ACCESSIBILITY AND PROTECTION OF TEXAS SHOREFRONT AREAS

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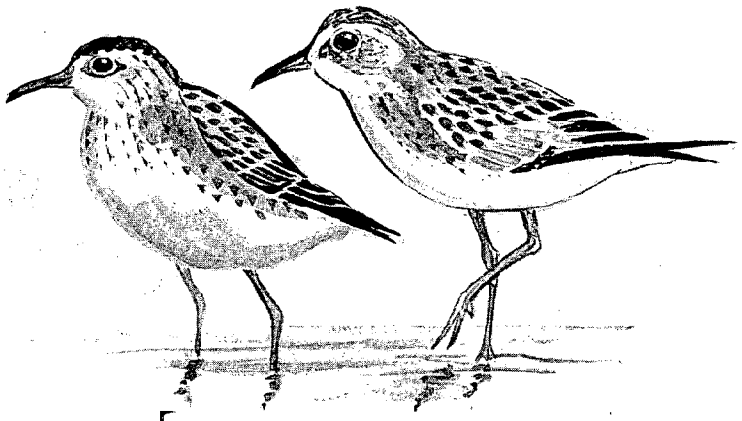

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GENERAL LAND OFFICE

UNDER THE DIRECTION OF

Bob Armstrong
Commissioner, General Land Office

Pearce Johnson
Chairman, Texas Parks and Wildlife Commission

Senator A. R. Schwartz

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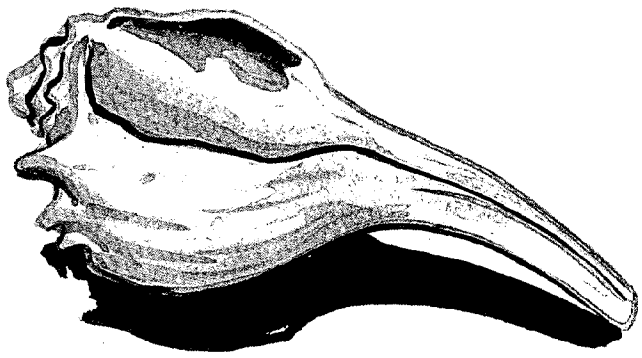

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The principal authors of this report were Hal Hees, project manager; Michael H. McKann; and Jerry W. McAtee, under the supervision of Wayne D. Oliver. Artwork for the report was done by Pat Wiles, who was also responsible for design and production. The maps were prepared by Gale Green and Christine Gever. Editorial assistance was provided by Muriel Wright.

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Draft versions of the report were reviewed by Bob Armstrong, Commissioner of the General Land Office; Pearce Johnson, Chairman of the Texas Parks and Wildlife Commission; Senator A. R. Schwartz; and Joe C. Moseley, Executive Director of the Texas Coastal and Marine Council.

Figures

Tables

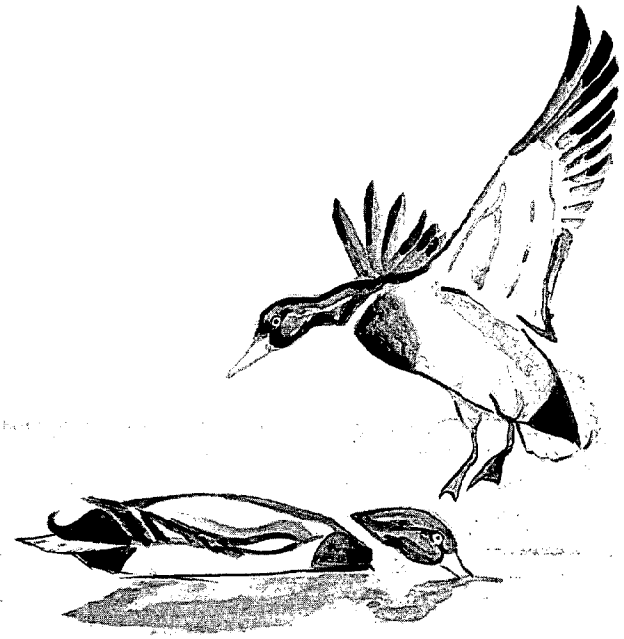


TABLE OF CONTENTS

INTRODUCTION

This report analyzes the accessibility of the state's public coastal areas—the shore subject to the ebb and flow of the tide, the submerged lands beneath the bays and Gulf of Mexico, and all publicly owned uplands contiguous to coastal waters—and of those beaches, either publicly or privately owned, to which the public is guaranteed right of access under the Texas Open Beaches Act.

The analysis includes an assessment of current accessibility, means of meeting future recreational demand, and problems associated with the recreational use of shorefront areas to which the public had always had free access. The protection of these areas is discussed only insofar as it affects their accessibility and recreational use.

Information for this investigation was gathered through study of published reports and ongoing research projects; four meetings held by the Texas Coastal Management Program in Brownsville, Corpus Christi, Freeport, and Galveston during October, 1977; and correspondence and conversation with local government officials and with managers of state and federal parks and wildlife refuges.

A set of shorefront inventory charts and seven maps accompany this report. The maps depict areas of erosion and accretion, active and potential washover channels, easily accessible Gulf shoreline, boat ramps, and ownership of shorefront areas. The charts catalog information on road access, shoreline mileage, ownership of littoral property, land use, beach regulations and management, public amenities, and physical features of identifiable segments within each of the 12 Texas counties fronting on the Gulf of Mexico.

The Texas Open Beaches Act

The Texas Open Beaches Act (TEX. NAT. RES. CODE Sec. 61.011 et seq.) is the principal statutory guarantee of the public's right to use and have access to the public beaches of the state. It was passed in 1959 after private landowners attempted to close some Galveston Island beaches to the public, challenging a right the public had acquired through continuous use of the beaches, bays, and Gulf waters of Texas since the time of Spanish ownership.

The Open Beaches Act guarantees the public unrestricted access to and use of (1) the state-owned portion of Gulf beaches below the line of mean high tide and (2) the larger area extending from the line of mean low tide to the line of vegetation bordering on the Gulf, but no more than 200 feet landward of the mean high tide line, in all areas where the public has acquired a right of use or easement by prescription, dedication, or continuous right.

The act reverses the usual burden of proof, shifting it from the public easement claimant to the landowner, in any case in which the public's right to use a beach is challenged. In any such suit, a showing that the beach area in question is between the mean low tide line and the line of vegetation is *prima facie* evidence that:

(1) the title of the littoral owner does not include the right to prevent the public from using the area for ingress and egress to the sea;

(2) there has been imposed upon the area subject to proof of easement a prescriptive right or easement *in favor of the public* for ingress and egress to the sea. (emphasis added)

The provisions of the act do not apply to any beaches on barrier islands or peninsulas that are not accessible by public road or common carrier ferry. This exclusion currently applies to San Jose Island, Matagorda Island, and Matagorda Peninsula west of the Colorado River Channel. Of the total 377 miles of Texas shorefront facing the open Gulf, 293 miles are currently covered by the provisions of the act and open for public use.

On the remaining 84 miles of Texas Gulf shorefront, composed of the barrier islands and peninsula named above, the only clear public right is to use of the "wet" beach, the state-owned strip of tidally inundated beach between the lines of mean high tide and mean low tide (fig. 1). The public's right to use the "dry" beach (the beach above the line of mean high tide) along these shorefront areas has never been judicially determined, and the extent of the public's right to have access to either the wet beach or the dry beach from the landward side is unclear. However, at present, the private landowners in these areas do not attempt to exclude people who confine their activities to the beach itself.

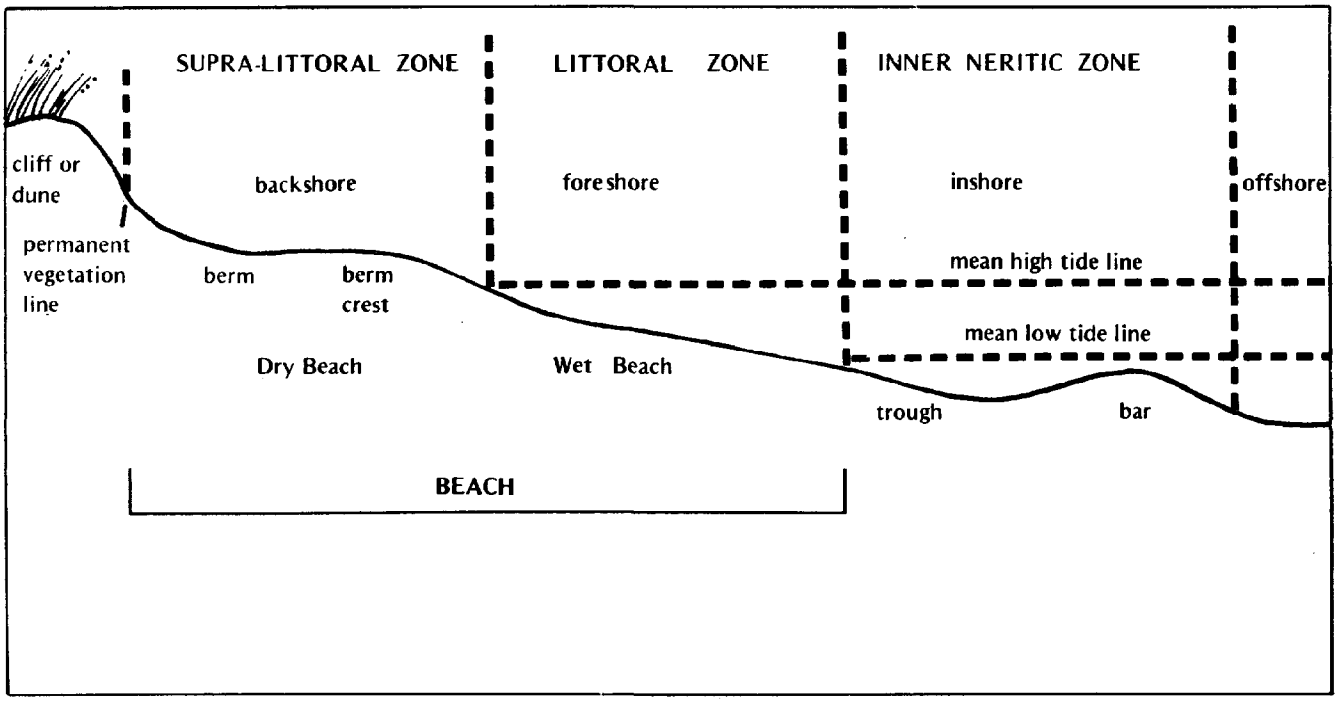
While the Texas Open Beaches Act guarantees the public's right of access only to Gulf beaches, subsequent state laws, culminating in the Coastal Public Lands Management Act of 1973, have protected the public's right to use and enjoy other public coastal areas of the state.

The Texas Outdoor Recreation Plan

Decisions concerning the number and location of new parks and recreational facilities in the Texas coastal area are based on Volume V of the ten-volume *Texas Outdoor Recreation Plan* (TORP). This plan, which covers all aspects of outdoor recreation in Texas, is the most thorough management program for outdoor recreation prepared by any state.

The TORP was developed as a result of a 1958 federal act establishing the Outdoor Recreation Re-

Figure 1



Geomorphological profile of a generalized beach as defined by the TCMP (adapted from Bird, 1968; King, 1972; and Komar, 1976—with modifications).

source Review Commission. In 1962, the commission issued a report entitled *Outdoor Recreation in America,* which led to the creation of the Bureau of Outdoor Recreation[1] and the federal Land and Water Conservation Fund. In order to obtain matching funds for recreational land acquisition and development from the Land and Water Conservation Fund, states were required to prepare an up-to-date, comprehensive outdoor recreation plan. The Texas Parks and Wildlife Department (TPWD), directed by the 59th Texas Legislature to develop such a plan, published the TORP in 1965. The plan was updated in 1968 and 1975. States are now required to update their plans every five years.

Information contained in the TORP has enabled the Texas Parks and Wildlife Department to allocate federal Land and Water Conservation Fund monies efficiently and equitably to local governments. It is also used to guide the allocation of the state's dedicated and general-revenue park and recreation funds.

Volume V, *Outdoor Recreation on the Texas Gulf Coast,* describes the coastal region as a whole, covering such topics as climate, economy, industry, transportation, wildlife, and ownership of coastal land areas. Each of the 17 coastal counties is described separately in terms of land area, major freshwater resources, climate, wildlife, population, economy, saltwater accessibility, and recreational opportunities and requirements. The extensive analysis of present and projected (through the year 2000) demand for coastal recreation is used by recreational planners at all levels of government to determine priorities for the acquisition and development of coastal recreational facilities.

PORT ARANSAS FERRY

For purposes of this analysis, shorefront areas will be classified as "Gulf shorefront," "bay shorefront," and "bay and Gulf waters."

The Gulf shorefront is the most seaward line along which the waters of the Gulf of Mexico meet the Texas upland. It is composed of the seaward faces of the Texas barrier islands and peninsulas, and the mainland shore along the Sabine and Brazos River deltas. The bay shorefront consists of the mainland-tidewater interface in all the bays and estuaries together with the landward shores of all the barrier islands and peninsulas of the Texas coast. The bay and Gulf waters include the waters of the bays and estuaries and the waters of the open Gulf of Mexico that lie within state boundaries.

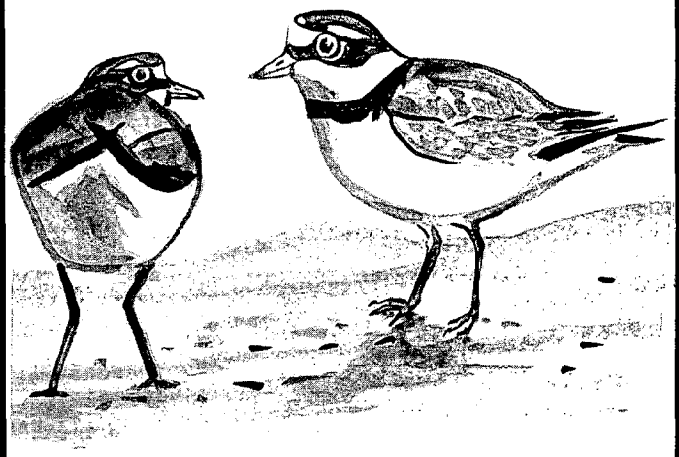
Definitions

Beach

The Texas Coastal Management Program defines "beach" as an area of high wave energy, consisting of an accumulation of unconsolidated sediment (sand, shell fragments, pebbles, or similar material) extending along the seaward shore of the Gulf of Mexico from the mean low tide line shoreward to some natural physiographic change such as a dune or sea cliff or to the point where permanent vegetation is established (fig. 1, p. 8).

According to this definition, almost all of the Texas shoreline that fronts on the waters of the open Gulf is classified as beach. The only Gulf shore areas excepted are the first 11 miles of shoreline west of Sabine Pass and one mile of the original Brazos River delta (U.S. Army Corps of Engineers, 1971). These 12 miles consist of coastal mud flats or marshes. Because of the constantly changing character of the Texas coastline, the one mile of mud flat at the old Brazos River delta has evolved into a sandy beach, while the beach located on the southern side of the new Brazos River delta could now be more aptly described as mud flat. All bay shores of the state, which consist primarily of mud flat, marsh, or bluff, are excluded by this definition, although 16 miles of bay shore may be described as "beach-like" (U.S. Army Corps of Engineers, 1971).

The Texas Coastal Management Program's definition of beach is consistent with the Open Beaches Act in that the act refers only to the Gulf shore and not to any of the bay shores. The definition also appears to be consistent with public opinion: in the public meetings on beach access held by the program in October, 1977, participants clearly regarded only the shorefront facing the open Gulf as beach.



CURRENT ACCESSIBILITY

Accessible

A coastal area is considered "accessible" if it is presumptively legally open for public access and use under the Open Beaches Act, if it is in public ownership and held open for public access and use, or if for any other reason the public has a legally protected right of access to and use of the area. This definition differs from the definition of accessible bay and Gulf frontage used in the TORP, which considers only physical accessibility. The Texas Coastal Management Program uses the term "accessible" to denote legal openness because this is more in keeping with the intent of the "Shorefront Access" element of the Coastal Zone Management Act Amendments of 1976.

The Gulf shorefront that is classified as accessible (legally open under the Open Beaches Act) is further defined by the terms "easily accessible" and "accessible with difficulty." These terms refer to physical ease of access.

A segment of Gulf shorefront is considered "easily accessible" if the general public can reach it with a reasonable expenditure of effort: via public road, by driving along the shore from a public road in a conventional two-wheel-drive vehicle, or by walking no more than one mile from a point which can be reached by a two-wheel-drive vehicle. This term corresponds to the TORP definition of "accessible Gulf shorefront."

A segment of Gulf shorefront is considered to be "accessible with difficulty" if it can be reached only by driving along the shorefront itself in a four-wheel-drive vehicle, by walking more than one mile, or by boat. Examples of such areas are the lower four-fifths of Padre Island National Seashore (accessible by four-wheel-drive vehicle, walking, or boat) and the shorefront area between the San Bernard River and the Brazos River (accessible by boat only).

The bay shorefront is legally open to the public between the lines of mean high and mean low tide by virtue of public ownership of the bays. Mileage figures for accessible bay shorefront in this report are taken from TORP estimates, based on access via known public roads.

The bay and Gulf waters are state-owned and legally open to public use. Their accessibility is assessed in terms of the availability and distribution of boat ramps and reliable navigation channels. Though closely associated with the use of the coastal waters, marinas and other boat storage facilities are not considered in the evaluation of the accessibility of bay and Gulf waters.

Inaccessible

A shorefront area is considered "inaccessible" if the public has no presumptive right of access to or use of it. The only areas on the Texas coast which fall into this category are the beaches of San Jose Island, Matagorda Island, and West Matagorda Peninsula—the areas excluded from coverage by the Open Beaches Act.

Publicly Owned Uplands

The public parks and refuges that lie adjacent to the coastal waters are, of course, all easily accessible to the public and are major avenues of access to the shorefront and waters of the Texas coast. They also ensure that these areas will not become inaccessible to the public as a result of private development which might eliminate accessways. Table 1 shows the total acreage of shorefront parks and refuges county by county; the maps that accompany this report show the locations of these areas.

A total of 478 miles of public land fronts on the Texas coastal waters, 128 miles along the Gulf shoreline and 350 miles along the bay shores. Approximately one-half of the publicly owned Gulf shoreland is in Padre Island National Seashore; the rest is well distributed throughout the coast (table 2).

Accessibility of Gulf Shorefront

The Texas Gulf shorefront extends 377 miles and includes 365 miles of beach.[2] One hundred seventy-three miles of the Texas Gulf shorefront

[2]Texas Coastal Management Program figures, calculated from maps prepared by the Bureau of Economic Geology at the University of Texas. The U.S. Army Corps of Engineers has calculated 373 miles of Texas Gulf shoreline.

Table 1

ACREAGE OF PUBLIC SALTWATER-ASSOCIATED PARKS AND REFUGES IN TEXAS COASTAL COUNTIES, 1971-1973 (TORP, VOL. V, 1975)

	Managing Entity						
	Federal			State*	Local		
County	Corps	NPS	USFWS	TPWD	Municipal	County	Total Acreage
Orange	0	0	0	0	0	0	0
Jefferson	0	0	0	15,221	2,562	0	17,783
Chambers	0	0	9,837	0	0	58	9,895
Harris	0	0	0	0	0	48	48
Galveston	172	0	0	1,922	497	1,791	4,382
Brazoria	0	0	25,039	878	0	466	26,383
Matagorda	0	0	0	0	4	0	4
Jackson	0	0	0	0	0	4	4
Calhoun	0	0	0	2	22	43	67
Refugio	0	0	0	0	8	0	8
Aransas	0	0	54,800	313	0	72	55,185
San Patricio	0	0	0	0	3	0	3
Nueces	0	0	0	3,570	154	548	4,272
Kleberg	0	37,056	0	0	0	25	37,081
Kenedy	0	87,027	0	0	0	0	87,027
Willacy	0	8,035	0	0	0	0	8,035
Cameron	0	0	38,198	218	0	387	38,803
TOTALS	172	132,118	127,874	22,124	3,250	3,442	288,980

*State acreages updated with 1978 data.

are easily accessible to the general public, and 120 miles are accessible with difficulty. The inaccessible areas—on San Jose Island, Matagorda Island, and West Matagorda Peninsula—comprise 84 miles of the Texas Gulf shoreline. Thus, a total of 293 miles (78 percent) of the Texas Gulf shoreline is accessible to the public (table 3).

In analyzing the adequacy of public access to the Gulf shorefront, the Texas Coastal Management Program concentrated on the easily accessible beaches because these areas afford the majority of beach recreational opportunity in the state. For purposes of this analysis, the coast is divided into upper, central and lower regions. Comparison of the regional distribution of easily accessible beaches (table 4) and recreational activity levels (fig. 2) indicates that there is a high percentage of easily accessible beach in those areas of the coast where the demand for recreational beaches is highest.

Table 2

OWNERSHIP OF THE TEXAS GULF SHOREFRONT IN LINEAR MILES (General Land Office, Gulf Shorefront Inventory, 1977)

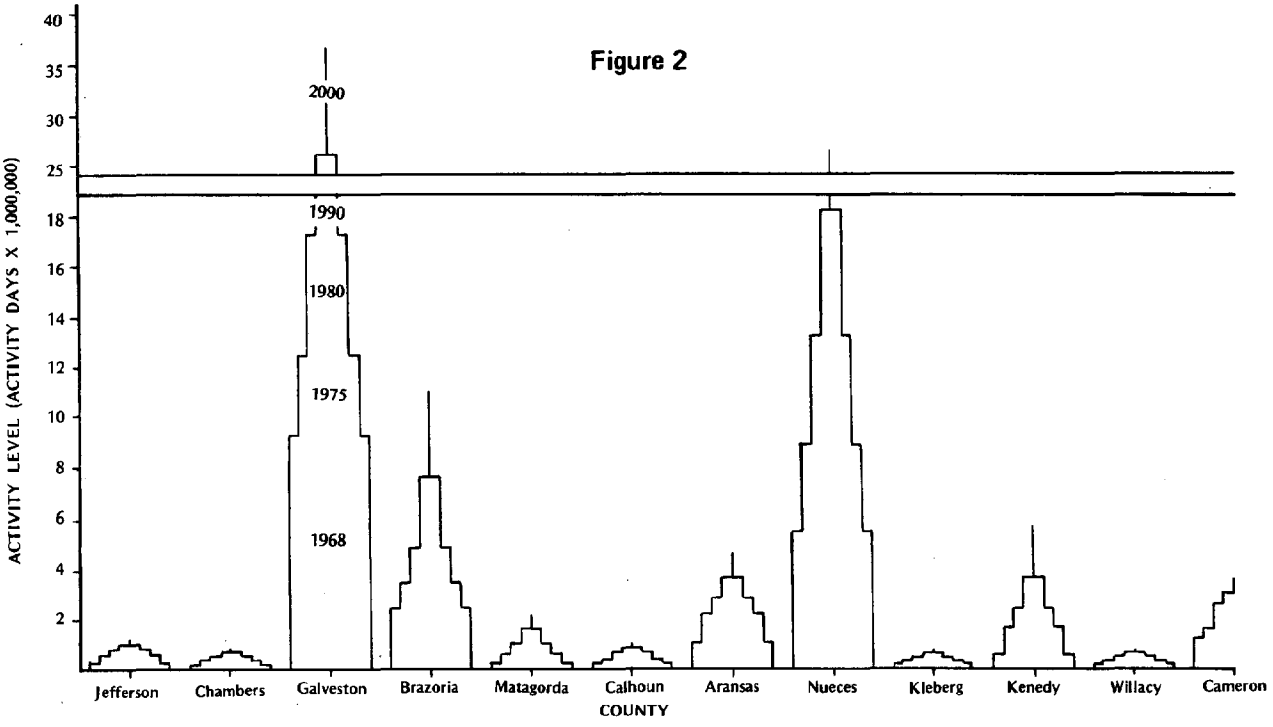
	Littoral Ownership			
County	Private	State	Federal	Local
Jefferson	27.8	5.5	–	–
Chambers	1.0	–	–	–
Galveston	47.5	1.6	–	9.3
Brazoria	23.1	1.0	6.2	(0.04)
Matagorda	60.9	0.2	–	–
Calhoun	9.9	–	27.5	–
Aransas	19.4	–	–	–
Nueces	13.0	5.8	–	1.9
Kleberg	6.8	–	15.5	–
Kenedy	–	–	48.1	–
Willacy	10.5	–	3.0	–
Cameron	28.3	1.2	–	1.6
TOTALS	248.2	15.3	100.3	12.8
Percent of Total Gulf Shoreline	65.9	4.1	26.6	3.4

Table 3

LINEAR MILES OF ACCESSIBLE GULF SHORELINE IN TEXAS BY COUNTIES (General Land Office, Gulf Shorefront Inventory, 1977)

	Shoreline Mileage	
County	Accessible	Total
Jefferson	33.3	33.3
Chambers	1.0	1.0
Galveston	58.4	58.4
Brazoria	30.3	30.3
Matagorda	33.5	61.1
Calhoun	-0-	37.4
Aransas	-0-	19.4
Nueces	20.7	20.7
Kleberg	22.3	22.3
Kenedy	48.1	48.1
Willacy	13.5	13.5
Cameron	31.1	31.1
TOTALS	292.6	376.6
Percent of Total Gulf Shoreline	77.6	100.0

Figure 2



Historical and projected recreational participation (fishing, surfing, swimming, camping, picnicking, walking, hiking, and nature study activities) on Gulf beaches in the Texas coastal counties (adapted from TPWD, 1977, based on TORP data).

Table 4

REGIONAL DISTRIBUTION OF ACCESSIBLE AND INACCESSIBLE TEXAS GULF SHOREFRONT IN LINEAR MILES (Adapted from Gulf Shorefront Inventory, GLO, 1977)

Region	Accessibility (miles of shorefront)			Total
	Easy	Difficult	Inaccessible	
Upper*	104	19	–	123
Mid	10	24	84	118
Lower	59	77	–	136
Totals	173	120	84	377
Percent of Total Gulf Shoreline	46	32	22	100

*The upper coastal region has 12 miles of non-beach shorefront, of which 2 miles are easily accessible and 10 miles are accessible with difficulty.

The upper coastal region, which includes Jefferson, Chambers, Galveston, Brazoria, Orange, and Harris Counties, has the highest population (2,348,166 in 1970) and the highest level of recreational activity. This region also has the greatest amount of easily accessible Gulf shorefront—104 miles of the total 123 miles of shorefront along Jefferson, Chambers, Galveston, and Brazoria Counties. There are 12 miles of non-beach in the upper region, of which two miles are classified as easily accessible. Of the 111 miles of beach shorefront along the upper coast, 102 miles are classified as easily accessible to the general public. Only nine miles of beach in the upper coastal region—all of it south of the Brazos River mouth—are classified as accessible with difficulty.

The central region, which consists of Matagorda, Calhoun, Aransas, Jackson, and Refugio Counties, contains 118 miles of Gulf shorefront. All of the shorefront along Matagorda, Calhoun, and Aransas Counties is beach. Only 10 miles, all in Matagorda County, meet the criteria of easy accessibility; 24 miles are accessible with difficulty; and 84 miles are inaccessible. The total population of the five-county region is low (77,115 in 1970), as are recreational levels (fig. 2, p. 14). Therefore, even this small supply of easily accessible beach appears adequate to meet current recreational demand in the central coastal region. However, as the region grows and recreationists from the more populous regions seek less crowded beaches, additional easily accessible beach may be needed.

The lower coastal region includes San Patricio, Nueces, Kleberg, Kenedy, Willacy, and Cameron Counties. Of 136 miles of Gulf shorefront in this region (all of which is beach), 59 miles are easily accessible. The remaining 77 miles of beach can be reached via four-wheel-drive vehicle or walking; 54 miles of this difficult-access area are within Padre Island National Seashore. Current recreational activity levels are high for the regional population (474,614 in 1970), which seems to indicate that a substantial number of visitors come from outside the region. The easily accessible Gulf beach is located near the major population and tourist centers of Corpus Christi and South Padre Island, and thus far has proven adequate to meet the regional demand. In the future, additional road access may be needed north of the city of South Padre Island as the local population and tourist industry of that area grow.

The recreational activity levels for Kleberg and Kenedy Counties presented in figure 2 (p. 14) are in accordance with data contained in the TORP. However, information obtained from those familiar with the lower coastal region indicates that Kleberg County has much more recreational activity than the TORP figures show, particularly on the Gulf shorefront at Malaquite Beach (the main activity center of Padre Island National Seashore). Conversely, Kenedy County, where the Gulf shorefront can be reached only by four-wheel-drive vehicle, probably sustains less recreational activity than the TORP figures indicate. These discrepancies appear to be due to imperfections in the data collection and processing procedures used by the Texas Parks and Wildlife Department in preparing the coastal volume of the TORP. Except for these two counties, TORP figures on coastal recreational activity levels appear to be valid and useful for planning.

Accessibility of Bay Shorefront

The 2,125 miles (U.S. Army Corps of Engineers, 1971) of bay shore along the Texas coast is almost entirely a combination of marsh, tidal flat, and bluff. Wave energy in Texas bays is too low to create sandy, devegetated dry beach areas. The U.S. Army Corps of Engineers Shoreline Study (1971) found that only 16 miles of Texas bay shore is characterized by beach-like unconsolidated sediment. Consequently, very little of the Texas bay shore is either amenable to or desirable for the

same sort of intensive and diversified recreational activities that occur on the Gulf beaches. The bay shores of Texas, therefore, have never been subject to the same sort of public demand and general public use as the beaches fronting the open Gulf. Bay shorefront recreation is largely limited to fishing (either from the bank or by wading the shallows) and waterfowl hunting.

The TORP states that 529 miles of bay frontage is easily accessible to the public through a combination of publicly owned parks and refuges and public road rights-of-way. Most of the 16 miles of beach-like bay shore has been acquired by local governments for public parks, including Sylvan Beach (Harris County), Magnolia Beach (Calhoun County), and Loyola Beach (Kleberg County).

Generally, the 529 miles of easily accessible bay shore has been adequate to meet current recreational needs according to the local officials, recreational planners, and residents of the bay areas.

Accessibility of Bay and Gulf Waters

The Texas coastal submerged lands lying beneath the bays and Gulf, as well as the waters themselves, are publicly owned. There are 15 major bays, which cover 1,537,000 acres. Connecting these bays are the Gulf Intracoastal Waterway (426 miles) and its tributary channels, which provide safe daytime navigation for both small craft and deep-draft boats (TORP, 1975). The state-owned Gulf area, which extends out to the 3-marine league line (10.35 miles), comprises approximately 2,508,000 acres.

The bay waters are extensively used for recreational activities—boat fishing, pleasure boating, skiing, and pier and jetty fishing. Access to the bays is provided through boat ramps, upland public park areas, easily accessible bay shore, and a variety of private commercial facilities open to the public. Of these, boat ramps (both public and commercial) are the primary means of access.

In 1973, the Texas Parks and Wildlife Department identified 278 coastal boat ramp lanes available to the public (TORP, 1975). The department predicted that 319 additional ramp lanes would be needed to meet the 1975 demand, and 147 more would be required by 1980. The TPWD's inventory of coastal facilities, which includes boat ramps, has not been updated since 1973. Since there are no other recent inventories, it is not possible to determine whether demands projected for 1975 have been met. Information obtained from other sources—council-of-governments publications, county maps, and a Texas A&M Sea Grant publication entitled *A Recreational Guide to the Central Texas Coast* (1974)—indicates that publicly available boat ramps are fairly well distributed along the coast. However, statements and information received in the course of this study indicate that there is a shortage of boat ramps throughout the coast.

The 2.5 million acres of Gulf waters within the state's jurisdiction are used by the public primarily for fishing (surf and offshore) and boating. Access for surf fishing and swimming is obtained via the public beach. The offshore areas of the Gulf are reached from protected bay shore harbors through the natural passes and river mouths that breach the barrier islands and mainland coast (though navigation is sometimes difficult even for small boats) and through the channels maintained for deep-draft navigation.

Twelve channels provide access to the open Gulf: (1) the maintained channels—Sabine Pass, Bolivar Roads, the Freeport Channel, the Colorado River Channel, the Matagorda Ship Channel, Aransas Pass, the Port Mansfield Channel, and Brazos-Santiago Pass; and (2) the natural channels—San Luis Pass, the Brazos River, Pass Cavallo, and the Rio Grande. Boats used in the Gulf are generally large sailing and fishing craft, which are moored in the numerous bayside marinas along the coast. Small boats can be launched from the Gulf beach during calm weather, but this means of access tends to be neither reliable nor safe. Overall, access to the Gulf waters appears to be adequate for recreational boating and fishing throughout the Texas coast.

Gulf Shorefront

Public access to the Gulf shorefront is protected by the Texas Open Beaches Act. The act is enforced by the state attorney general, county attorneys, district attorneys, and criminal district attorneys. Each of these officers is empowered to seek a court order or injuction to have any physical obstruction or barrier removed from a public beach, or to prohibit any other restraint or interference which restricts reasonable free access to a useable beach.

Penalties for violation of the Open Beaches Act may be assessed under TEX. NAT. RES. CODE Sec. 61.014. This statute makes it unlawful to claim, by written or oral communication, that a public beach or accessway is closed to the public. The attorney general or appropriate local legal officer may assess a fine of $10 to $200 for each day of violation.

Early judicial tests of the Open Beaches Act by littoral landowners failed to either invalidate the act or find any beach covered by the act to be closed to the public. (See *Seaway Co.* v. *Attorney General,* 375 SW2 923; and *Galveston East Beach,* v. *State,* Cause No. 87,893, in the 10th Judicial District, Galveston County.) These early failures, combined with a policy of rigorous enforcement by the state attorney general and local legal officers, have discouraged any subsequent attempts to close a beach covered by the act.

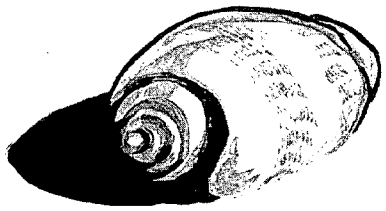
Bay Shorefront

Access to public bayshore areas through federal, state, county, or city parks and refuges is protected by the various public entities that own and operate those recreational facilities.

Bay shore access that is afforded by public highway rights-of-way is protected by the Texas State Department of Highways and Public Transportation (SDHPT). The SDHPT adheres to a policy of allowing such rights-of-way to be used for access to the bay shores as long as such usage does not create a hazard to public safety. This policy was strengthened by the passage of House Concurrent Resolution 56 during the 1977 session of the Texas Legislature. The resolution expressed a state policy that all state agencies and institutions possessing substantial areas of undeveloped land should, to the fullest extent possible, make such lands available to the public for outdoor recreational use.

Bay Waters

The bay waters of the state are publicly owned, and public use of them is a legally protected right. Because access to the bays is afforded through a combination of publicly owned bay shore areas,



LEGAL AND INSTITUTIONAL MECHANISMS FOR PRESERVING SHOREFRONT ACCESS

public roads, and public and commercial boat ramps, protection of access to these upland areas also protects access to the bay waters.

Public access to the bay waters could be threatened if the number of types of commercial activities permitted effectively excluded the public from large areas of the bays. However, the bay waters have been kept open for public use by the School Land Board's adherence to the policies of the Coastal Public Lands Management Act of 1973 (TEX. NAT. RES. CODE Sec. 33.001).

Activities permitted in the state's bays fall into five categories: (1) those related to oil and gas development, (2) those related to the protection of fish and wildlife, (3) those related to public recreation, (4) those related to navigation, and (5) those related to commercial fishing.

Oil and gas development (see TEX. NAT. RES. CODE Sec. 52.011), the preservation of fish and wildlife habitat (see TEX. NAT. RES. CODE Sec. 33.105), and the development of public recreational facilities (see TEX. NAT. RES. CODE Sec. 33.105) are all subject to the authority of the School Land Board and governed by the policies of the Coastal Public Lands Management Act of 1973 (TEX. NAT. RES. CODE Sec. 33.001-33.176).

The Coastal Public Lands Management Act states that the surface estate in the coastal public lands is an important and valuable asset dedicated to the Permanent School Fund and declares that it shall be managed pursuant to the following policies, among others:

(a) The natural resources of the surface estate in coastal public lands shall be preserved. *Such resources shall be construed to include the natural aesthetic values of those areas and the value of such areas in their natural state for the protection and nurture of all types of marine life and wildlife.*

(b) *Uses which the public at large may enjoy and in which they may participate shall take priority over those uses which are limited to fewer individuals.*

(c) The public interest in navigation in the intracoastal waters shall be protected.

(d) *Utilization and development of the surface estate in such lands shall not be allowed unless the public interest as expressed by this Act is not significantly impaired thereby.*

(f) *For the purposes of this Act, the surface estate in coastal public lands shall not be alienated except by the granting of leaseholds and lesser interests therein, and by exchanges of coastal public lands for littoral property as provided therein.* [emphasis added]

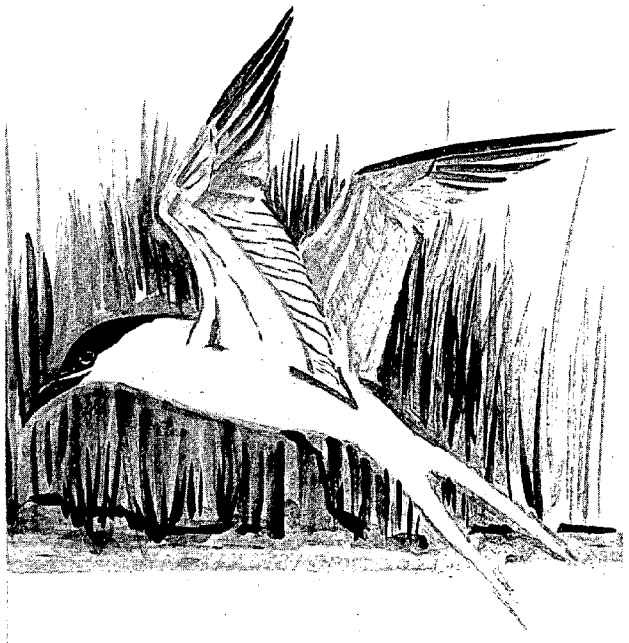
Navigation-related activities in Texas bay waters are conducted by specially created navigation districts (see TEX. WATER CODE Sec. 60.001). These districts have acquired rights to use certain submerged bay lands for navigation-related purposes. Most of the granting instruments conveying these rights have specifically reserved the right of the public to hunt and fish on these lands and waters. Although some of the instruments do not specifically reserve such rights, these lands and waters have been uniformly regarded as open for such public use. Navigation district activities have therefore not constituted an impediment to public access or use. In fact, the creation of channels and harbors has in most cases increased the accessibility of bay waters.

Commercial fishing in Texas waters is regulated by the Texas Parks and Wildlife Department (TEX. PARKS AND WILDLIFE CODE Sec. 47.001 et seq.) for the purpose of

> . . . the conservation of an ample supply of wildlife resources in the places covered by this chapter to insure reasonable and equitable enjoyment of the privileges of ownership and pursuit of wildlife resources. This chapter provides a flexible law to enable the commission to deal effectively with changing conditions to prevent depletion and waste of wildlife resources.

Gulf Waters

Gulf waters within the three-marine-league jurisdiction of Texas are also the property of the state (TEX. NAT. RES. CODE Sec. 11.012). These waters, like bay waters, are considered by Texas courts to be held in trust by the legislature for all the people. Consequently, only the legislature, by specific enactment, may grant these lands to a private individual (*City of Galveston* v. *Menard,* 23 Tex. 349). The General Land Office, as manager of the Texas Gulf water bottoms, therefore follows the policy of granting only the interests authorized to be granted by the legislature. These interests have been limited almost entirely to three kinds: (1) patents for navigational purposes, (2) leases for oil and gas development, and (3) easements for pipelines. None of these interests interferes with public use of the Gulf waters, and navigational channels and offshore oil platforms (which attract fish) have usually improved public access to and enjoyment of the Gulf waters.



MEETING FUTURE RECREATIONAL DEMAND

The rapid growth of the Texas coastal population, combined with an increase in the number of coastal visitors from other parts of the state and nation, will create a demand for additional shorefront recreational space and improved access. This demand may be met by:

1. making more easily accessible those public coastal areas that are now accessible with difficulty by providing new access roads and boat ramps;
2. providing public access roads or ferries to areas that are currently inaccessible (not covered by the Open Beaches Act);
3. buying more public parkland adjacent to the shorefront; or
4. banning or otherwise controlling vehicles on heavily used beaches, either entirely or during peak use periods.

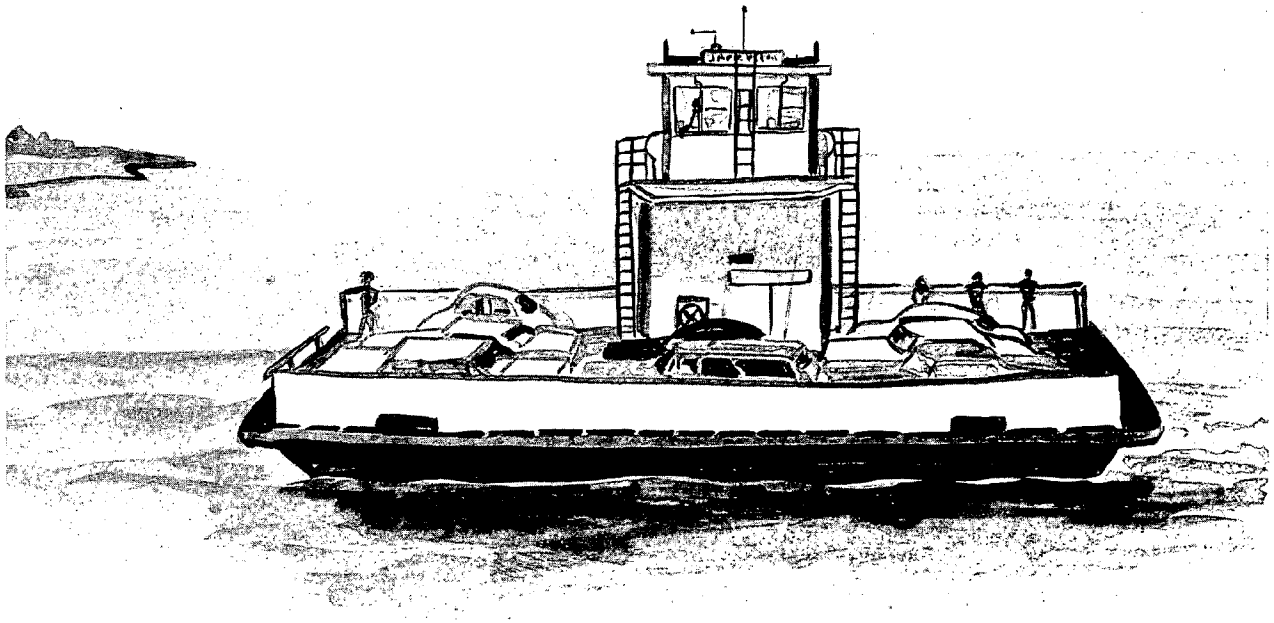
The last alternative, banning or otherwise controlling vehicles on the beach, must be implemented in such a way that it does not in fact reduce ease of access by making it expensive or inconvenient for the average beach visitor to reach and use the beach.

Provision of Additional Access Roads and Boat Ramps

The State Department of Highways and Public Transportation constructs new roads at the request of county commissioners courts, who submit their requests through the district engineers of the SDHPT. Counties are required to pay at least 50 percent of the cost of a right-of-way for a two-lane highway, the type that usually serves beach areas. The SDHPT has the authority to condemn a right-of-way it considers necessary if a county is unable or unwilling to pay its share.

The SDHPT may initiate plans for new causeways or ferries to barrier islands. To determine the need for such accessways, the department makes traffic counts and consults local citizens and officials.

Public boat ramps providing access to the bay waters may be funded through the Texas Parks and Wildlife Department Special Boat Fund (TPWD Fund 059). Monies for the fund are generated from boat registration fees and a portion of the unclaimed water boat fuel taxes. The TORP is used to establish priorities for boat ramp construction, and the Texas Parks and Wildlife Commission gives final approval for all funding contracts. A project generally includes a ramp, a parking area, and an access road (not to exceed 2,500 feet). Once the facility is constructed, the Texas Parks and Wildlife Department assumes responsibil-



ity for repairing the boat ramp and maintaining the area.

During the current year, some 20 boat ramp construction projects are planned by the Texas Parks and Wildlife Department at a total cost of $248,000. Local governments are expected to provide 30 percent of the total funding. Three projects out of the 20 are planned for coastal areas, two in Galveston and one in Aransas Pass. At least three more coastal boat ramp projects are planned for 1979, in Galveston, Brazoria, and Calhoun Counties.

Extension of the Texas Open Beaches Act

The state currently has no plan to provide public accessways—ferries or causeways—to San Jose Island, Matagorda Island, or West Matagorda Peninsula, all of which are excluded from coverage by the Texas Open Beaches Act. If either type of accessway were established, however, the provisions of the Open Beaches Act would apply to the beaches of these areas and they would be presumptively open to the public.

The beaches of the islands and peninsula are now largely undisturbed natural areas. Any future decision to open these beaches to the general public should be made only after careful consideration of the public interest; it may, in fact, be more desirable to protect at least some areas of the Texas Gulf shorefront from the effects of heavy use by retaining them as wilderness areas.

Acquisition of New Shorefront Recreational Areas

The Texas Parks and Wildlife Department may acquire new public shorefront recreational areas as public needs arise. Determinations of need are based on the TORP. State acquisitions are financed by Texas Parks and Wildlife Department Fund 31, which provides monies for the establishment of state parks and recreational areas. Both acquisition and development costs of new recreational facilities are paid from this fund. Supplied by a portion of the state's cigarette tax revenues, the fund currently generates approximately $14 million annually, of which approximately $11 million is currently being made available for land acquisition and development. Other sources are the TPWD's bonding authority ($75 million maximum) and federal matching funds for certain projects.

Between 1970 and 1974, the TPWD concentrated its acquisition efforts on the coastal area, acquiring four new state parks adjacent to the Gulf. Sea Rim Park (far north coast) was acquired in two purchases—14,360 acres in FY 1973 for $2,154,000 and 749 acres in FY 1974 for $158,833. Galveston Island State Park, totaling 1,922 acres, was acquired in FY 1970 for $890,875 (gift plus purchase of life estate). The initial purchase of 509 acres that established Bryan Beach State Recreation Area was made in FY 1974 for $475,357; two additional purchases made in FY 1976 and FY 1977 for $801,441 added

another 369 acres to the park. The 3,570 acres in Mustang Island State Park were purchased in FY 1973 for $3,696,000.

Expenditures between 1970 and 1974 totaled $7,375,065, or 65 percent of the total statewide expenditures made by TPWD during that period. The total acreage acquired was 21,110 acres, or 56 percent of the total statewide acreage acquired during that period. (See maps for location of the parks.)

The recent abandonment of the Matagorda Bombing Range on Matagorda Island by the U.S. Air Force will eventually provide an additional 27.5 miles of public shorefront in the central coastal region. Current negotiations between the State of Texas and the General Services Administration will determine whether the island will be owned by the state or a federal agency. Whatever the outcome, state and federal negotiators have agreed that the beaches will be open for public use.

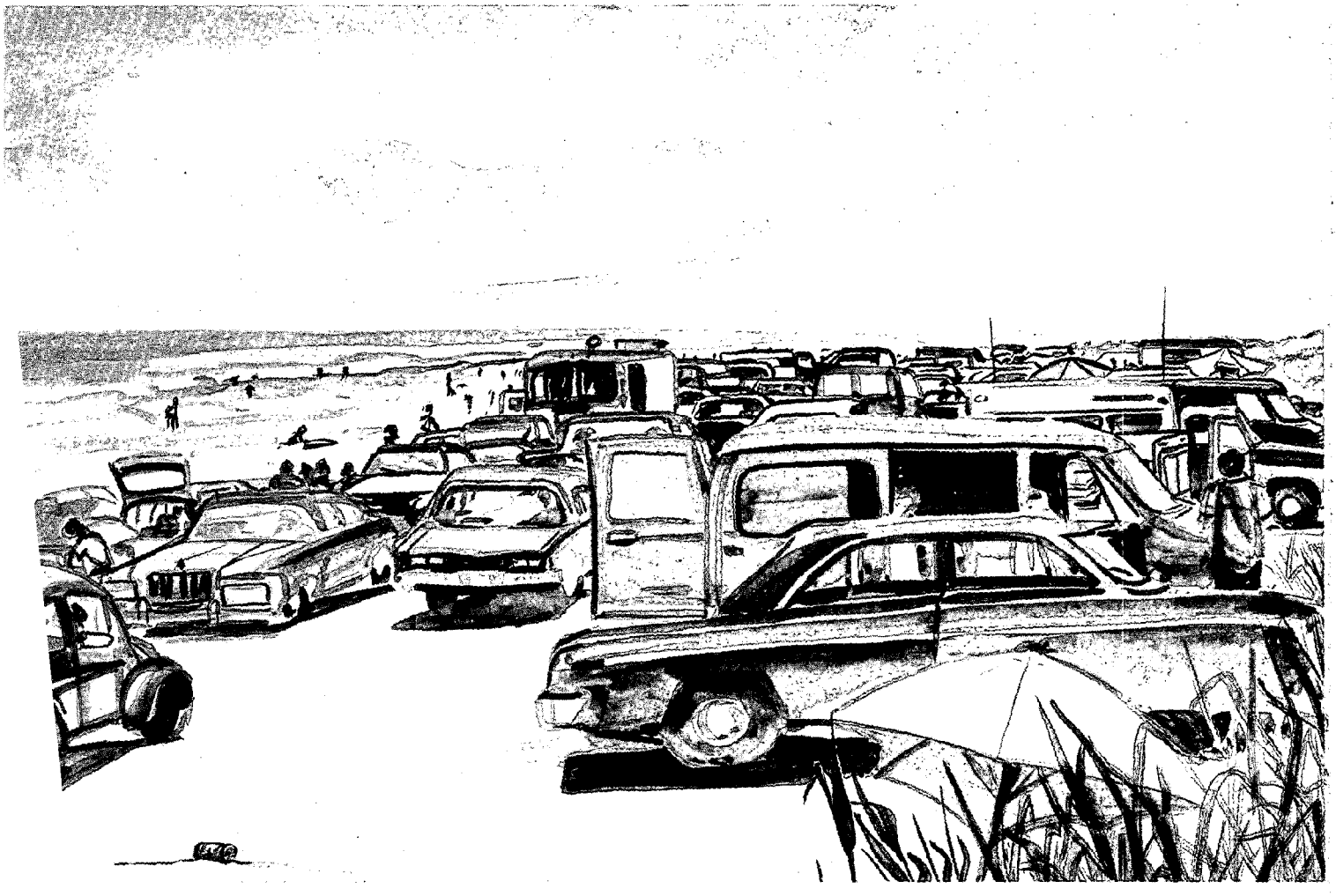
Local government acquisitions are assisted by the Land and Water Conservation Fund, which is administered by the TPWD. The fund will provide $12,518,236 in FY 1978 for local government park acquisition and development statewide. Additional funding sources available to local governments, as well as to private individuals and corporations, are listed in the TORP. Incorporated communities with a population of 7,500 or less and counties with a population of 15,000 or less receive technical assistance in park planning through the Local Planning Assistance Branch of the TPWD.

Restriction of Beach Traffic

The State of Texas permits vehicular traffic on its beaches, imposing only minimal traffic rules in most areas—setting speed limits and prohibiting anyone from driving on the beach while intoxicated. The Texas Open Beaches Act permits cities and counties to establish beach traffic regulations, but only a few beach areas have been closed to motor vehicles by local governments.

The issue of beach traffic has recently become a topic of public interest and debate in the state, and a bill to authorize the TPWD to ban vehicles from beaches was introduced in the 1977 session of the Texas Legislature. The bill did not pass, but resulted in the formation of a senate committee to study beach problems. It is expected that this committee will propose legislation regarding beach traffic to the legislature in 1979.

Wherever the decision is made to prohibit vehicles on heavily used segments of Texas beaches, off-beach parking areas and new access roads will have to be constructed to ensure adequate public access. The ramifications of this method of increasing the amount of beach space available for pedestrian use are explained in the following discussion of shorefront management problems.



Congestion

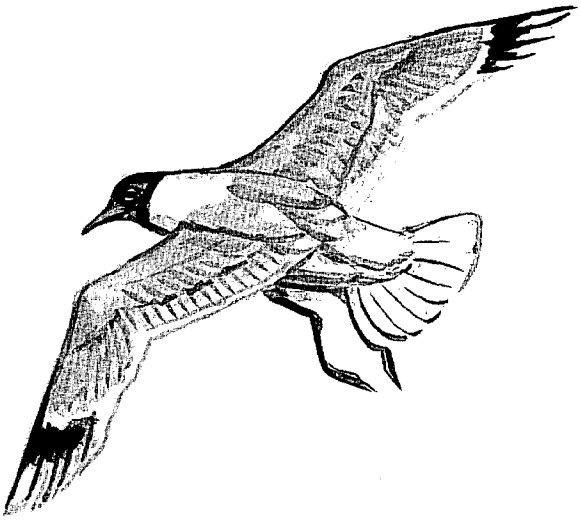
The increase in recreational use of the Texas Gulf beaches during the past two decades has caused periodic congestion of some beach areas—most notably on Galveston, Mustang, and North Padre Islands.

Congestion impedes the movement of people and vehicles on the beach, restricts beach activities, and increases damage to sand dunes by both pedestrian and vehicular traffic. On narrow beach segments in particular, congestion is intensified by the presence of vehicles, both moving and parked, which take up considerable space. On crowded beaches, vehicular traffic increases the danger of auto/pedestrian accidents and hinders the passage of emergency vehicles.

Congestion tends to occur only during peak-use periods: summer weekends and holidays (Memorial Day, Fourth of July, and Labor Day (fig. 3). Traffic counts indicate that seasonal patterns of use vary somewhat from north to south along the Gulf shoreline (fig. 4), though in all three areas of the coast, peak use levels occur from May through August. On Mustang and North Padre Islands, beach use peaks sharply in July. On Galveston Island, there is a more constant high level of use from May through August. South Padre Island beach use also peaks in July, but use levels are only slightly lower throughout the rest of the year.

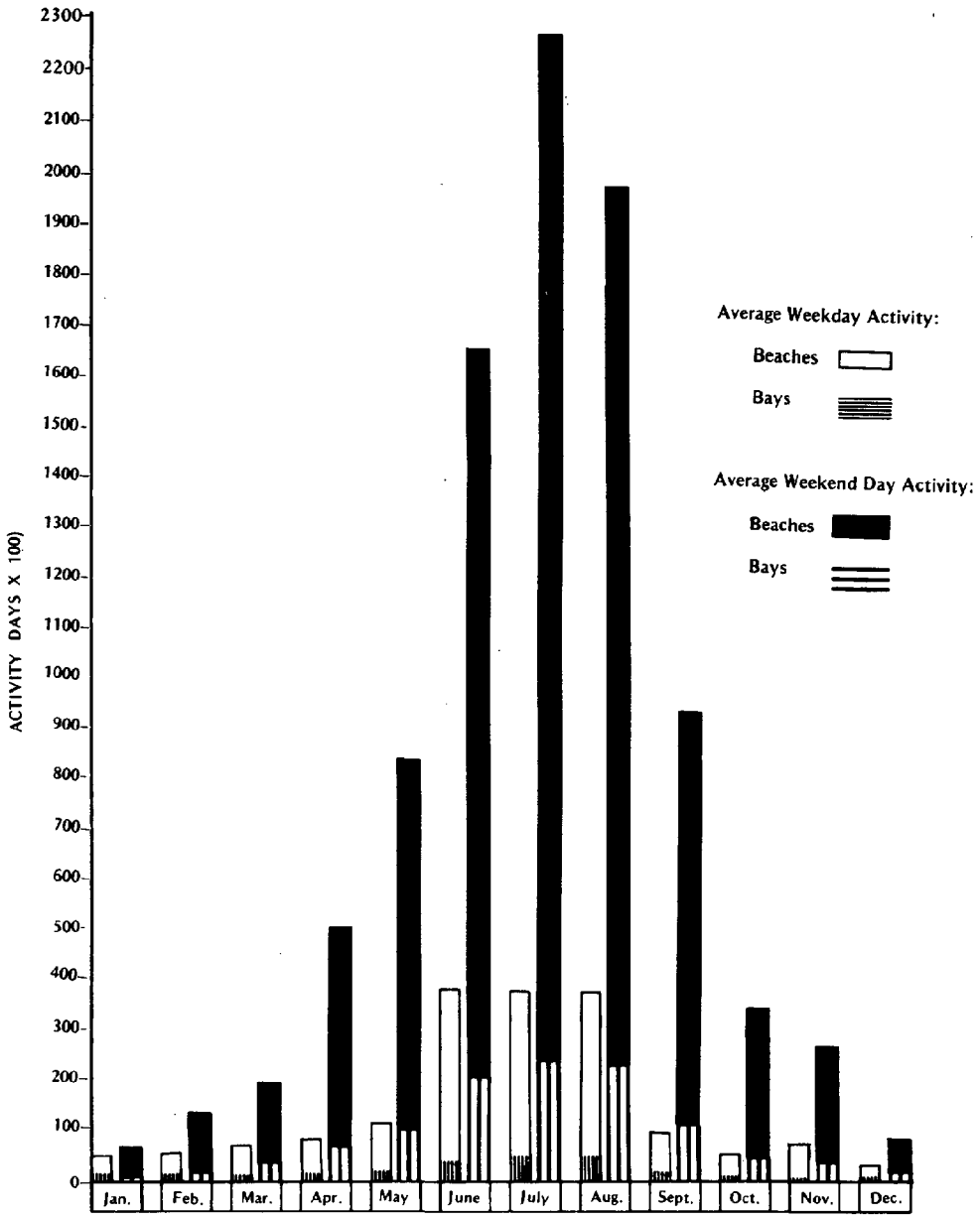
Large pockets of congestion develop on all the beaches of Galveston Island. Such pockets also develop on South Padre Island, on Padre Island north of Padre Island National Seashore, on Mustang Island near Port Aransas, and on Surfside Beach in Brazoria County. The Galveston Island beaches—particularly East Beach, Stewart Beach, and the first few miles of beach west of the Galveston seawall—are the most heavily used and have had the most severe beach traffic problems.

Localized crowding occurs despite the availability of extensive beaches that are easily accessible to the public. Some beach users, particularly young people, seem to prefer to gather in large congregations at established locations because large groups permit more socializing. Crowds also tend to concentrate where major roads intersect the beach, where concessions and other amenities are available, and where easily recognized landmarks provide a convenient meeting point. These patterns of beach use tend to leave portions of easily accessible beaches uncrowded when nearby beaches are heavily congested. Participants in the public meetings on beach access reported that when beaches in and adjacent to the city of South Padre Island are crowded, the easily accessible beaches just north of the area have relatively few visitors; and when West Beach on Galveston Island is congested, the beaches of Bolivar Peninsula (just



MANAGEMENT PROBLEMS

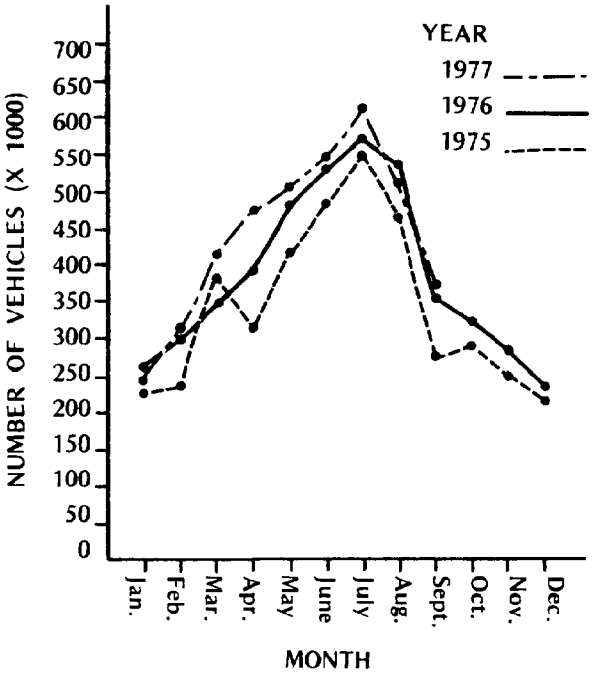
Figure 3



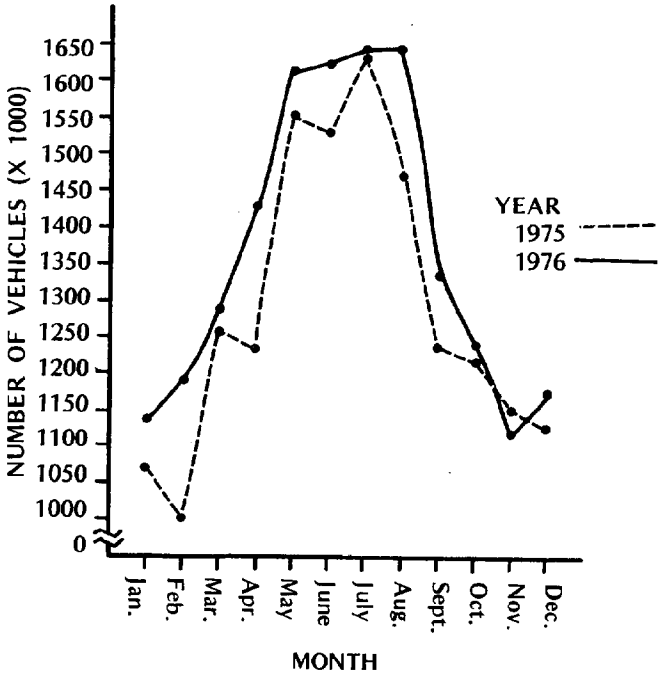
Seasonal recreational activity based on activity days for swimming, fishing, and camping on Texas Gulf beaches and bays on average weekend days and weekdays using TPWD Region 28 (Chambers, Brazoria, and Matagorda Counties) as an example (adapted from TPWD, 1977, based on TORP data).

Figure 4

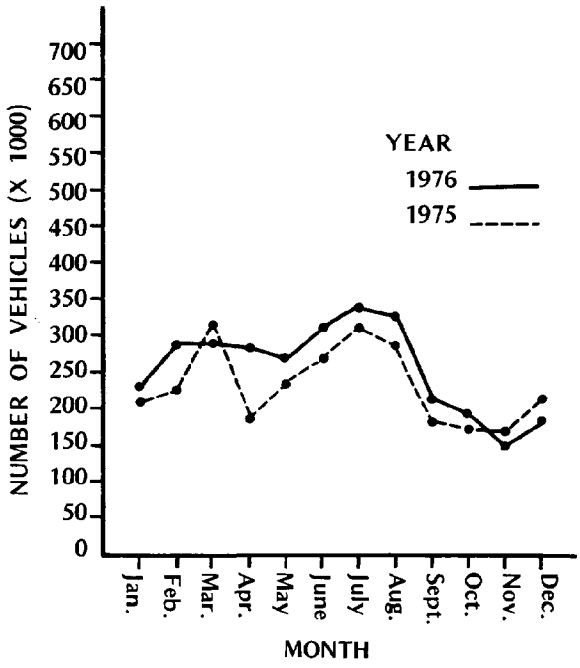
Highway traffic counts indicating the seasonal variations in recreational use in three areas of the Gulf coast.



Number of vehicles crossing the John F. Kennedy Causeway (Corpus Christi) and Port Aransas Ferry (Port Aransas) to Mustang and North Padre Islands, Texas, during 1975, 1976, and 1977 (from Ditton, et al., 1977, and SDHPT, 1977).



Monthly visitation to Galveston Island, Texas, via Interstate 45 causeway (Houston), Bolivar Ferry (Port Bolivar), and San Luis Toll Bridge (San Luis Pass) for 1975 and 1976 (from Ditton, et al., 1977).



Monthly visitation to South Padre Island, Texas, via Queen Isabella Causeway (Port Isabel) for 1975 and 1976 (from Ditton, et al., 1977; SDHPT, 1975, 1976).

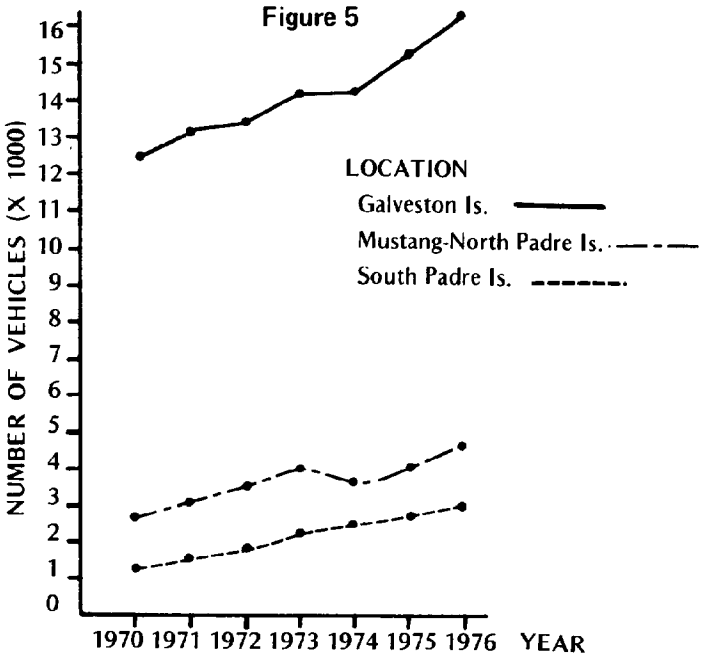
north of Galveston) and Follet's Island (across San Luis Pass from Galveston Island) are lightly used. The recent closing of Galveston Island beaches to vehicular traffic will certainly alter the patterns of use on Bolivar Peninsula and Follet's Island.

These patterns of use—congestion in local pockets during peak-use periods with lighter use between pockets and during non-peak-use periods—indicate that there is a sufficient supply of public beach in all areas of the coast to meet current levels of demand if beach use is properly managed. The task of managers is to see that congestion problems are solved without impairing public access.

New congestion problems can be expected to arise in the future as the coastal population grows. Traffic counts and visitation records of state and federal parks along the Texas coast reflect a steady increase in the recreational use of public areas. Vehicular traffic from 1970 to 1976 increased 32 percent on the I-45 causeway to Galveston Island, 85 percent on the J.F.K. Causeway to Mustang and North Padre Islands, and 150 percent on the Queen Isabella Causeway to South Padre Island (fig. 5). Visitation to state parks along the Gulf shoreline is increasing, and new parks have reached high use levels soon after their opening. Annual visitation to Padre Island National Seashore increased from 160,000 in 1969 to 980,000 in 1976 (USDI, 1977). Continuation of these trends will intensify congestion problems.

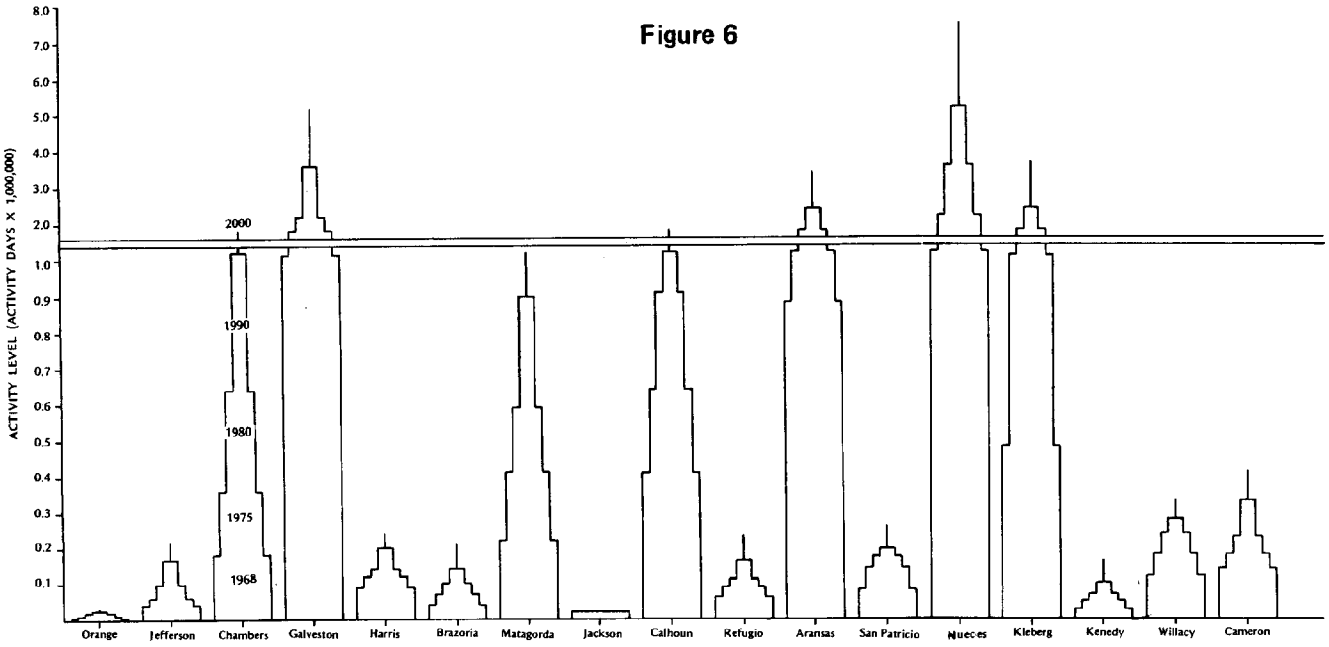
The TORP predicts that recreational use of the Gulf shorefront will continue to increase, with the highest visitation levels occurring in Galveston and Nueces Counties (fig. 6). Though there is less

Figure 5



Estimated annual two-way traffic counts for 1970 through 1976 to Galveston Island (via Interstate 45 causeway at Houston, Bolivar Ferry at Port Bolivar, and San Luis Toll Bridge at San Luis Pass), Mustang and North Padre Islands (via John F. Kennedy Causeway at Corpus Christi and Port Aransas Ferry at Port Aransas), and South Padre Island (via Queen Isabella Causeway at Port Isabel). (From Ditton et al., 1977; SDHPT 1970-1976.)

Figure 6



Historical and projected recreational participation (boating, fishing, skiing, swimming, camping, picnicking, marsh hunting, walking, hiking, and nature study activities) on and around Gulf bays in Texas coastal counties (adapted from TPWD, 1977, based on TORP data).

recreational activity in the bay areas than on the Gulf beaches (fig. 2, p. 14), congestion does occur at some access points (boat ramps) during peak use periods. Significant increases in bay recreational activities are projected for Chambers, Matagorda, Calhoun, and Kleberg Counties (fig. 6). These bay and Gulf waters can support increased use, but congestion at access points will have to be alleviated.

Beach Traffic

Texas has a long tradition of using vehicles on its Gulf beaches. The early explorers and settlers used the beaches as natural roads, and by the end of the 19th century the Galveston Island beach from the City of Galveston to San Luis Pass had been made a dedicated public highway. A horse-drawn stagecoach line made daily runs down the beach carrying mail and passengers to and from the ferry at San Luis Pass. With the advent of the automobile, motorized vehicular traffic replaced the horse. From these beginnings, recreational use of the Gulf beaches has grown tremendously, and the automobile has maintained a role in beach use. Today that role is still valid in most areas except when large numbers of vehicles cause overcrowding of the beach and create a safety hazard.

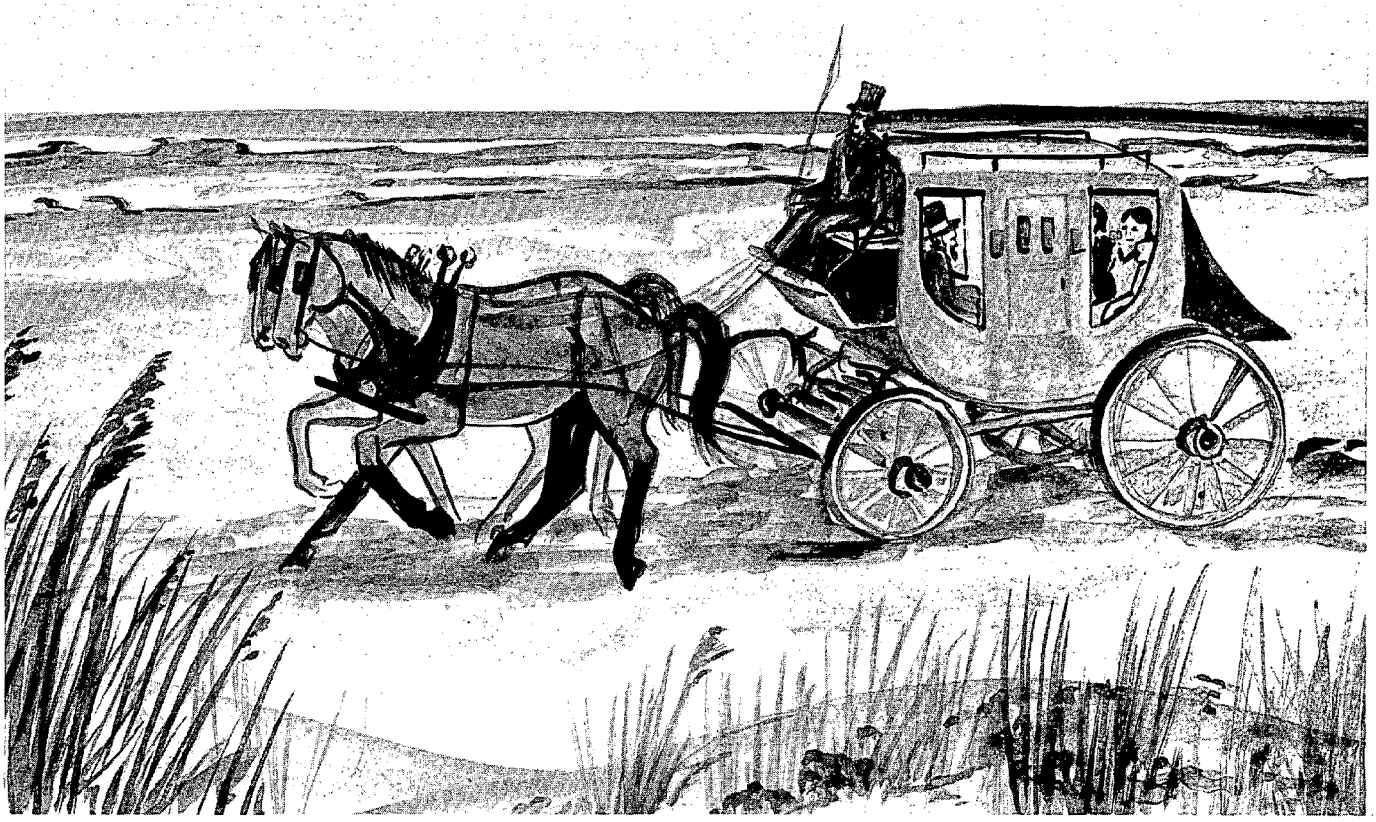
Texas beaches are well suited to automobile driving. The sand packs tightly when damp on the wide, gently sloping beaches and, in most areas, is sufficiently compact to drive on. The Gulf coast is relatively flat, with no steep or rocky cliffs adjacent to the beaches. The beaches can be easily reached through the low, broken sand dunes of the northern coast or through breaches in the higher dunes of the southern coast. The only natural obstructions to vehicles on the beach are infrequent channels and washovers, and most washovers can be crossed at low tide.

The increase in the number of vehicles on the beaches in recent years has caused a call for greater regulation of beach traffic. Vehicles in motion on the beach endanger sunbathers and pedestrians, who may neither notice nor be noticed by drivers. Vehicles also contribute to congestion, because driving lanes and parking areas reduce the pedestrian/bather capacity of the beach. Four-wheel-drive vehicles driven over the upper beach or sand dunes uproot the stabilizing vegetation (making the dunes more vulnerable to blowouts) and break down the dunes themselves.

But vehicles are the only means of access to many beaches. Public debate of beach traffic problems and possible solutions has made it apparent that no single solution will be appropriate for the entire Texas coast.

Consequences of Removing Traffic from the Beaches

Banning vehicles from Texas beaches would eliminate a major safety hazard to beach users and open more beach area for use by pedestrians and bathers. It would also eliminate most recreational



vehicle traffic from the dunes: dunes are usually entered from the beach, since most back-beach areas are privately owned.

The main problem with the banning of beach traffic from state beaches is the high cost of maintaining current levels of accessibility by other means. Many segments of the public beach that are currently easily accessible can be reached only by driving along the beach, and an additional 100+ miles can be reached only by four-wheel-drive vehicle. The construction of new access roads to beaches that would be made inaccessible by the banning of automobiles would not only be expensive but would also damage back-dune habitats.

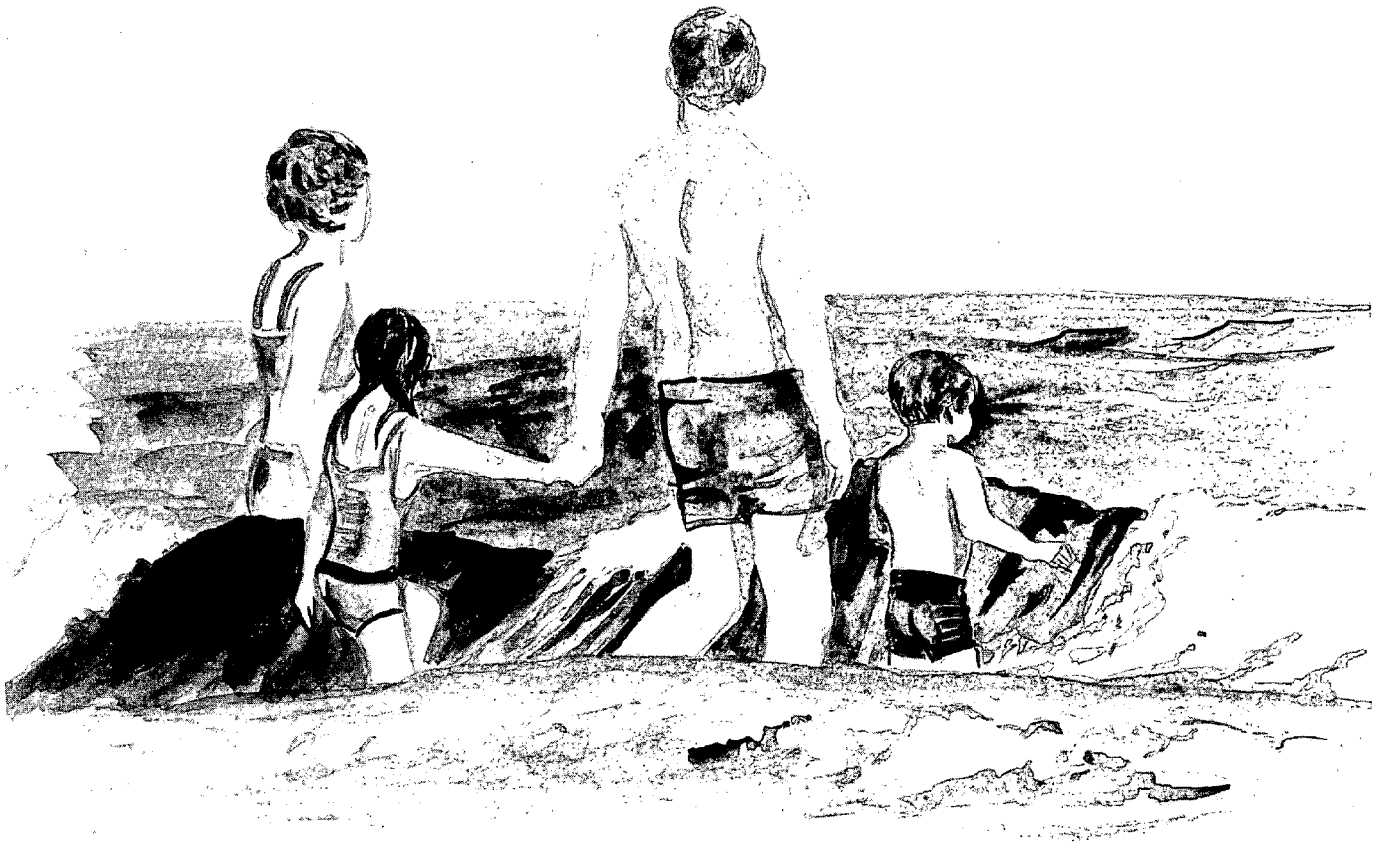
Additional costs would be incurred in the construction of off-beach parking areas, both for the acquisition of high-priced beachfront property and for the construction of the facilities. Frequent crossing of the dunes by pedestrians walking from these parking areas to the beach would damage dune and back-beach environments. Elevated walkways might be an appropriate solution in some areas, but this approach has been unsuccessful in Galveston Island State Park, where pedestrians ignore the walkways and cut footpaths through the dunes. Wooden walkways have also be dismantled and used for firewood.

An alternative to frequent off-beach parking facilities is a shuttle service providing transportation to the beach from a parking facility located where land is less expensive and less fragile. The cost of establishing such a service would also be high, however, and users might be charged both a parking and shuttle fee.

The question of user fees for off-beach parking systems deserves careful study. The public has never been charged for access to or use of public beaches in Texas. Thus, the charging of fees for parking would be contrary to state policy. If a shuttle service were the only means of beach access available to the public, the charging of a user fee might be illegal under the Texas Open Beaches Act. Fees for either publicly or privately owned parking facilities with added amenities such as bathhouses should be low enough to keep the beaches equally accessible to all segments of the public.

Current Controls

The Texas Open Beaches Act permits cities to establish beach traffic regulations within their corporate limits and authorizes counties to regulate traffic on beaches outside city limits. Local political subdivisions may receive assistance in developing traffic safety plans from the Texas Department of Community Affairs (TEX. REV. CIV. STAT. (ANN. art. 4413(201)). State law regulates beach traffic directly through TEX. REV. CIV. STAT. ANN. art. 6701d-21, which sets beach speed limits of 25 mph during the day and 20 mph at night and makes it unlawful to drive on the public beach while intoxicated.



Under the Open Beaches Act, local governments may restrict vehicles from the beaches, restrict certain activities from certain areas of the beach, set beach speed limits, and establish any other necessary traffic regulations. Until very recently, South Padre Island was the only city that had completely closed its beaches to automobile traffic. The city of Galveston has now banned all vehicular traffic from the beach on West Galveston Island during the peak use season (by city council action on March 2, 1978).

In the city of South Padre Island, public accessways to the beach have been provided at every city block from cul-de-sacs of the city streets running perpendicular to the beach (City of South Padre Island, Ord. 4). Parking is available along city streets. However, pedestrian accessways are unmarked, leaving it unclear whether the beach user is crossing over public or private property. Galveston's recent banning of vehicles from West Beach was preceded by planning and acquisition of some parking areas by the county and city, but it appears that the available parking will be inadequate to fully accommodate the volumes of traffic experienced in the past few years. Cameron County has also banned cars from the beach at Isla Blanca Park, which is adjacent to the southern boundary of the city of South Padre Island. Adequate parking has been provided there; the county parking lots are capable of accommodating 4,000 to 5,000 cars.

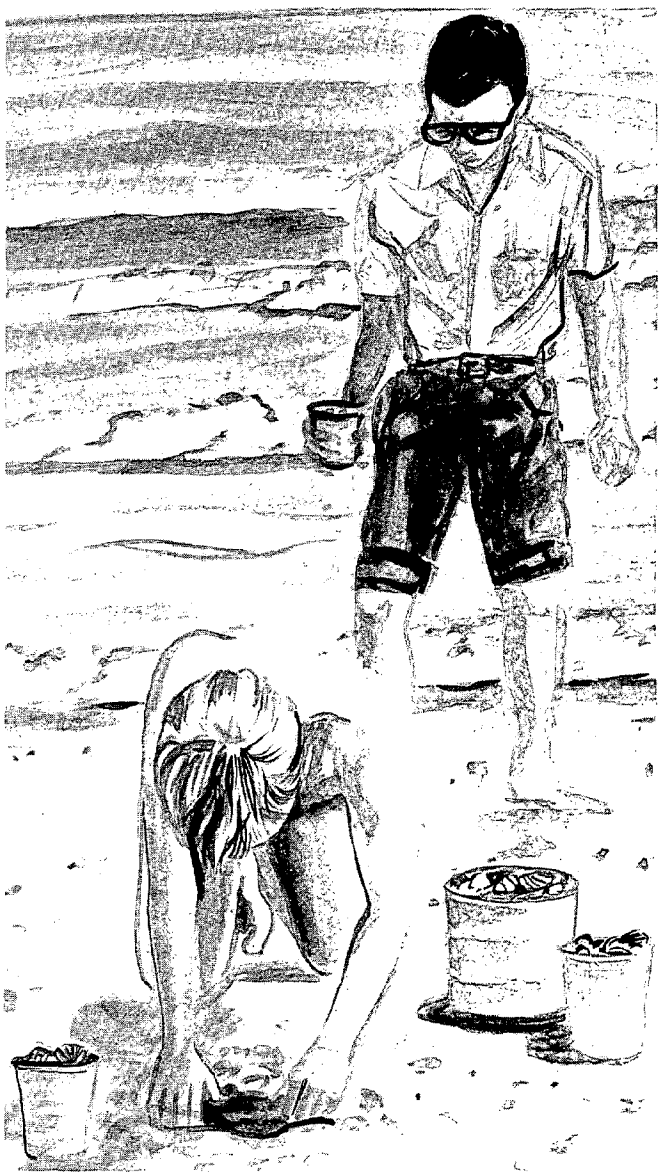
Some cities and counties have used their ordinance powers to reserve certain areas for specific activities such as bathing, camping, parking, and driving. For example, the city of Galveston (which has recently annexed most of Galveston Island) has prohibited driving on Stewart Beach and restricted parking to enclosed back-beach areas, thus reserving a large portion of that beach for bathers only (Galveston Code, chap. 4, art. 1, sec. 4-6). Port Aransas has used barrels to form traffic lanes away from the water's edge, which is reserved for swimming and camping. Speed limits are posted and parking is permitted in specific areas of the beach (City of Port Aransas, Ord. 77-6).

Because of the varying intensity of use of Texas Gulf beaches, it seems most practical for beach traffic to be regulated at the local level. Strict regulations, or a total ban on beach traffic, may be the best solution for beach areas subject to congestion. Where beaches are lightly used and accessible only by vehicle, however, it may be best to permit driving on the beach, imposing only dune-protection regulations.

In planning for parking or other ancillary beach access facilities, local governments may require technical assistance in planning alternative means of access that will protect dune and back-dune ecosystems. This assistance should be made available by the state upon request of local governments. Also, because access to the beaches is a right of all Texans, and because most beach users are not residents of the cities and counties with beach jurisdiction, the state should provide increased financial aid (either high-percentage matching grants or total funding) to local governments for the enforcement of beach traffic regulations and for the provision of facilities needed to ensure adequate access.

Litter

Litter on beaches is not only aesthetically displeasing; certain types of litter may be a safety hazard. Pieces of metal and broken glass are particularly hazardous when they are covered by sand or water and are invisible to pedestrians and swimmers.



While the beach user is a primary contributor to beach litter, much litter is washed onto the beach from offshore. Offshore litter comes from recreational craft, fishing boats, and seagoing cargo ships and tankers. Litter from these sources is carried onshore from river mouths, from passes between the barrier islands and peninsulas, and from distant Gulf waters by longshore or littoral drift.

Current Controls

The primary state legal mechanisms for controlling deposition of litter in public coastal areas are TEX. REV. CIV. STAT. ANN. art. 4477-9, which makes it illegal to dispose of waste on public or private land without permission of the private owner or appropriate public agency; TEX. REV. CIV. STAT. ANN. art. 6701-22, which makes it illegal to deposit litter in county parks; and the Texas Open Beaches Act, which gives county and city governments the authority to regulate and levy fines for littering.

The state provides for the removal of litter from Gulf beaches through the 1969 Beach Cleaning Act (TEX. NAT. RES. CODE Sec. 61.061). This act assigns cities and counties the duty of cleaning the beaches and provides for partial (up to two-thirds) reimbursement of the cost of such cleaning to qualified cities and counties. In 1973, the Texas Legislature amended the statute to allow counties and cities to be reimbursed for expenditures incurred in the employment of lifeguards, beach patrols, and litter patrols; however, no funds have been appropriated for these purposes. The Beach Cleaning Program, administered by the TPWD, was funded at $321,567 for fiscal year 1977 and $338,369 for fiscal year 1978. Table 5 shows the amounts spent by local governments for beach cleaning from 1972 to 1976 and the amounts reimbursed by the TPWD.

The Beach Cleaning Act was designed to relieve local governments of part of the cost of a service to all beach users, many of whom come from outside their jurisdictions. A significant percentage of beach users are day visitors from outside the cities and counties where the beaches are located. These visitors contribute considerably less to the local economy than do overnight visitors. Traffic counts on 61st street in the city of Galveston indicate that 90 percent of visitors to West Beach on Galveston Island are day visitors from the Houston metropolitan area. Patterns of use on Galveston Island and other popular beach areas indicate that the current two-thirds reimbursement may not be equitable or sufficient aid to the local entities responsible for beach maintenance.

Concessions

Beach concessions are beneficial if properly regulated. They offer food and drink at convenient locations for beach visitors, and such services as surfboard and umbrella rentals facilitate a more diversified use of the beach. If they are too numerous on crowded beaches, however, concessions may contribute to littering, beach traffic hazards, or congestion by occupying space that would otherwise be available for recreational activity. Present regulation of beach concessions by the state and by municipal governments is providing the control necessary to prevent these problems.

Table 5

EXPENDITURES BY COASTAL COUNTIES OR CITIES FOR BEACH CLEANUP AND AMOUNTS REIMBURSED BY THE TPWD FROM 1972 (WHEN THE PROGRAM WAS INITIATED) THROUGH 1976
(Adapted from TPWD, 1977)

	Year									
	1972		1973		1974		1975		1976	
Participant	Expd.	Reimb.	Expd.	Reimb.	Expd.	Reimb.	Expd.	Reimb.	Expd.	Reimb.
Galveston Co.	118,082	50,000	131,884	50,000	110,030	40,000	119,653	50,000	140,961	85,930
Cameron Co.	22,624	11,312	29,805	14,902	24,911	14,525	35,063	14,315	26,181	17,459
Brazoria Co.	89,461	44,731	109,216	45,586	89,677	48,195	72,200	36,100	52,162	34,775
Kleberg Co.	19,577	7,831	29,319	6,000	29,434	6,355	36,053	6,295	–	–
Jefferson Co.	15,503	9,406	14,041	7,020	15,872	10,565	23,919	11,681	16,267	10,845
Nueces Co.	64,904	32,452	55,130	26,824	58,903	35,570	72,195	34,970	87,151	45,240
Matagorda Co.	–	–	–	–	–	–	13,596	6,345	16,674	11,074
Galveston City	56,995	28,447	53,414	24,462	66,374	28,340	80,986	27,880	138,762	43,300
TOTALS	387,146	184,179	422,809	174,694	395,101	193,550	453,648	187,586	478,158	248,623

Current Controls

TEX. NAT. RES. CODE Sec. 61.161 is the state-level mechanism for regulation of commercial establishments on the beach. It prohibits fixed or permanent commercial establishments on the public beaches, but allows the TPWD to permit a reasonable number of mobile businesses on any Gulf beaches located outside the limits of any incorporated area. A provision added to the act in 1973 stipulates that no licensed concessionnaire may sell any commodity in a glass container.

Coastal cities have the authority to regulate beach concessions within their jurisdictions. Most have adopted the policies established in the state law, and some have instituted even stricter regulations. The city of Galveston prohibited all beach concessions as of January 1, 1978, to help relieve the extreme congestion on Galveston beaches (City Ord. No. 77-51). The city of Port Aransas prohibits fixed or permanently located concessions on the beach and requires all mobile beach businesses to obtain permits (City Ord. No. 75-2). Action taken by the city council after the 1977 summer season prohibits food concessions from operating on the city's Gulf beach.

Encroachment on Private Property

Encroachment on private property is a potential problem at any boundary between private land and public land in an area where the public has rights of access and use. The extensive and sometimes indefinite boundaries of the Texas bays and Gulf shorefront increase in possibility of such encroachment, particularly along the Gulf beach.

Beach users enter private property adjacent to the Gulf beach for several reasons: to walk, drive, or play in the dunes; to gather driftwood for fires; to seek shade; or to find privacy. Where no public restrooms or showers are available on beaches near developed areas, bathers may cross private property in search of these facilities. It is reported that this is the most frequent cause of trespassing.

Current Controls

The trespass laws are the principal legal recourse available to the private property owner. With current high levels of beach use, however, these laws are not an effective solution to the problem of encroachment on private land.

Indirect controls have been the most successful means of reducing encroachment on private property. These include eliminating the need to trespass (by providing public restrooms and bathhouses) and prohibiting activities that encourage trespass (fire-building and camping). For example, when trespassing and vandalism (mostly to obtain firewood) became a problem on the beaches of West Galveston Island, the city of Galveston solved much of the problem by prohibiting overnight camping and fires. The city is currently establishing pocket parks with restroom and shower facilities to discourage trespassing. These projects are being partially financed by Land and Water Conservation Fund monies. The Beach Cleaning Program is being used to provide portable toilets on the beaches throughout the Gulf coast.

PORT ARANSAS
EASTER WEEKEND, 1977

Erosion

Erosion affects the accessibility of shorefront areas directly by eliminating beach areas, or indirectly by causing the shoreline to recede behind structures, which then impede travel along the shorefront. Erosion rates for the Texas Gulf shoreline are listed in the inventory charts (appendix), and eroding areas are indicated on the maps.

The first effect is evident in Galveston, where the Gulf beach in front of the city seawall has slowly disappeared. The second effect is evident at Surfside and Sargents Beach where (in the absence of a large seawall) the shoreline has retreated inland of the first row of houses. These houses now stand on pilings between the lines of mean low and mean high tide. Also, within the corporate limits of the city of South Padre Island a number of private bulkheads, undermined by erosion, now form obstructions on the beach.

The Open Beaches Act vests in the state attorney general the authority to seek removal of obstructions on the beach. The act does not, however prevent any agency, department, institution, subdivision, or instrumentality of the state from erecting or maintaining any structure as an aid to navigation, protection of the shoreline, safety, or any other lawful purpose. The U.S. Army Corps of Engineers may build protective structures for navigational purposes and for the protection of cities without obtaining a permit from the state.

A more effective way to reduce the effects of erosion on shorefront access is to allow natural systems to function with minimal interference by man's activities. Sand dunes help retard erosion by storing sand that is resupplied to the beach. For this and other reasons, dunes may be protected by state and local regulations. At the local level, municipalities may exercise their zoning powers to establish set-back requirements and other building standards that will protect sand dunes. Under the Sand Dune Protection Act (TEX. NAT. RES. CODE Sec. 63.001), a county may establish a dune protection line within 1,000 feet of the mean high tide line for the purpose of regulating activities that might be destructive to the dunes in that area. Though this act does not apply to the Gulf shorefront below the Mansfield Ship Channel, the two counties in that area (Willacy and Cameron) have been given zoning authority in areas of Padre Island outside corporate city limits (TEX. REV. CIV. STAT. ANN. art. 23721.

Subsidence

Subsidence does not appear to significantly affect any Texas Gulf beaches; however, measurable

PROTECTION OF PUBLIC SHOREFRONT AREAS

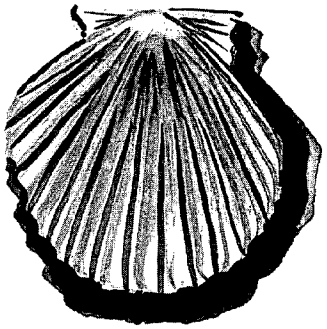
subsidence of at least 0.2 feet per year does occur in at least three areas encompassing bay shoreline:

(1) the upper Texas coastal plain, extending from Bay City northward into Louisiana; (2) a part of Jackson County near Port Lavaca, and (3) an area in Nueces and San Patricio Counties. Continuing subsidence on the Texas coast and the increase in the size of the area affected will cause additional subsidence of some bayshores, but at a very slow rate.

Subsidence may impede access to the bayshores by making roads more susceptible to flooding and may damage bayshore structures. Both of these effects are apparent around the San Jacinto Monument near Houston, where the land has subsided 8.5 feet since 1906 (Turner, Collie, and Braden, 1972). In 1975, the Texas Legislature created the Harris-Galveston Coastal Subsidence District to regulate groundwater withdrawals, which cause subsidence in this region. The district's efforts have slowed the rate of subsidence, but the process is nevertheless expected to continue for the next 20 years.

Hurricanes and Flooding

Hurricanes and flooding can make beaches inaccessible by destroying access roads or by cutting channels across the beach and adjacent lands. Human lives are severely endangered when floodwaters threaten to inundate the causeways that connect the major barrier islands to the mainland or when storm tides and high winds make it impossible to operate public ferries. At the present time, there are only six public access routes to barrier islands: the bridge at South Padre Island, the bridge at Mustang and North Padre Islands, the bridge across San Luis Pass, the ferry at Port Aransas, the ferry at Bolivar Island, and IH-45 from Houston to Galveston. Even if these accessways are not closed by flooding or storm tides, they may soon be inadequate to entirely evacuate some barrier islands during a hurricane because both resident and tourist populations on the islands are increasing. Access roads on bay shores may likewise be made impassable by hurricane floodwaters, and congestion of roads that remain open may impede evacuation.



RECOMMENDATIONS

Policy

The state, using Texas Parks and Wildlife Department evaluations of the current accessibility of Texas beaches and bay shores, should develop policies to guide the development of new shorefront accessways. Consideration should be given to the desirability of preserving remote, undeveloped areas by limiting their accessibility. The legislature should carefully consider whether there is a present need to fully fund the acquisition of shorefront access rights-of-way at the state level.

Regulation of beach traffic at the local level should continue. Where removal of vehicles from the beach is necessary or desirable, the state should establish a policy of providing cities and counties with technical assistance, upon request, for the development of ecologically sound methods of maintaining public access.

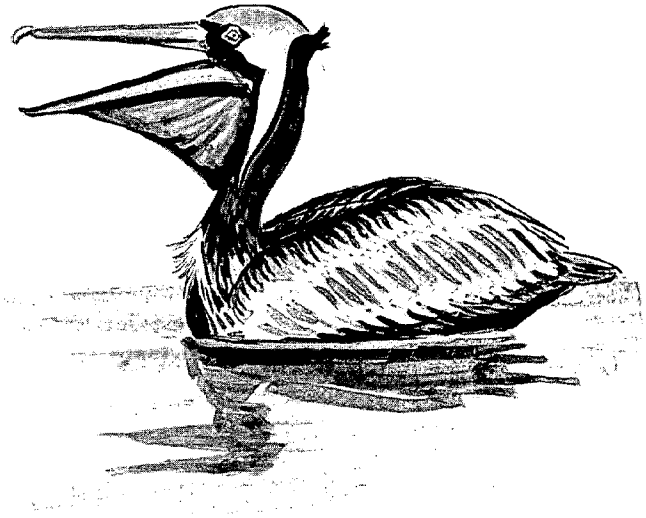
Funding

Banning or limiting vehicular traffic on the Gulf beaches often creates a need for expensive off-beach parking areas or other traffic control measures. The Natural Resources Council should recommend to the legislature whether state funding is needed for the construction of off-beach parking facilities.

The state should provide funds under the Beach Cleaning Act to aid local governments in the employment of lifeguards, beach patrols, and litter patrols. In addition, beach maintenance costs should be more fully underwritten by increasing the total legislative appropriation to the Beach Cleaning Fund and by increasing the percentage of state compensation for such expenditures.

To help prevent encroachment on private lands along the Gulf shoreline, the state should make funds available to cities and counties for the provision of more public beach facilities such as restrooms and bathhouses.

PORT ARANSAS



APPENDIX

AN INVENTORY OF TEXAS GULF SHORELINE AREAS

The following charts contain information on the uses and physical characteristics of the Texas Gulf shoreline. For this inventory, the shoreline was divided into segments marked by easily identifiable features, including county and municipal boundaries, roads, park boundaries, channels, and jetties. The information presented was obtained from the State Department of Highways and Public Transportation, the Texas Parks and Wildlife Department, the Bureau of Economic Geology at The University of Texas, existing literature, conversations with local officials and managers of public lands, and on-site observation of the areas.

A shoreline segment was considered easily accessible if it could be reached by two-wheel-drive passenger vehicle or by walking no more than one mile from a passenger vehicle access point. Beach width was designated as *narrow* if less than 100 feet, *moderate* if between 100 and 200 feet, and *wide* if in excess of 200 feet.

The erosion rates listed were calculated by averaging recorded annual rates from 1937 to the present. The information on annual rates was obtained from the Bureau of Economic Geology; 1937 was selected as the starting date because erosion on the Texas coast has increased significantly since that year.

		Use Parameters								Physical Description						
			Shore Frontage (miles)							Beach				Fore-Island Dunes		
County	Shoreline Segment	Road Access	Total Segment	Easily Accessible Portion	Littoral Ownership	Use of Adjacent Land	Vehicles Permitted on Beach	Designated Parking Areas	Beach Camping	Public Amenities	Maintenance	Width	Composition	Accreting (+) or Eroding (-) (feet/year)	Height Range (feet)	Percent Vegetated	Washovers or Blowouts
Jefferson & Chambers	Sabine Pass to Sea Rim State Park	None	9.0	0	Private	Grazing (undeveloped)	Yes (however, not driveable)	None	No	None	None	Narrow	Mud or thin sand veneer; 50 % shell or less	-20.6	Marsh – no dunes present		
	Sea Rim State Park	S.H. 87 to Park Road 69	5.5	4.5	State (TPWD)	Recreation (moderately developed)	Yes, except for 0.5 mile swimming area	Yes (240 cars)	Yes	Restrooms, showers, picnic tables, concessions	Texas Parks and Wildlife Department (TPWD)	Narrow	Mud or thin sand veneer; 50% shell or less	-17.2	0-3	45	Frequent (poorly developed dune areas)
	Sea Rim State Park to Chambers-Galveston Co. line	S.H. 87 to unpaved access roads approximately every ½ mi.	19.8	19.8	Private	Recreation (slightly developed)	Yes	None	Yes	Portable toilets, trash receptacles	Jefferson County – first 2 mi. only adjacent to state park (Beach Cleaning Act [BCA] funds)	Narrow	Mud or thin sand veneer; 50% shell or less	0 (first 2 mi.) -2.3 (last 18.9 mi.)	0-3	45	Frequent (poorly developed dune areas)
Galveston	Chambers-Galveston County line to Rollover Pass	S.H. 87	9.0	9.0	Private	Residential (moderately developed)	Yes	None	Yes	Portable toilets	County (BCA funds)	Narrow	Fine to very fine sand; 1-12% shell	-5.9	5-10	70	Frequent (poorly developed dune areas)
	Rollover Pass to North Jetty	S.H. 87	18.3	18.3	Private	Residential and resort lodging (moderately developed)	Yes	None	Yes	Portable toilets	County (BCA funds) and City of Crystal Beach within city (6.5 mi.)	Moderate	Fine to very fine sand; 1-12% shell	-2.5 (N) +16.8 (S)	3-5	60	Frequent (poorly developed dune areas)
	North Jetty to Ferry Landing (includes Fort Travis County Park)	S.H. 87	2.3	2.3	County owns central 0.7 mi.; remainder private	Recreation and residential (moderately developed)	Yes	None (some planned for county park)	Yes	Portable toilets	County (BCA funds)	Narrow	Fine to very fine sand; 1-12% shell	Not available	3-5	60	Very frequent (poorly developed dune areas)
	East Beach (including R.A. Apffel Park)	Boddecker St. Seawall Blvd. San Jacinto	2.6	2.6	City (northern 0.9 mi.); private (southern 1.7 mi)	Recreation (undeveloped park land), resort condominiums (slightly developed)	Yes	Yes	No	Lifeguards during the summer, trash receptacles, portable toilets, concessions at South Jetty	City of Galveston (BCA funds)	Moderate	Fine to very fine sand; 1-12% shell	+17.9	3-5	0	Very frequent (poorly developed dune areas)
	Stewart Beach	Seawall Blvd.	.9	.9	City	Recreation (highly developed)	Yes, but only on upper beach reserved for parking	Yes	No	Concessions, restrooms, showers, lifeguards, and guarded parking	City of Galveston (BCA funds)	Wide	Fine to very fine sand; 1-12% shell	+12.5	0	0	None
	Galveston Seawall	Seawall Blvd.	6.8	6.8	County owns seawall	Commercial, residential, resort lodging, and recreation (highly developed)	No	Yes (parallel parking along seawall)	No	Concessions, restrooms, hotels, restaurants	County-seawall & rip-rap (BCA funds) City-beach (BCA funds)	Very narrow to zero	Fine to very fine sand; 1-12% shell	+1.0 (N) -3.4 (S)	0	0	None
	Galveston Seawall to Galveston Island State Park	7th thru 12th Mile Roads	6.1	6.1	Private and county (3 small pocket parks) -0.5 mi.	Residential, resort lodging, and recreation (moderately developed)	No	Yes (under construction)	No	Portable toilets, trash receptacles	City of Galveston (BCA funds)	Moderate	Fine to very fine sand; 1-12% shell	-2.9	3-5	70	Frequent (poorly developed dune areas)
	Galveston Island State Park	F.M. 3005 to Park Road 66	1.6	1.6	State (TPWD)	Recreation (slightly developed)	No	Yes	No	Showers, restrooms, picnic tables, hook-ups, and concessions	TPWD	Narrow	Fine to very fine sand; 1-12% shell	-3.3	3-5	70	Few (poorly developed dune areas)
	Galveston Island State Park to San Luis Pass	Several roads from F.M. 3005	10.8	10.8	Private	Residential and resort lodging (slightly developed)	No	Yes (under construction)	No	Portable toilets, trash receptacles	City of Galveston & City of Jamaica Beach (BCA funds) City of Pirates Beach	Wide	Fine to very fine sand; 1-12% shell	-2.5	3-5	50	Few (poorly developed dune areas)
Brazoria	San Luis Pass to northern limits of City of Surfside	Unpaved roads approximately every 2 mi. from County Road 257	11.0	11.0	County (200 ft. on south end of segment); remainder private	Residential and resort lodging (moderately developed)	Yes	None	Yes	Portable toilets, trash receptacles	County (BCA funds)	Wide (N) Moderate (S)	Fine to very fine sand; 2-10% shell (N) Thin sand veneer over mud; 2-10% shell (S)	-13.1(N) -6.3(S)	3-5	20	Very frequent (poorly developed dune
	City of Surfside	S.H. 332 to Surfside Streets	3.8	3.8	Private	Residential and resort lodging (highly developed)	Yes	None	Yes	Portable toilets, trash receptacles	County (BCA funds)	Moderate	Thin sand veneer over mud; 2-10% shell	-2.2	3-5	20	Very frequent (poorly developed dune areas)

County	Shoreline Segment	Use Parameters: Road Access	Shore Frontage (miles): Total Segment	Shore Frontage (miles): Easily Accessible Portion	Use Parameters: Littoral Ownership	Use Parameters: Use of Adjacent Land	Use Parameters: Vehicles Permitted on Beach	Use Parameters: Designated Parking Areas	Use Parameters: Beach Camping	Use Parameters: Public Amenities	Physical Description: Beach: Maintenance	Physical Description: Beach: Width	Physical Description: Beach: Composition	Physical Description: Beach: Accreting (+) or Eroding (-) (feet/year)	Physical Description: Fore-Island Dunes: Height Range (feet)	Physical Description: Fore-Island Dunes: Percent Vegetated	Physical Description: Fore-Island Dunes: Washovers or Blowouts
	Freeport Harbor Channel to Bryan Beach State Rec. Area	F.M. 1495 to Bryan Beach Road and Quintana Rd.	5.5	5.5	Private	Residential (slightly developed)	Yes	None	Yes	Portable toilets, trash receptacles	County (BCA funds)	Moderate	Thin sand veneer over mud; 2-10% shell	-85.8(N) +24.6(S)	5-20	5	Very frequent (poorly developed dune areas)
	Bryan Beach State Recreation Area	F.M. 1495 to beach, then 3 mi. south on beach	1.0	1.0	State (TPWD)	Recreation (undeveloped)	Yes	None	Yes	None	TPWD	Moderate	Thin sand veneer over mud; 2-10% shell	+93.2	5	10	Frequent (poorly developed dune areas)
	New Brazos River Channel to Matagorda-Brazoria Co. line	None	9.0	0	Private and federal (USFWS)--southern 4.8 mi.	Grazing (N) and wildlife refuge (S) (undeveloped)	Yes, but no road access	None	Yes	None	None (N) USFWS (S)	Moderate	Thin sand veneer over mud; 2-10% shell	+87.9(N) -18.4(S)	5	10	Frequent (poorly developed dune areas)
Matagorda	Matagorda-Brazoria Co. line to Brown Cedar Cut	F.M. 457 to Sargents Beach	13.6	5.0	Private and federal (USFWS)--northern 1.4 mi.	Wildlife refuge (N) grazing (S) (undeveloped), residential at Sargents Beach (moderately developed)	Yes	None	Yes	None	County-5 mi. of beach (BCA funds)	Moderate (N) Narrow (S)	Fine to very fine sand; 20-70% shell	-21.1	3-5	10	Frequent (poorly developed dune areas)
	Brown Cedar Cut to Colorado River mouth	F.M. 2031 to beach	19.9	5.0	Private	Grazing (N) (undeveloped), residential and resort lodging (moderately developed)	Yes	Yes at temporary county park	Yes	Picnic tables, sun shelter, portable toilets, trash receptacles	County-5 mi. of beach north from end of F.M. 2031 (BCA funds)	Narrow (N) Moderate (S)	Fine to very fine sand; 20-70% shell	-6.5	3-5(N) 10-12(S)	10 30	Frequent (poorly developed dune areas)
	West Matagorda Peninsula	None	27.6	0	Private and state 0.2 mi.	Grazing (undeveloped)	Yes	None	No (not covered by OBA)	None	None	Moderate	Very fine sand; 20-70% shell	-8.9	5-10(N) 3-5(Mid) 3-5(S)	10 10 50	Frequent (poorly developed dune areas)
Calhoun	Matagorda Island Bombing and Gunnery Range	None	27.5	0	Federal (U.S.A.F.)	Grazing (most), abandoned U.S. Air Force Base at north end (slightly developed)	No	None	No (not covered by OBA)	None	None	Wide	Fine to very fine sand	-5.7	5-30 5-20 5-20	80(N) 80(Mid) 60(S)	Few (moderately developed dune areas)
	Matagorda Island Bombing Range, south boundary to Cedar Bayou	None	9.9	0	Private (T.L. Wynne)	Ranching (slightly developed)	No	None	No (not covered by OBA)	None	None	Wide	Fine to very fine sand	-3.7	5-20(N) 5-30(Mid) 5-50(S)	90(N) 80(Mid) 70(S)	Few (moderately developed dune areas)
Aransas	San Jose Island	None	19.4	0	Private (S. Bass)	Ranching (slightly developed)	No	None	No (not covered by OBA)	None	None	Moderate	Fine to very fine sand	-4.2	5-35(N) 5-40(Mid) 5-20(S)	60(N) 60(Mid) 30(S)	Few (N) Frequent (S)
Nueces	Port Aransas Park	P 53 to Beach St. or Cotter St. in Port Aransas to beach	0.8	0.8	County	Recreation (moderately developed)	Yes	Yes (150 cars)	Yes ($2/night)	Restrooms, showers, pier, concessions	County	Moderate	Well-sorted fine to very fine sand; little shell	-2.7	5-25	60	Frequent (well developed dune areas)
	Port Aransas Park to Port Aransas city limits	P 53 to city streets	2.2	2.2	Private	Residential and resort lodging (highly developed)	Yes	None	Yes	Portable toilets; trash receptacles	County (BCA funds)	Moderate	Well-sorted fine to very fine sand; little shell	-4.1	5-20	50	Few (well developed dune areas)
	Port Aransas city limits to Mustang Island State Park	P 53 to city streets	8.4	8.4	Private	Residential and resort lodging (slightly developed)	Yes	None	Yes	Portable toilets, trash receptacles	County (BCA funds)	Moderate	Fine to very fine sand; little shell	-4.1	5-34	60	Few (well developed dune areas)
	Mustang Island State Park	P 53 to park road	5.2	5.2	State (TPWD)	Recreation (slightly developed)	Yes (2.3 mi. restricted to 30-ft. lane on upper beach)	Yes (300 cars)	Yes ($2/night; 300 units)	Restrooms, showers, drinking water, concessions	State (TPWD)	Wide	Fine to very fine sand; little shell	-2.4	5-32	50	Frequent (well developed dune areas)
	Mustang Island State Park to Padre Island Park	P 53 to Access Rd. 3 (north) and S.H. 22 to Whitecap Blvd.	2.8	2.8	State (0.57 mi. at Packery Chl.); remainder private	Resort lodging (only developed on south end; condominiums)	Yes (restricted to 1-way in front of seawall)	None	Yes (except in front of seawall)	Portable toilets, trash receptacles	County (BCA funds)	Moderate	Fine to very fine sand; little shell	-1.1	5-28	20	Frequent (well developed dune areas)
	Padre Island Park	P 22 to park roads	1.3	1.3	County (north 1.3 mi.); private (south 0.2 mi. to county line)	Recreation (moderately developed)	Yes (1400 ft. of beach where cars restricted to upper beach)	Yes (300 cars)	Yes ($2/night)	Restrooms, showers, pavillion, first aid, concessions	County (BCA funds)	Moderate	Fine to very fine sand; little shell	-1.4	5-26	50	Frequent (well developed dune areas)

		Use Parameters									Physical Description						
			Shore Frontage (miles)								Beach				Fore-Island Dunes		
County	Shoreline Segment	Road Access	Total Segment	Easily Accessible Portion	Littoral Ownership	Use of Adjacent Land	Vehicles Permitted on Beach	Designated Parking Areas	Beach Camping	Public Amenities	Maintenance	Width	Composition	Accreting (+) or Eroding (-) (feet/year)	Height Range (feet)	Percent Vegetated	Washovers or Blowouts
Kleberg	Kleberg-Nueces Co. line to Padre Island Natl. Seashore (P.I.N.S.)	Beach only (0.3 mi. from P 22 through county park on north; 1.7 mi. from P 22 through P.I.N.S. on south)	6.8	6.8	Private	None (undeveloped)	Yes	None	Yes	Portable toilets, trash receptacles	Nueces Co. (BCA funds)	Moderate (N) Wide (S)	Fine to very fine sand, high shell (N); Fine to very fine sand, 20% shell (S)	+2.0(N) -5.0(S)	5-15(N) 3-5(S)	70(N) 60(S)	Moderate to frequent (well developed dune areas)
	Padre Island Natl. Seashore to end of paved park road	P 22 to park roads and Malaquite Beach parking area	5.5	5.5	Federal (NPS)	Recreation (moderately developed)	Yes, except for 4.5 miles of beach beginning 1 mile south of park boundary	Yes (at Malaquite Beach)	Yes ($2/night at Malaquite Beach; rest no charge)	Pavillion, restrooms, showers, concessions, picnic tables, camp sites	NPS	Moderate	Fine to very fine sand; 1% shell	-0.7	5-30	40	Few (well developed dune areas)
	End of paved park road to Kleberg-Kenedy Co. line	Beach only (from park road on north)	10.0	6.4	Federal (NPS)	Recreation (undeveloped)	Yes (4-wheel drive only on south 4.6 mi.)	None	Yes	Portable toilets, trash receptacles (northern 5.5 mi. only)	NPS	Wide	Fine to very fine sand; 50% shell	-1.2(N) +1.8(S)	10-15(N) 10-38(S)	40(N) 60(S)	Frequent to few (well developed dune areas)
Kenedy	Padre Island Natl. Seashore	Beach only (10 mi. south from P 22)	48.1	0	Federal (NPS)	Recreation (undeveloped)	Yes (can be traversed via 4-wheel drive only)	None	Yes	None	NPS	Narrow (N) Moderate (S)	Fine to very fine sand, high shell (N); Fine to very fine sand, 20% shell (S)	+2.0(N) -5.0(S)	5-15(N) 3-5(S)	80(N) 10(S)	Moderate to frequent (well developed dune areas)
Willacy	Padre Island Natl. Seashore to Port Mansfield Pass	Beach only (57.5 mi. south from P 22)	2.5	0	Federal (NPS)	Recreation (undeveloped)	Yes (can be traversed via 4-wheel drive only)	None	Yes	None	NPS	Narrow	Fine sand	-17.3	5-15	20	Frequent (well developed areas)
	Port Mansfield Pass to Willacy-Cameron Co. line	Beach only (11.2 mi north from P 100)	11.0	0	Private (10.5 mi. so.); federal (0.5 mi. no.)	Recreation (undeveloped)	Yes (can be traversed via 4-wheel drive only)	None	Yes	None	NPS	Moderate	Fine sand	-7.9	5-12	5	Frequent to moderate (moderately developed dune areas)
Cameron	Cameron-Willacy Co. line to Andy Bowie Park	P 100 to southern portion (2 paved lateral roads; north portion via beach only	18.8	6.9	Private	None (undeveloped)	Yes (northern 11.9 mi. can be traversed via 4-wheel drive only)	None	Yes	None	County (BCA funds)	Moderate	Fine sand	-13.0	5-22	80	Very frequent (1/3 of area is washover) (poorly developed dune areas)
	Andy Bowie Park	P 100 to paved lateral roads	.7	.7	County	Recreation (slightly developed)	Yes	Small lot near pier	Yes	Restrooms, concessions, fishing pier	County (BCA funds)	Moderate	Fine sand	-5.4	5-20	40	Frequent (poorly developed dune areas)
	Andy Bowie Park to Isla Blanca County Park (City of South Padre Island)	P 100 to city streets; walk to beach	4.1	4.1	Private	Residential and resort lodging (highly developed)	No (prohibited by city ordinance)	None	No (prohibited by city ordinance)	None	County (BCA funds)	Moderate	Fine sand	-5.1	5-15	20	Frequent (poorly developed dune areas)
	Isla Blanca County Park	P 100 to park roads; walk to beach	0.9	0.9	County	Recreation (highly developed)	No (prohibited by county ordinance)	Yes 4-5,000 cars)	No	Restrooms, concessions, cabanas, civic center camper hookups	County (BCA funds)	Moderate	Fine sand	-4.7	5-17	20	Very frequent (poorly developed dune areas)
	Brazos Santiago Pass to Brazos Island State Recreation Area	S.H. 4 to beach; north on beach	3.5	3.5	Private	Recreation (slightly developed; a few beach cabins near pass)	Yes	None	Yes	None	County (BCA funds)	Narrow	Fine sand	+14.5	5-14	60	Very frequent (1/3 of area is washover) (poorly developed dune areas)
	Brazos Island State Recreation Area	S.H. 4 to beach; immediately north on beach	1.2	1.2	State (TPWD)	Recreation (undeveloped)	Yes	None	Yes	None	County (paid by TPWD)	Narrow	Fine sand	+4.1	5-25	60	Few to frequent (poorly developed dune areas)
	Boca Chica Island—state park to international boundary	S.H. 4 to beach; south on beach	1.9	1.9	Private	None (undeveloped)	Yes	None	Yes	None	County (BCA funds)	Moderate	Fine sand	-24.3	5-28	20	Frequent (poorly developed dune areas)

BIBLIOGRAPHY

Ditton, R. B., C. E. Alling, D. D. Beardsley, J. M. Falk, and D. W. Pybas. 1977. Barrier Islands on the Texas Coast: Existing and Future Recreational Use and Development. College Station, Texas: Texas A&M University, Recreation and Parks Department.

Doran, E., Jr. and B. P. Brown, Jr. 1974. *A Recreational Guide to the Central Texas Coast.* College Station: Center for Marine Resources, Sea Grant College Program, Texas A&M University.

National Park Service. 1975-1977. Public Use in the Southwest Region: Visitation to Padre Island National Seashore. Santa Fe, New Mexico: U.S. Department of the Interior, Southwest Region. Mimeo.

State Department of Highways and Public Transportation. 1977. Two-way Vehicular Crossing to Padre Island and Mustang Island. Corpus Christi, Texas. Mimeo.

Texas Parks and Wildlife Department. 1975. *Texas Outdoor Recreation Plan: Outdoor Recreation on the Texas Gulf Coast* (Vol. 5). Austin, Texas: Texas Parks and Wildlife Department, Comprehensive Planning Branch.

Texas Parks and Wildlife Department. 1977. Beach Cleaning Expenditures, 1972-1976. Austin, Texas: Texas Parks and Wildlife Department, Design and Construction Division, Boat Ramp Section. Mimeo.

Turner, Collie, and Braden, Inc., Consulting Engineers. 1972. *Flood Protection Feasibility Study for San Jacinto Battleground State Historical Site.* Austin, Texas: Texas Parks and Wildlife Department.

U.S. Army Corps of Engineers. 1971. *National Shoreline Study: Texas Coast Shores, Regional Inventory Report.* Galveston, Texas: U.S. Army Corps of Engineers, Galveston District.

U.S. Department of the Interior. 1974. *Natural Resources Management Plan for Padre Island National Seashore.* Albuquerque, New Mexico: Padre Island National Seashore Staff and Southwest Region Office of Natural Science.

U.S. Department of the Interior. 1977. Monthly Public Use Report: Padre Island National Seashore. Corpus Christi, Texas: National Park Service. Mimeo.

LEGEND

OWNERSHIP

Federal

State

Local

County ●

Municipal ■

EROSION

0-10 ft/yr

10-20 ft/yr

over 20 ft/yr

ACCRETION

0-10 ft/yr

10-20 ft/yr

over 20 ft/yr

EASILY ACCESSIBLE GULF SHORELINE

BOAT RAMPS ▼

ACTIVE AND POTENTIAL HURRICANE WASHOVER CHANNELS (symbol indicates approximate onshore location) ♦ ♦ ♦

Base maps obtained from Bureau of Economic Geology; additional information plotted by Planning Program, General Land Office of Texas.

DATE DUE

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