimated that total fishery profits have increased 63% since 1981. The increase in profits would not have been possible if fishing effort had increased more than it did over the period. According to an analysis of the Maryland fishing industry from 1981 to 1987, an increase in blue crab fishing effort would have lessened the increase in productivity and lowered profits.

Resource Status

Commercial catch statistics and fishery independent data indicate that the blue crab stock fluctuates considerably. Analysis of Maryland DNR trawl survey data, which has been collected annually since 1977, indicates that blue crab abundance was relatively high in 1977, was low from 1978-1980 and has been relatively high since 1981. The significant increase after 1981 can be attributed to a change in the Maryland reporting system. Analysis of the Virginia Institute of Marine Science (VIMS) trawl survey data from 1972-1988 indicates major interannual fluctuations in blue crab abundance; lowest abundance in 1974-1977 and 1985-1988, and highest abundance in 1972-1973 and 1978-1984. Commercial catch and effort data, when expressed as CPUE, correlates well with the results of the trawl survey and suggests that abundance has been relatively stable in recent years. However, catch and effort data for MD commercial trotlines and crab pots indicates a trend of increasing effort with concurrent declines in CPUE and catch.

Laws and Regulations

Limited entry:

Maryland - After August 31, 1988 previously unlicensed applicants must wait two years after registering with MDNR before a license to fish more than 50 pots will be issued.

Virginia - not in effect.

Potomac River Fisheries Commission (PRFC) - Only Maryland and Virginia residents may commercially crab.

Minimum size limit:

Maryland - Peelers, 3"; soft crabs, 3.5"; male hard crabs, 5" (10 per bushel tolerance limit); mature females have no minimum size.

Virginia - Male and immature female hard crabs, 5" (tolerance limit 10 per bushel or 35 per barrel); no minimum size limits for peelers, soft crabs or mature females.

PRFC - Male hard crabs, 5" (4 per bushel or 10 per barrel tolerance limit); peelers, 3"; no minimum size limits for soft crabs or mature female hard crabs.

Creel limit:

Maryland - Unlicensed sport crabbers - 1 bushel per person per day or no more than 2 bushels per boat per day. Licensed sport crabbers - 2 bushels per day.

Virginia - No license required for the taking of 1 bushel of hard crabs and 2 dozen peeler crabs per person per day for household use by dip net or two crab pots.

PRFC - No license required for taking of 1 bushel of hard crabs and 3 dozen soft or peeler crabs per person per day. Licensed crabbers have no limit.

Harvest quotas:

Maryland - Not in effect.

Virginia - There is a catch limit of 25 barrels per boat per day during the winter crab dredge fishery, and a catch limit of 51 bushels or 17 barrels per boat per day for the spring crab pot fishery (March 15 - May 31).

PRFC - None.

By-catch restrictions:

None for Maryland or Virginia.

PRFC - Crabbers may not possess any sponge crab, spawn crab, blooming female crab, mother crab, or female crab from which the egg pouch or bunion has been removed.

Gear restrictions:

Maryland - Crab pots, both cubic and rectangular pots are permitted. Cubic pots cannot exceed 24" on a side. Rectangular pots cannot exceed 12" in height, 24" in width and 48" in length. All pots must be constructed of wire having a mesh of one inch or more. Tidewater shoreline property owners may fish 2 or 4 pots (depending on the county of residence) if they are attached to their pier or to a pole set within 200 feet of shore and if crabs are for personal consumption. Trotlines - sport crabbers fishing a trotline longer than 500 feet must have a license. Scrapes or dredges - total width may not exceed 60" and may not have teeth or any diver, chain or other device to hold it to the bottom; no more than two scrapes or dredges per boat. Bank traps - enclosure no more than 4' long by 4' wide with one row of hedging no more than 75' long. Channel pounds - enclosure no more than 8' long and 4' wide; no more than two rows of hedging each of which must be no more than 100' long. Seines - maximum length 50'; must be hauled up in the water. Collapsible traps - license required for six or more traps. SCUBA diving - capture of crabs using diving apparatus prohibited.

Virginia - Crab pots can be made of wire or thread net with a mesh size of at least 1 1/2". All crab pot buoys must display the assigned number. Peeler pots - a wire mesh pot (no mesh size limitations) baited with only live adult male blue crabs and food for these crabs. Scrapes - mouth not to exceed four feet overall and no teeth on the bar; may be hauled only by hand; limit of two

scrapes per boat overboard at one time; no tolerance for hard crabs. Dredges -inside mouth width not to exceed eight feet and may have teeth; when two or more dredges are fixed together their total width may not exceed sixteen feet; unlawful to use more than two dredges at any time, and such boat may use only one dredge on each side of the boat or join two dredges together for use over the stern; unlawful to use hydraulic methods to dislodge the crabs from the bottom. Rakes, dredges and scrapes or other devices other than hand rakes, may not be used for crabbing on the seaside of the Eastern Shore in water less than four feet deep at mean low tide.

PRFC - Crab pots, trotlines, dip nets, patent trotlines, and peeler traps are permitted. Dredges or scrapes are prohibited. Each vessel shall be equipped with a culling container.

Area Restrictions:

Maryland - crab pots can be set in waters of Chesapeake Bay proper, Pocomoke Sound and Somerset county waters of Tangier Sound. In general crab pots are prohibited in all other bays, sounds and tributaries. Except in designated areas, pots may not be set in less than 4' of water. From May 1 to September 30, pots cannot be set within 200 yards of a public beach.

Virginia - unlawful to place, set or use crab traps or crab pounds within 100 yards of any other crab trap or pound, and placing crab pots in marked navigational channels is prohibited. Use of dredges prohibited in rivers, estuaries, inlets or creeks except on the ocean side of Accomack and Northampton Counties. It is unlawful to take crabs for resale from certain areas of the lower Bay near the mouth of Hampton Roads from June 1 to

September 15, inclusive. It is unlawful to set, place or fish a fixed fishing device of any type within 300 yards of the Chesapeake Bay Bridge Tunnel. A designated area north of Tangier Island is closed for the setting of crab pots, being reserved for crab scraping only.

PRFC - Crabbers may not crab within 200 yards of any public bathing beach during May, June, July, August and September.

Season/Time Restrictions:

Maryland - closed season for hard crabs - January 1 through March 31. Closed season for crab scrapes - November 1 through April 14.

Virginia - Crab dredging on Saturday is prohibited, as is commercial crabbing on Sunday or between sunset and sunrise (does not apply to peeler crab traps or floats, pens or onshore facilities for soft crab shedding operations). Closed season for crab dredges - April 1 to December 1.

PRFC - Commercial crabbing between sunset and one hour before sunrise is prohibited. There is no closed season.

Status of Traditional Fishery Management Approaches

Catch-Effort:

Existing catch and effort data for the hard crab fishery is apparently a reasonable indicator of stock size. Statistics for the peeler and soft crab fishery are thought to be low. However, the relationship between these data and actual harvests are not known.

Estimates of mortality on the abundance of successive age groups:

Unknown - no information on age based specific relative abundance over time.

Yield-Per-Recruit: First approximations indicate that at $F = 1.25$, yield-per-recruit is maximized by delaying fishing until crabs reach 5.5 inches.

Stock-Recruitment Relationship: A Ricker-type recruitment curve provides a good fit to a time series of recruits and stock developed from Smith Island crab scrape data collected over the period 1948-72. These data indicate two environmentally distinct periods: one from 1948-1952 and during the mid 1970s that favored high recruitment, and the second from the mid 1950s through the 1960s that was less favorable to recruitment. The VIMS trawl survey abundance time series from 1972-1988 significantly fits the Ricker stock/recruitment model. Both data sets offer strong evidence for a significant stock/recruitment relationship in Chesapeake Bay.

Maximum Sustainable Yield: Estimates derived from Schaefer, Pella-Tomlinson and Fox surplus production models ranged from 69 - 76 million pounds for Chesapeake Bay.

Virtual Population Analysis: Has not been carried out - no information on estimates of catch.

Data and Information Needs

1. Reliable Chesapeake Bay-wide estimates of catch and effort by life history stage and sex by gear type in the commercial and recreational fisheries.
2. Estimates of natural and fishing mortality rates.
3. Reliable measures of year class strength at several key stages in the life history.
4. Determination of the relationship between spawning stock and year class strength and availability.
5. Economic information on the trotline, pot (both hard crab and peeler), scrape, dredge, crab pound net and recreational fisheries and of the wholesale, retail and processing sectors of the industry.

6. Develop an ecological model to quantify the carrying capacity of habitats for different sizes of blue crabs.

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SECTION 2. BLUE CRAB MANAGEMENT

The source documents for this plan (Cronin (1987), Jones et. al. (1983), Milliken and Williams (1984) and Tang (1985)) discuss the problems associated with the current status of the Chesapeake Bay stock and fisheries for blue crabs. There is concern about the increasing fishing pressure that is exerted year round on the blue crab fishery. Current catch and effort data suggest a need to control harvest. The collapse of other fisheries in the Chesapeake Bay and elsewhere dictate the need for temperate management practices. Blue crab problems have been grouped into categories and serve as the basis for identifying the management goal and objectives. The recommended strategies for managing the Chesapeake Bay blue crab stock have been developed with incomplete knowledge of blue crab population dynamics and incomplete knowledge about the environmental factors that affect larval stages. The plan, therefore, reflects a prudent approach to managing the resource. Current regulations regarding the harvest of blue crabs will continue to be enforced with specific changes as recommended by the management plan.

Fishery activity on the tidewater portion of the Potomac River is managed by the Potomac River Fisheries Commission, a six member body empowered under the Maryland-Virginia Potomac River Compact of 1958. The Commission meets quarterly to establish and maintain a program of conservation and improvement of the seafood resources of the Potomac River and to regulate and license fisheries in the river. The Commission will develop appropriate Actions and Implementation plans to address the Problems and Strategies identified in this Management Plan which are within the purview of the Commission by July 1990.

A. GOAL AND OBJECTIVES

The goal of this plan is:

Manage blue crabs in Chesapeake Bay in a manner which conserves and protects the ecological value of the stock and at the same time, generates the greatest long term economic and social benefits from using the resource. The management plan for blue crab will be adaptive and involve continuous responses to new information about the current state of the resource.

In order to achieve the goal, the following objectives must be met:

1. Maintain the spawning stock at a size which eliminates low reproductive potential as a cause of poor spawning success.
2. Promote protection of the resource by maintaining a clear distinction between conservation goals and allocation issues.

3. Minimize conflicts among user groups and between jurisdictions by coordinating management efforts throughout Chesapeake Bay.
4. Promote a program of education and publicity to help the public understand the causes and nature of problems in the blue crab industry and the rationale for management efforts to solve these problems.
5. Promote a baywide regulatory process which provides adequate resource protection, optimizes the commercial harvest, provides sufficient opportunity for recreational crabbers, and considers the needs of other user groups.
6. Promote harvesting practices which minimize waste and maximize the economic return from the resource.
7. Determine and adopt standards of environmental quality and habitat protection necessary for the maximum reproduction and survival of blue crabs.
8. Promote research to improve the understanding of blue crab biology and population dynamics.
9. Promote studies to collect necessary economic, social, and fisheries data to effectively monitor the status of the blue crab fishery.

B. PROBLEM AREAS AND MANAGEMENT STRATEGIES

Problem-Fishing Effort is Increasing: The total amount of gear used in the crab fishery is increasing over time and, as a result, an increasing fraction of the crab stock can be harvested each year. Escalating fishing effort is also increasing competition among user groups both within and between the states of Maryland and Virginia.

Strategy-Fishing Effort: There is a significant stock/recruitment relationship in the Chesapeake Bay blue crab population. The number of young produced (recruitment) is influenced by the number of adult spawners and by environmental factors. "Good" recruitment requires optimum spawning stock size and favorable environmental conditions. In order to protect the reproductive potential of the blue crab stock, appropriate fishing levels are needed. Specific levels of fishing effort for both the commercial and recreational fisheries are currently being estimated. Blue crab commercial harvests are being analyzed to determine safe levels of harvest.

PROBLEM 1.1

There is growing concern that continued increases in fishing effort will lead to over-exploitation of the stock and over-capitalization of the fishery. With the exception of

Maryland's Delayed Entry Program, there are no laws or regulations in effect which limit the total amount of gear that can be fished and none which regulate the total harvest. Consequently, the blue crab spawning stock could be reduced below an optimum level.

STRATEGY 1.1

Maryland will establish catch limits to regulate blue crab fishing effort and harvest based on biological information. Virginia will establish a daily catch limit for the crab pot fishery and will reduce the 25 barrel limit for the crab dredge fishery.

ACTION 1.1.1

Maryland and Virginia will contain the commercial harvest of blue crabs at present levels. Types of management actions which will be considered in the regulation of blue crabs are as follows:

- Harvest season- For example, seasonal patterns of catch for hard crabs and peelers suggest a possible crab-fishing strategy which would target peelers from May to July then hard crabs the remainder of the year. In Maryland, the blue crab season is closed between January 1 and April 1.
- Gear restrictions- For example, limit the number of commercial crab pots and length of trotline per license. Restrictions on where crab pots and trotlines can be fished are currently being implemented.
- Catch limits- For example, set a catch limit for crab pots, trotlines and scrapes. Catch limits would be based on current catch per unit effort data, historical harvest data and stock/recruitment information. Catch limits would be modified as new information is acquired.
- Size limits to maximize yield per recruit- For example, develop the optimal size at first entry into the fishery. Currently, Maryland has the following minimum size limits: 5 inches, spine to spine, for male hard crabs; 3 inches for peeler crabs; 3 1/2 inches for soft crabs; and no size limit for mature female crabs. Virginia has the following size limits in effect: 5 inches, male and immature female hard crabs; and, no minimum size limits for peelers, soft crabs or female mature crabs.

IMPLEMENTATION 1.1.1
1991

ACTION 1.1.2

Maryland will continue the delayed entry program and Virginia will establish a delayed entry program similar to Maryland's.

IMPLEMENTATION 1.1.2

Maryland currently has a delayed entry program in effect. Virginia is developing a similar delayed entry program and will be implemented by 1991.

PROBLEM 1.2

Because non-residents can be licensed to crab in Maryland or Virginia waters of Chesapeake Bay, and because all Bay fishermen are harvesting the same stock of crabs, inter-jurisdictional allocation is an issue.

STRATEGY 1.2

Maryland and Virginia will work to clarify interjurisdictional allocation issues by improving estimates of harvest and effort, and by evaluating the impacts of harvest by individual states on the crab population.

ACTION 1.2

Maryland and Virginia will determine Baywide regulations concerning the harvest of peeler crabs, soft crabs, hard crabs, and female crabs and size limits on all crabs based on yield per recruit data.

IMPLEMENTATION 1.2
1991

PROBLEM 1.3

Competition for the blue crab resource is a cause of conflict between the commercial, non-commercial and recreational crabbers in Maryland. Economic and social benefits from each user group are not fully known.

STRATEGY 1.3.1

Maryland will reduce the conflict between commercial and recreational crabbers through gear and license requirements.

ACTION 1.3.1

A clear distinction between commercial and recreational crabbers will be defined by reducing the bushel limit for the non-commercial crabbing license.

IMPLEMENTATION 1.3.1

1991

ACTION 1.3.2

The economic and social impacts of commercial, non-commercial and recreational crabbing in the Chesapeake Bay will be evaluated in order to resolve conflicts between user groups.

IMPLEMENTATION 1.3.2

1990

Problem-Wasteful Harvesting Practices: Harvesting small crabs or crabs of poor quality precludes maximizing the best economic value of the resource. Other marginal harvesting practices include taking egg-bearing females which decreases reproductive potential and green crabs (any peeler crab without red or pink coloration in the swim fin).

Strategy-Wasteful Harvesting: Optimum use of the blue crab resource will be promoted by eliminating and/or minimizing wasteful harvest practices.

PROBLEM 2.1

The economic yield of crabs is not always optimized if buckrams, which yield small amounts of meat, and dredge crabs, which can yield poor quality meat in late winter, are harvested and brought to market.

STRATEGY 2.1

The harvest of poor quality crabs will be reduced.

ACTION 2.1

- A) Maryland will promote the release of buckram (papershell) crabs by increasing the general awareness of commercial and recreational crabbers of the economic advantages of being more selective.
- B) Virginia will consider design limitations on crab dredges and establish management or sanctuary areas to avoid wastage problems in the crab dredge fishery.

IMPLEMENTATION 2.1
1990

PROBLEM 2.2

Sublegal crabs generally have a small amount of meat compared to legal size crabs.

STRATEGY 2.2

The harvest of sublegal crabs will be reduced.

ACTION 2.2

- A) Maryland and Virginia will promote the use of cull rings to allow sublegal crabs to escape from crab pots.
- B) The effectiveness of using cull rings will be evaluated from crab pot studies.

IMPLEMENTATION 2.2
1989

PROBLEM 2.3

The practice of harvesting sponge crabs (and females of any other life history stage as well) results in a loss of reproductive potential.

STRATEGY 2.3

The reproductive potential of blue crabs will be protected.

ACTION 2.3

- A) Maryland will prohibit the harvest of egg-bearing females (sponge crabs) and examine methods of controlling fishing mortality on females during other life history stages. For example, size at maturity is necessary to determine minimum harvestable size.
- B) Virginia will monitor the harvest of female crabs to study the effect of female harvest on crab population dynamics, especially in the winter dredge fishery. This data will be used to determine management measures that protect the reproductive potential of blue crabs.
- C) Maryland and Virginia will investigate the extent of mortality on mature female crabs used as bait in the Chesapeake Bay eel fishery.

IMPLEMENTATION 2.3

- A) 1990; B) 1993; C) 1990

PROBLEM 2.4

Lost and abandoned crab pots may trap and eventually kill significant numbers of crabs.

STRATEGY 2.4

The problem of abandoned crab pots will be addressed.

ACTION 2.4

- A) Virginia law prohibits abandonment of crab pots in navigable water less than six feet deep.
- B) Maryland law requires the removal of all crab pots by the last day of the fishing season. A regulation specifically addressing the problem of abandoned pots will be considered.
- C) Maryland will consider the use of biodegradable sections in crab pots.
- D) Both Maryland and Virginia will improve the enforcement of existing regulations.

IMPLEMENTATION 2.4

Virginia law currently in effect. Maryland will consider a regulation addressing abandoned crab pots by 1990.

PROBLEM 2.5

The mortality rate of green crabs (a peeler crab without red or pink coloration in the swim fin) held in shedding floats is high compared to peelers that are close to molting.

STRATEGY 2.5

The mortality rate of green crabs will be reduced.

ACTION 2.5

Maryland and Virginia will promote the reduction of peeler mortalities associated with holding practices in peeler floats and shedding operations by providing the most up-to-date technical information to the owners. Any necessary regulatory changes will be made and implemented.

IMPLEMENTATION 2.5

1991

Problem-Stock Assessment Deficiencies: There has been a considerable amount of blue crab data collected in recent years. The information derived from these data have significantly improved our understanding of blue crab biology. These studies have also been valuable in providing direction as to the kinds of information needed to manage the blue crab fishery. There still are specific areas where information is lacking.

Strategy-Stock Assessment Deficiencies: Accurate catch and effort data from both the recreational and commercial fishery is fundamental for stock assessment. Several issues concerning blue crab population dynamics require further research. There will be a baywide effort to research specific topics to improve monitoring efforts and aid management decisions.

PROBLEM 3.1

The commercial crab fishery catch and effort data collection program carried out by Virginia and Maryland do not collect adequate information on the composition of the catch by life history stage (e.g. peelers, soft crabs, buckrams, male hard crabs and sooks). More precise data on the amount of effort expended by gear type in the commercial fishery is also needed.

STRATEGY 3.1

Maryland and Virginia will maintain both fishery dependent and independent stock abundance surveys to provide data for timely management measures.

ACTION 3.1

- A) Maryland and Virginia will continue the crab trawl survey to monitor blue crab abundance and distribution. (In progress)
- B) Maryland and Virginia will continue the blue crab winter dredge survey through 1990.
- C) Maryland will implement a modified crab reporting system to obtain an accurate measurement of effort by gear and fisherman. (1990)
- D) Virginia will design and implement a mandatory reporting program for all species, including blue crabs, that will effectively monitor harvest and effort levels as well as the biological characteristics of the harvest. (1990)
- E) Both the Virginia and Maryland reporting system will be compatible with one another to facilitate a Baywide effort to obtain catch and effort data. (1991)

IMPLEMENTATION 3.1

Variable, depending on the specific project.

PROBLEM 3.2

There is a lack of information about the blue crab recreational catch and effort and the economic impact of recreational crabbing on the Chesapeake Bay blue crab stock.

STRATEGY 3.2

There will be a Baywide effort to collect recreational catch and effort data and to evaluate the economic impact of the recreational harvest on blue crabs industry.

ACTION 3.2

- A) Maryland and Virginia will utilize information obtained from the National Marine Fisheries Service's "Marine Recreational Fishery Statistics Surveys" (MRFSS) in order to determine effective management options.
- B) Maryland will continue a survey on recreational crabbing and Virginia will investigate survey methods for the recreational blue crab fishery. Virginia will institute a survey to determine recreational harvest and effort at the conclusion of the study.
- C) Management strategies will be implemented based on the information from Baywide recreational surveys. Methods of controlling effort will be similar to management measures described in Action 1.1.1.

IMPLEMENTATION

1991

PROBLEM 3.3

The population dynamics of the blue crab stock is not fully understood and could be improved by obtaining additional information on natural and fishing mortality rates, the stock-recruitment relationship, and the effects of environmental variables and anthropogenic change on year class strength and availability.

STRATEGY 3.3

There will be a Baywide effort to design an effective program to collect population data on blue crabs.

ACTION 3.3

Maryland and Virginia will support cooperative research to address and define the stock/recruitment relationship, natural and fishing mortality rates and the environmental parameters that effect short-term and long-term fluctuations in crab populations.

IMPLEMENTATION 3.3

1990

PROBLEM 3.4

Information on the current status of the eel resource is needed to address concerns that over-exploitation may be occurring as a result of increasing demand for eels as bait in the blue crab trotline fishery and as an export product.

STRATEGY 3.4

Maryland and Virginia will delay action on regulating the use of eels for bait until the status of the eel population is investigated more fully.

ACTION 3.4

Delayed

IMPLEMENTATION

Open

Problem-Regulatory Issues: The blue crab regulatory process in Chesapeake Bay is based on biological and conservation concerns as well as long standing social, economic and political considerations.

Strategy-Regulatory Issues: The blue crab fishery consists of recreational, commercial, and non-commercial fractions which provide economic, social, and recreational benefits to the community. Conflicts among user groups and the general boating public can be minimized by rational application of time, area, and gear restrictions to allocate space and harvest of the resource. Coordinated interstate management is necessary to insure optimal baywide usage. Protecting any living resource requires educational programs to increase public awareness of its potentials and problems.

PROBLEM 4.1

Conflict between crab potters and recreational boaters has become a serious problem in some of the more densely populated areas of Virginia and Maryland. From the recreational boater's point of view, crab pot floats are interfering with recreational boating. From the commercial waterman's perspective, recreational boaters are interfering with crab potting because they inadvertently run over and cut off crab pot floats.

STRATEGY 4.1

Maryland and Virginia will continue to monitor conflicts between crabbers and recreational boaters and enforce existing regulations on open and closed crabbing areas and pot-free channels.

ACTION 4.1

- A) Maryland will actively investigate placing crab pots on lines in order to reduce the number of floats.
- B) Maryland will increase the number of float-free areas.

IMPLEMENTATION 4.1

1990

PROBLEM 4.2

The interstate shipment of peelers and soft crabs may circumvent efforts to protect the Chesapeake Bay stock from illegal fishing activities. The major problem is that undersized crabs are illegally harvested and then either marketed in state as out-of-state crabs or shipped to states which have no minimum size limits.

STRATEGY 4.2

Maryland and Virginia will investigate the biological and economic effects of regulated size limits on the soft crab fishery and the need to coordinate soft and peeler crabs size limits.

ACTION 4.2

As previously stated in section 1.2, Maryland and Virginia will determine Baywide regulations concerning the harvest of peeler crabs, soft crabs, hard crabs, and female crabs and size limits on all crabs based on yield per recruit data and a better understanding of economic effects.

IMPLEMENTATION 4.2

1991

PROBLEM 4.3

Recreational licensing requirements are inconsistent in that a license is required for some types of sport crabbing but is not needed for others. For example, a Maryland license is required to fish more than 5 collapsible traps, but is not needed to fish 2 to 4 crab pots from a pier (depending on the county of residence), or to fish less than 500 feet of trotline for noncommercial purposes.

STRATEGY 4.3

Maryland will standardize regulations regarding permissible gear types for all recreational licensing. Virginia will delay action on recreational licensing requirements, but will utilize surveys to determine recreational harvest and effort.

ACTION 4.3

Maryland will consider the use of crab pots for commercial harvest only.

IMPLEMENTATION 4.3

1990

PROBLEM 4.4

Bay-wide penalties are inconsistent and are generally considered inadequate to deter violations except for the Maryland DNR Point Assignment System which serves as a deterrent rather than functioning as an additional business cost.

STRATEGY 4.4

There will be a Baywide reassessment of enforcement practices as a means of deterring violations.

ACTION 4.4

- A) Maryland will continue the Point Assignment System which serves as a deterrent to crabbing violations.
- B) Virginia will investigate implementing a point schedule system, similar to Maryland's, to address inconsistent and inadequate penalties currently assessed for illegal crab harvesting practices.
- C) Maryland and Virginia will adopt consistent enforcement policies and practices insofar as state laws permit, and continuously seek uniformity.

IMPLEMENTATION 4.4

Maryland system currently in effect. Virginia system to be developed.

Problem-Habitat Degradation: Crabs appear to be one of the more resilient species in the Bay, however the loss of habitats, such as declines in submerged vegetation, destruction of wetlands and periodic anoxia in deeper water do have an impact on the species.

Strategy-Habitat Degradation: The effects of pollution and hypoxic conditions on the blue crab population are unclear. The jurisdictions will maintain strict environmental standards and protect prime habitats to benefit the blue crab population.

PROBLEM 5.1

There has been a loss in blue crab habitat, an increase in intraspecies competition, and an increase in crab mortality from crabs caught in pots due to low dissolved oxygen levels in bottom waters.

STRATEGY 5.1

Maryland and Virginia will pursue research to demonstrate the effect of reduced water quality on blue crabs as a means of developing more effective water quality criteria and controls for spawning and hatching areas.

ACTION 5.1

The first three action items are commitments under the 1987 Chesapeake Bay Agreement. Maryland DNR and VMRC will not carry out the specific commitments, but are involved in setting the objectives of the programs to fulfill the commitments and reviewing the results of the action programs. The achievement of these commitments will lead to improved water quality and enhanced biological production.

- A) Develop and adopt a basinwide plan that will achieve a 40% reduction of nutrients entering the Chesapeake Bay by the year 2000.
 - 1) Construct public and private sewage facilities.
 - 2) Reduce the discharge of untreated or inadequately treated sewage.
 - 3) Establish and enforce nutrient and conventional pollutant limitations in regulated discharges.
 - 4) Reduce levels of nutrients and other conventional pollutants in runoff from agricultural and forested lands.
 - 5) Reduce levels of nutrients and other conventional pollutants in urban runoff.

- B) Develop and adopt a basinwide plan for the reduction and control of toxic materials entering the Chesapeake Bay system from point and nonpoint sources and from bottom sediments.
 - 1) Reduce discharge of metals and organic compounds from sewage treatment plants receiving industrial wastewater.
 - 2) Reduce the discharge of metals and organic compounds from industrial sources.
 - 3) Reduce levels of metals and organic compounds in urban and agriculture runoff.
 - 4) Reduce chlorine discharges to critical finfish areas.

- C) Develop and adopt a basinwide plan for the management of conventional pollutants entering the Chesapeake Bay from point and nonpoint sources.

- 1) Manage sewage sludge, dredge spoil and hazardous wastes.
- 2) Improve dissolved oxygen concentrations in the Chesapeake Bay through the reduction of nutrients from both point and nonpoint sources.
- 3) Continue study of the impacts of acidic conditions on water quality.
- 4) Manage groundwater to protect the water quality of the Chesapeake Bay.
- 5) Continue research to refine strategies to reduce point and nonpoint sources of nutrient, toxic and conventional pollutants in the Chesapeake Bay.

IMPLEMENTATION 5.1:

Variable, depending on the specific project.

PROBLEM 5.2

The loss of submerged aquatic vegetation (SAV) and intertidal wetlands has resulted in the loss of blue crab habitat, particularly during the juvenile and molting stages.

STRATEGY 5.2

Maryland and Virginia will identify prime habitat areas for blue crabs and actively protect these areas from the effects of dredging, development, and pollution.

ACTION 5.2

Maryland and Virginia will establish crab sanctuaries where harvest may be controlled and environmental modifications are restricted. These areas will be determined using the abundance and distribution data collected from trawl and other fishery independent surveys.

IMPLEMENTATION 5.2

1991

PROBLEM 5.3

Rigorous water quality standards for the spawning grounds and major nursery areas cannot be determined because the environmental requirements of larval and juvenile crabs are not well known.

STRATEGY 5.3

Maryland and Virginia will continue to support research to investigate the environmental requirements for juvenile and larval blue crabs, which includes critical habitats such as SAV beds and intertidal wetlands.

ACTION 5.3

- A) Protect and restore submerged aquatic vegetation
 - 1) Conduct an annual survey of the distribution and abundance of SAV throughout the Chesapeake Bay
 - 2) Develop new remote sensing techniques to improve data quality
 - 3) Implement a shallow water habitat monitoring program
 - 4) Develop a centralized data base
 - 5) Establish regional ambient water quality requirements based on SAV needs
 - 6) Set submerged SAV acreage, abundance and diversity restoration goals
 - 7) Develop a management plan for the restoration of SAV based on a watershed approach
 - 8) Implement best land management practices which will promote improvements in SAV habitat quality

- B) Support tidal and non-tidal wetlands management strategies

- C) Support the development of the "Use of Habitat Requirements for Chesapeake Bay Living Resources" document which would be used to distribute geographically specific information on critical or sensitive areas for living resources, including blue crabs, to water quality and land use management personnel.

IMPLEMENTATION 5.3

Variable, depending on the specific project.

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