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Dear Reviewer,

In accordance with provisions of the National Environmental Policy Act of 1969, we enclose for your review the Draft Programmatic Environmental Impact Statement and Draft Management Plan (DPEIS/DMP) for the proposed Federal designation of the Mission-Aransas National Estuarine Research Reserve.

Approval of this proposal would allow for the establishment of the reserve representing the Western Gulf of Mexico sub-region of the Louisianan biogeographic region. The Reserve will be operated primarily for research and education purposes. No new regulations have been proposed pursuant to this action. Traditional uses with the boundary will continue to be regulated by existing local and state laws and management policies.

The National Oceanic and Atmospheric Administration (NOAA) and the University of Texas Marine Science Institute are pleased to release this DPEIS/DMP. Your review is an important part of the process. Comments made at public hearings and in writing will help us to develop a final PEIS/MP. The purpose of this document is to disclose adverse impacts and benefits so that the public and decision-makers can be as informed as possible.

Public hearings will be held on the DPEIS/DMP on:

Wednesday, November 9, 2005 at 10:30 am, Hearing Room E1.012 in the Capitol Extension, Texas State Capitol, 1400 Congress Ave., Austin, TX 78701. A visitor parking garage is located at 12th Street and San Jacinto Boulevard.

Thursday, November 10, 2005 at 4 pm, Saltwater Pavilion, 810 Seabreeze Drive, Rockport Beach Park, Rockport, TX 78383. (Parking is available at Rockport Beach Park.)

All comments received at the hearing, as well as written comments, will be considered in the preparation of the Final Programmatic Environmental Impact Statement (FPEIS) and Final Management Plan. The comment period for the DEIS/DMP will end on **November 23, 2005**. Please submit comments via mail, email, or fax to: Matthew Chasse, NOAA Estuarine Reserves Division, 1305 East-West Highway, N/ORM5, Silver Spring, MD 20910 (or via fax: (301) 713-4012, or via email: [Matt.Chasse@noaa.gov](mailto:Matt.Chasse@noaa.gov)). Cc: Paul Montagna, University of Texas Marine Science Institute, 750 Channel View Drive, Port Aransas, TX 78373 (or via fax: (361) 749-6786, or via e-mail: [paul@utmsi.utexas.edu](mailto:paul@utmsi.utexas.edu)).



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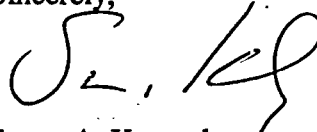
STP-006 Template

SISA Review

A copy of your comments should also be submitted to me by mail at NOAA Strategic Planning Office (PPI/SP), SSMC3, Rm. 15603, 1315 East-West Highway, Silver Spring, Maryland 20910; by fax to 301-713-0585; or by e-mail to [nepa.comments@noaa.gov](mailto:nepa.comments@noaa.gov).

**For additional information, please contact Paul Montagna, University of Texas at Austin Marine Science Institute at (361) 749-6779 or [paul@utmsi.utexas.edu](mailto:paul@utmsi.utexas.edu). or Laurie McGilvray, Chief, Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, NOAA, 1305 East-West Highway, Silver Spring, Maryland 20910, (301) 713-3155 ext 158; or visit the project web site: [www.utmsi.utexas.edu/nerr/](http://www.utmsi.utexas.edu/nerr/).**

Sincerely,

A handwritten signature in dark ink, appearing to read 'S. Kennedy', with a stylized flourish at the end.

Susan A. Kennedy  
Acting NEPA Coordinator

## **Correction to DPEIS for the Texas National Estuarine Research Reserve and Management Plan: The Mission-Aransas Estuary**

Substitute language for Section 5.7.3 Endangered Species Act (ESA), Page 46:

"NOAA/NOS believes that neither program implementation nor Federal funding of the activities of the proposed reserve will jeopardize the continued existence of a listed species under the Endangered Species Act (ESA) or result in the destruction or adverse modification of designated critical habitat. The purpose of the NERRS is to conduct research and monitoring and to develop solutions to problems affecting estuarine environments. Some future studies may focus on endangered or threatened species within the Reserve, but researchers are required to follow appropriate research protocols when conducting such studies. In some cases, a new boardwalk providing access to the public will encourage some encroachment into habitat by the public, but under controlled conditions. NOS has initiated ESA Section 7 consultation regarding the proposed NERR with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, and that process is ongoing."

Replacement text for Section 5.7.6 National Historic Preservation Act (NHPA), Page 47:

"Under the National Historic Preservation Act of 1966, the Secretary of Interior has compiled a national register of sites of significant importance (Figure 36). NOAA believes that the Reserve and associated activities will not negatively impact registered sites or eligible sites. The draft Coastal Lease (Attachment A, Appendix 5) has a specific provision requiring the UTMSI to cease any operation if a site, object, location, or artifact of archaeological, scientific, education, cultural, or historical interest is encountered during their activities and to notify the proper authorities so that appropriate action can be taken to protect or recover the findings. NOAA has contacted the TX SHPO with its opinion that Reserve designation will not adversely impact registered or eligible sites, and is awaiting a response from the SHPO."

# Agencies, Organizations and Individuals who Received this Document

## United States Government

### U.S. Senate

Senate Commerce, Science & Transportation Committee (3)

### U.S. House of Representatives

Committee on Science

Committee on Resources (4)

Subcommittee on Fisheries, Conservation, Wildlife & Oceans (2)

### Texas Delegation

Senator Kay Bailey Hutchinson

Senator John Cornyn

Congressman Ron Paul

Congressman Ruben Hinojosa

Congressman Solomon Ortiz

### Independent Agencies

Advisory Council on Historic Preservation

Environmental Protection Agency (8)

Marine Mammal Commission

International Boundary and Water Commission, US & Mexico

National Science Foundation

Nuclear Regulatory Commission

Federal Maritime Commission

### Council on Environmental Quality

Associate Director for NEPA Oversight

Deputy General Counsel

General Counsel

### Department of Agriculture

Natural Resources Conservation Service

U.S. Forest Service

### Department of Commerce (8)

Economic Development Administration

National Oceanic and Atmospheric Administration

National Marine Fisheries Service

Ocean and Coastal Resource Management

National Ocean Service

Estuarine Reserves Division

### Department of Defense

Army Corps of Engineers (2)

Department of Army

### Department of Energy

Office of Environment, Safety and Health

### Department of Homeland Security (2)

U. S. Coast Guard (2)



### **Organizations**

Fennessey Ranch  
Alaska Wilderness League  
Camp Aranzazu  
Egery Flats Marina  
Johnson Ranch  
Port Aransas Rod & Reel  
Rockport Mail Center  
Save Cedar Bayou, Inc.  
The Rockport Pilot  
Wallace & Wheeler, LLP  
Citgo (2)  
Gulf Intracoastal Canal Association  
Naismith Engineering (2)  
Shiner Moseley & Associates Inc  
Valero Refining Co.  
Lydia Ann Lighthouse  
Texas State Aquarium  
Aransas First (3)  
Coastal Bend Bays & Estuaries Program, Inc.  
Coastal Bend Bays Foundation  
Coastal Bend Land Trust  
Coastal Bend Sierra Club  
Coastal Conservation Association (2)  
Corpus Christi Caller Times  
Corpus Christi Museum of Science and History (2)  
Keep Aransas Beautiful  
National Wildlife Federation  
San Antonio Express News  
Save Cedar Bayou, Inc.  
Save the Lake Your Water Supply  
Texas Master Naturalist  
The Nature Conservancy (2)  
Texas Water Resources Institute

### **Universities**

Southwest Texas State University  
Texas A&M Corpus Christi (2)  
Texas A&M University  
Texas Sea Grant College Program  
University of Houston (2)  
University Texas Marine Science Institute (5)  
University of Texas Institute for Geophysics

### **Libraries**

Aransas Pass Library  
City of Port Aransas Library  
Dennis M. O'Connor Public Library  
Rockport Public Library

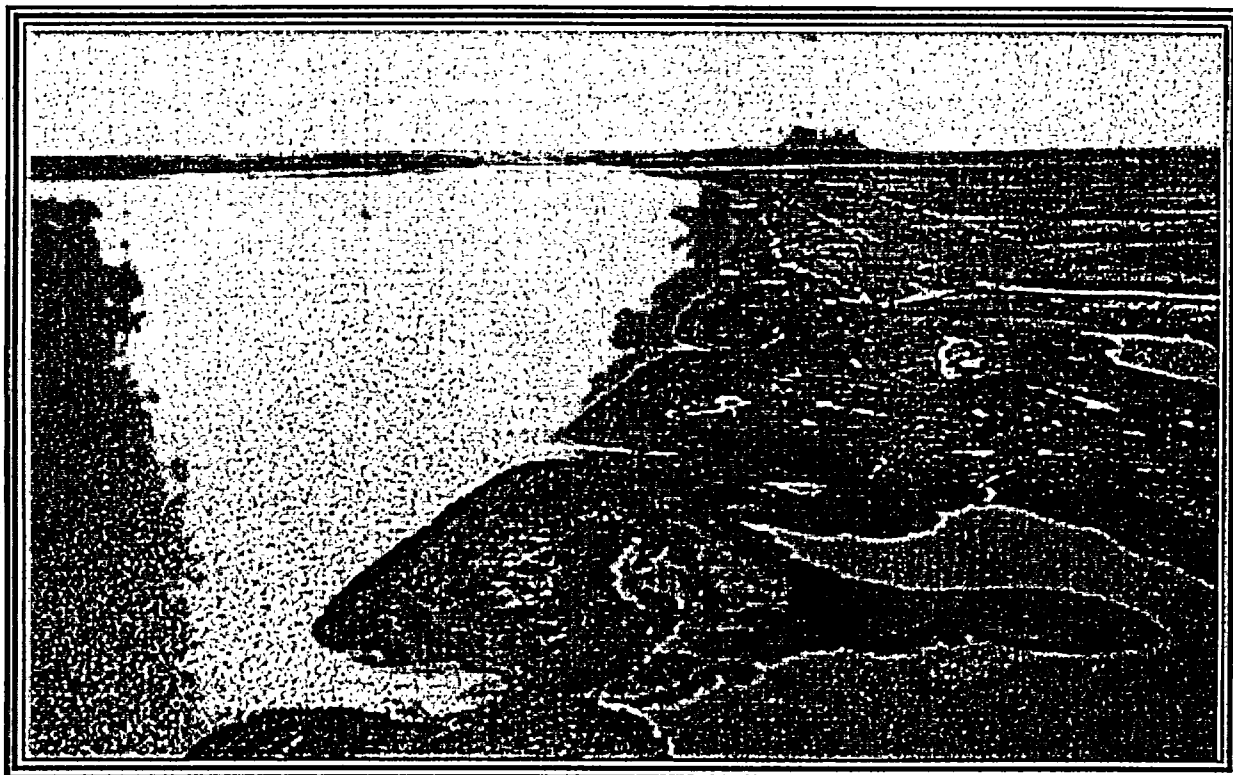
### **Individuals**

Orville Ballard, Riviera, Texas  
Richard Bianchi, Rockport, Texas  
Barbara Buck, Rockport, Texas  
Ken Burns, Fort Worth, Texas

# **DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT**

**FEDERAL APPROVAL OF THE  
TEXAS NATIONAL ESTUARINE RESEARCH RESERVE AND  
MANAGEMENT PLAN:  
THE MISSION-ARANSAS ESTUARY**

**August 2005**

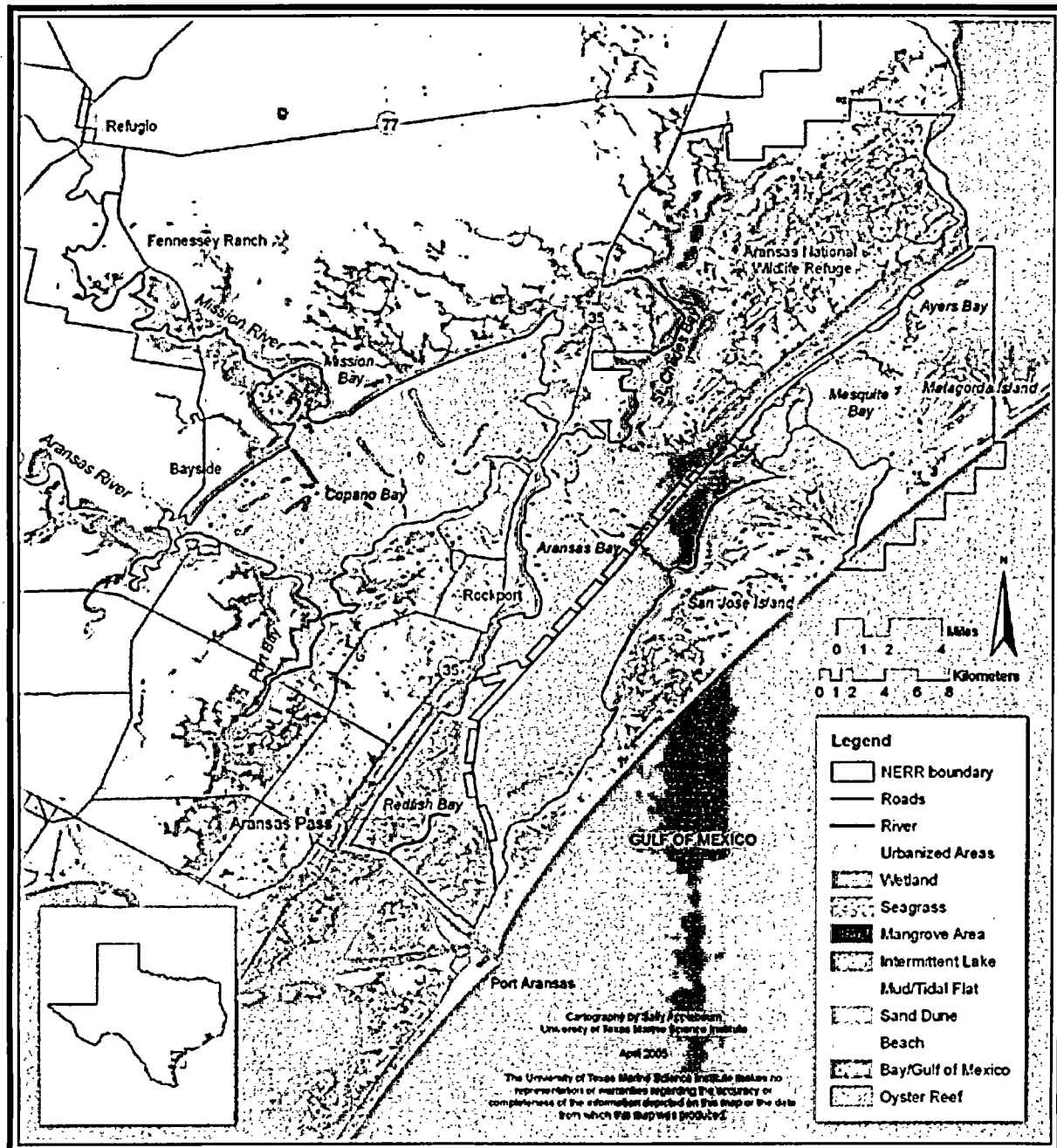


**U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL OCEAN SERVICE  
OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT  
ESTUARINE RESEARCH DIVISION**



# REFERENCE MAP

## TEXAS NATIONAL ESTUARINE RESEARCH RESERVE



## **NOTE TO REVIEWERS**

This is a Draft Programmatic Environmental Impact Statement (DPEIS) prepared to review the environmental consequences of a Federal action to approve a potential site nominated by the State of Texas to the National Estuarine Research Reserve System. The statement looks at the nominated site in its entirety along with a Management Plan that will serve to guide all aspects of managing the site for the conduct of research, education and outreach activities, and related management, acquisitions and community purposes. Future actions such as potential changes to boundaries, acquisition and construction related activities would receive additional reviews within the framework of this programmatic document but only with the supplemental information needed to make informed decisions of the action in question and help to avoid costly and unnecessary repetition of information.

NOAA gratefully acknowledges the very considerable contributions in providing site specific information by the University of Texas Marine Science Institute for this DPEIS.

### **DPEIS prepared by:**

National Oceanic and Atmospheric Administration  
National Ocean Service  
Ocean and Coastal Resource Division  
Estuarine Reserves Division  
1305 East-West Highway  
Silver Spring, Maryland 20910

### **Draft Reserve Management Plan prepared by:**

University of Texas at Austin Marine Science Institute  
750 Channel View Drive  
Port Aransas, Texas 78373

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## LIST OF ACRONYMS

ANWR	Aransas National Wildlife Refuge
BBL	Unit of measurement for oil (barrel = 42 US gallons)
CBBF	Coastal Bend Bays Foundation
CBGA	Coastal Bend Guides Association
CBLT	Coastal Bend Land Trust
CCA	Coastal Conservation Association
CCBNEP	Corpus Christi Bay National Estuary Program
CCC	Coastal Coordination Council
CELP	Coastal and Estuarine Land Conservation Program
CFR	Code of Federal Regulations
CHRIS	Chemical Hazards Response Information System
CMP	Coastal Management Plan
CNRAs	Coastal Natural Resource Areas
CZMA	Coastal Zone Management Act
ERD	Estuarine Reserves Division
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FWCA	Fish and Wildlife Coordination Act
GCD	Groundwater Conservation Districts
GIS	Geographic Information System
GIWW	Gulf Intracoastal Waterway
GLO	Texas General Land Office
GPS	Global Positioning System
K-12	Kindergarten through twelfth grade
MOU	Memorandum of Understanding
MP	Management Plan
MRRP	Monofilament Recovery & Recycling Program
NEAC	Nueces Estuary Advisory Committee
NEPA	National Environmental Policy Act
NERR	National Estuarine Research Reserve
NERRS	National Estuarine Research Reserve System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRCS	Natural Resources Conservation Service
NWP	Nationwide Permit (U.S. Army Corps of Engineers)
NWS	National Weather Service
OCRM	Ocean and Coastal Resource Management
OMSA	Offshore Marine Supply Association
OPUS	Organization for the Protection of an Unblemished Shoreline
OSPR	Oil Spill Prevention and Response Program
OSPRA	Oil Spill Prevention and Response Act of 1991
PCCA	Port of Corpus Christi Authority

PINS	Padre Island National Seashore
PSF	Permanent School Fund
RRC	Texas Railroad Commission
RRT	Regional Response Team
SES	Site Evaluation Subcommittee
SLB	School Land Board
STAC	Scientific and Technical Advisory Committee
SPMWD	San Patricio Municipal Water District
SSC	Site Evaluation Committee
STCZAC	South Texas Coastal Zone Advisory Committee
STSSN	Sea Turtle Stranding and Salvage Network
SWCD	Soil and Water Conservation District
TABS	Texas Automated Buoy System
TAC	Texas Administrative Code
TAMU	Texas A&M University
TAMU - CC	Texas A&M University - Corpus Christi
TCOON	Texas Coastal Oceanic Observation Network
TCEQ	Texas Commission of Environmental Quality (formerly TNRCC)
TCMP	Texas Coastal Management Program
TMMSN	Texas Marine Mammal Stranding Network
TNC	The Nature Conservancy
TNRCC	Texas Natural Resource Conservation Commission
TNRIS	Texas Natural Resources Information Service
TPWD	Texas Parks and Wildlife Department
TRC	Texas Railroad Commission
TSA	Texas State Aquarium
TSFA	Texas Seafood Association
TSPA	Texas Seafood Producers Association
TSN	Turtle Stranding Network
TSSWCB	Texas State Soil and Water Conservation Board
TWDB	Texas Water Development Board
TWOA/AWO	Texas Waterway Operators Association/American Waterway Operators
TxDOT	Texas Department of Transportation
USACOE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USNPS	United States National Park Service
UTA	University of Texas at Austin
UTMSI	University of Texas Marine Science Institute
YETA	Youth and Environmental Training Area

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# EXECUTIVE SUMMARY

The University of Texas Marine Science Institute (UTMSI) with an endorsement by Governor Rick Perry of Texas, have submitted a nomination to designate parts of the Mission-Aransas Estuary as a National Estuarine Research Reserve (NERR). With passage of the Coastal Zone Management Act of 1972 (CZMA), the Federal government officially recognized the national significance of coastal resources and authorized the Federal Coastal Zone Management Program (CZMP) and the National Estuarine Research Reserve System (NERRS). In response to the CZMP, the state of Texas established the Texas Coastal Management Program (CMP), which was federally approved by National Oceanic and Atmospheric Administration (NOAA) in 1997. The Texas CMP coordinates state, local, and Federal programs for the management of Texas coastal resources. Both the CZMP and NERRS are administered by NOAA. Since 1972, parts of twenty-six estuaries have been designated in the NERRS. The NERRS works with existing Federal and state authorities to establish and operate research reserves and provide for their long term stewardship.

Research and education are the main focus of the NERRS. Major goals of NERR sites include:

- address the information needs of resource managers and the public identified as significant through coordinated estuarine research within the System,
- promote Federal, state, public and private use of the proposed reserve for research (Figure 3),
- conduct and coordinate estuarine research within the System,
- gather and make available information necessary for improved understanding, use and management of estuarine areas, and
- provide suitable opportunities for public education and interpretation.



Figure 3. Teaching estuarine research methods on the UTMSI R/V Katy.

The Mission-Aransas Reserve (200,137 acres/ 312 sq. mi./ 810 sq.km.) consists of a combination of approximately 129,567 acres of state-owned coastal habitat, including estuarine intertidal marsh and shallow open-water bottoms and approximately 66,216 acres of estuarine marsh and non-tidal coastal plain habitat that is part of the Aransas National Wildlife Refuge. The site also encompasses the Buccaneer Ranch Cove Preserve (728 acres), the Fennessey Ranch (3,324 acres), and the Goose Island State Park (271 acres) (see Reference Map). The site includes a diverse suite of estuarine and non-estuarine habitats (many of high quality) that form major representative parts of a coastal watershed. The site also includes a number of archaeological sites (i.e., Indian middens) and supports significant faunal and floral components. The site is relatively rural with limited industrial and community impacts. Portions of the estuary including the rights-of-way associated with the Gulf Intracoastal Waterway and the transportation right-of-way along the Copano Bay Bridge (Highway 35) are not included in the proposed site.

The lands within the site are owned by a combination of state, Federal and private entities. The Texas General Land Office (GLO) owns the majority of submerged lands (bays and open water) within the site. The U.S. Fish and Wildlife Service (USFWS) owns the Aransas National Wildlife Refuge, which includes Matagorda Island. The Texas Parks and Wildlife Department (TPWD) owns the Goose Island State Park. Private landholders will include the Coastal Bend Land Trust, The Nature Conservancy, and the Fennessey Ranch. Designation of the Texas NERR will not introduce new state or Federal regulations, nor will it prohibit traditional uses of the area. Current uses include boating, fishing, hunting, mining (gas and oil), shellfish harvesting, camping and other recreational activities. Measures will be taken to ensure the integrity of selected core research sites for the conduct of long term research needs.

The Mission-Aransas NERR will be administered by the UTMSI, the lead agency for the proposed reserve. Other key state, Federal and private partners in the Texas NERR include the USFWS, GLO, TPWD, Coastal Bend Land Trust, The Nature Conservancy, and the Fennessey Ranch. Further information on the administration and management of the Texas

NERR can be found in the Mission-Aransas NERR Management Plan (Attachment A). The management plan describes the administration, existing resource protection, boundaries/acquisition plan, stewardship plan, public access plan, facilities/construction plan, research and monitoring plan, education/interpretation/outreach plan, and the volunteer plan.

In addition to the preferred alternative, other alternatives relative to the establishment of a NERR site in Texas are considered, including the "no action" option of not designating a site, and alternative boundaries and/or alternative management options for the NERR. Under the no action option, the lands within the NERR boundary would continue to be managed under separate programs administered by the responsible state, Federal or private landholding agency. Additional Federal grant awards to manage the site, provide extra funds for carrying out research and educational efforts would not be awarded. Although these lands would continue to be protected, they would be managed differently, dictated by varying available resources and priorities of the respective agencies involved. The potential for sale and development of the Fennessey Ranch without a conservation easement would be a possibility. Reserve designation would provide a clear alternative to current management of these lands by combining and magnifying the resources of each landholding agency or partner. Alternative boundaries for the site are considered and largely involve limited modifications to core and buffer area designations. Alternative management options include modifications to the roles and responsibilities of management partners.

The consequences of NERR designation and management plan implementation will be environmentally, socially, and economically positive as the number of disparate sites within the estuary are tied together through linkages and ecosystem understanding. Minor physical alterations and impacts will be restricted to limited areas associated with construction of new facilities and access sites associated with future growth and potential acquisition. Overall, the natural resources of the area will benefit from greater protection and management and the site will serve to foster better understanding of the importance of these resources.

# 1.0 INTRODUCTION

## 1.1 The National Estuarine Research Reserve System

The National Coastal Zone Management Act of 1972 (Act, P.L. 92-583, as amended, hereinafter the Act) was designed to assist coastal States, territories and local governments in developing tools and programs to improve their management capabilities of the rapidly developing coastal zone to help protect, preserve, develop and restore the fragile natural resources such as the bays and estuaries, the beaches, dunes and wetlands, and the flora and fauna that are dependent on those habitats. Because scientific knowledge was often lacking to assist decision makers, developers and the public in understanding how the coastal ecosystems worked and the consequences associated with development activities so essential for growth and well-being, Congress provided an additional incentive in the Act to assist coastal management regimes provide answers to unknown questions regarding the importance and sensitivities of estuaries and their watersheds. Section 315 of the Act set in motion the opportunity to provide laboratories and educational facilities in representative estuaries around the Nation.

After 30 years of implementing Section 315, the United States and its Trust Territories now enjoy the benefits of what is known as the National Estuarine Research Reserve System (NERRS) as a network of protected places that serve as reference sites for research, education and stewardship. Reserves represent different biogeographic regions of the United States.

A biogeographic region is a geographic area with similar dominant plants, animals and prevailing climate. There are 11 major biogeographic regions around the coast, with 29 sub regions. The reserve system currently represents 18 of those sub regions and is designed to include sites representing all 29 biogeographic subregions (Figure 4). In the near term, priority for Federal designation of new NERR sites is given to coastal states that are in unrepresented biogeographic regions. *The Texas proposal is the latest site to be nominated for approval and is the subject of this environmental impact review.*

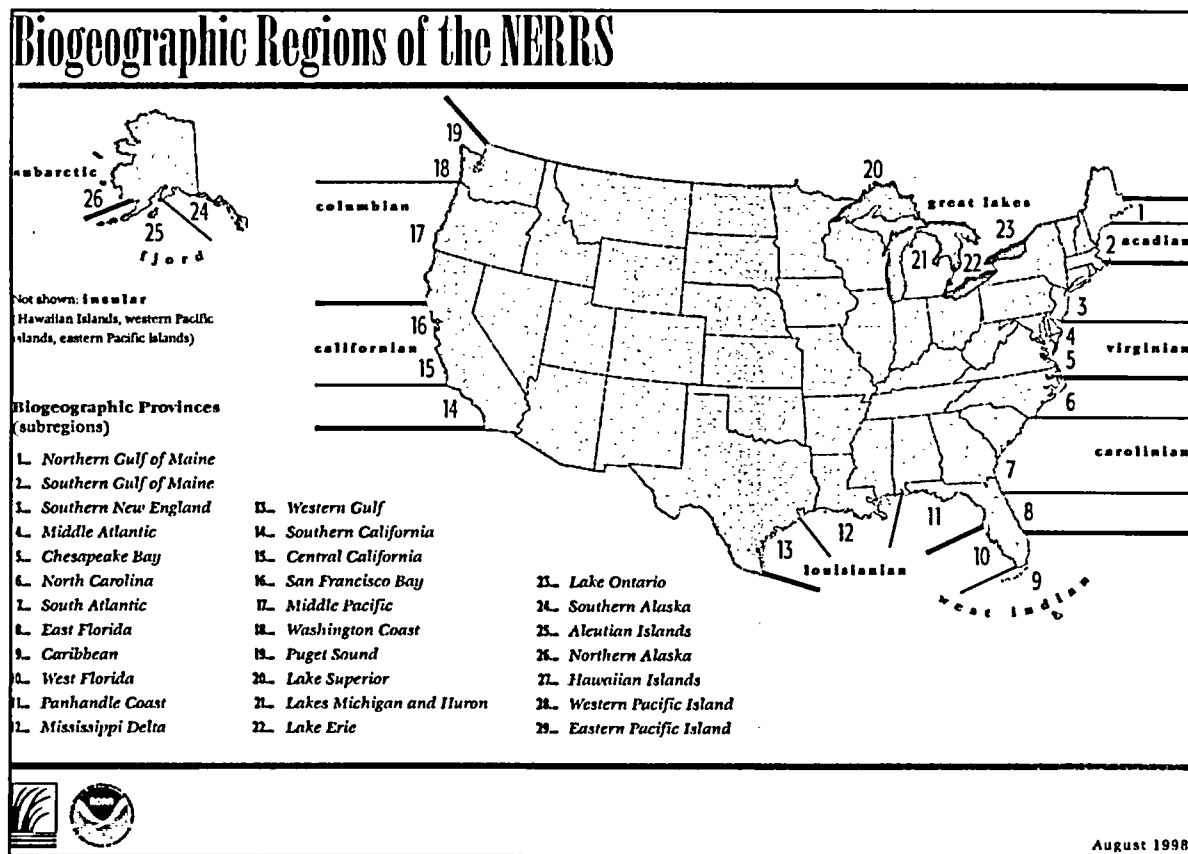


Figure 4. Biogeographic regions representing diverse estuarine environments.



NERRS is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. NOAA provides funding, national guidance and technical assistance. Each reserve is managed on daily basis by a lead state agency or university, with input from local partners.

Reserve staff work with local communities and regional groups to address natural resource management issues, such as non-point source pollution, habitat restoration and invasive species. Through integrated research and education, the reserves help communities develop strategies to deal successfully with these coastal resource issues. Reserves provide adult audiences with training on estuarine issues of concern in their local communities. They offer field classes for K-12 students and support teachers through professional development programs in marine education. Reserves also provide long-term water quality monitoring as well as opportunities for both scientists and graduate students to conduct research in a "living laboratory."

## 1.2 The Texas NERR in relation to the other NERR sites

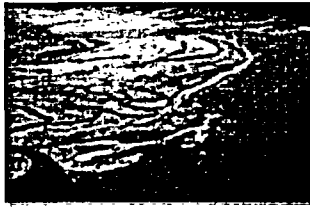
The proposed Texas NERR would designate over 200,000 acres of the Mission-Aransas Estuary making it the third largest NERR in the Nation. Table 1 below shows the other NERR sites along with their year of designation and size. There is a great deal of diversity to be found in these sites and the Texas site would provide a significant addition to the resources and capabilities of the total NERRS (Figure 5). The rich diversity of habitat types that are found in the Mission-Aransas Estuary will continue a tradition of excellent choices made by the coastal states and territories in the site selection process (Figure 6).

Table 1. Reserve Designation Dates, Acreage and Biogeographic Regions.

Reserve	Year	Acrest	Sq. Mi	Sq. Km	Region
South Slough, OR	1974	4,779	7.0	18.2	Carolinian (7)
Sapelo Island, GA	1976	6,110	9.5	24.7	Carolinian (7)
Rookery Bay, FL	1978	110,000	171.9	445.2	West Indian (10)
Apalachicola Bay, FL	1979	246,000	385.6	998.6	Louisianian (11)
Elkhorn Slough, CA	1979	1,400	2.2	5.6	Californian (15)
Padilla Bay, WA	1980	11,000	16.7	43.3	Columbian (19)
Naragansett Bay, RI	1980	4,259	6.7	17.2	Virginian (3)
Old Woman Creek, OH	1980	571	0.9	2.3	Great Lakes (21)
Jobos Bay, PR	1981	2,883	4.4	11.3	West Indian (9)
Tijuana River, CA	1982	2,513	3.9	10.2	Californian (14)
Hudson River, NY (4 components)	1982	4,838	7.6	19.6	Virginian (3)
North Carolina (4 components)	1985, 1991	10,000	15.6	40.5	Carolinian (6)
Wells, ME	1986	1,600	2.5	6.5	Acadian (2)
Chesapeake Bay, MD (3 components)	1985, 1990	4,820	7.5	19.5	Virginian (5)
Weeks Bay, AL	1986	6,016	13.3	34.6	Louisianian (11)
Waquoit Bay, MA	1988	2,600	3.5	9.1	Virginian (3)
Great Bay, NH	1989	5,280	8.3	21.4	Acadian (2)
Chesapeake Bay, VA (4 components)	1991	4,435	6.9	17.9	Virginian (5)
Ace Basin, SC	1992	134,710	213.4	552.8	Carolinian (7)
N. Inlet Winyah Bay, SC	1992	12,327	19.3	49.9	Carolinian (7)
Delaware	1993	4,930	7.7	20.0	Virginian (4)
Jacques Cousteau, NJ	1998	114,665	178.1	461.3	Virginian (4)
Kachemak Bay, AK	1999	365,000	570.3	1477.1	Fjord (25)
Grand Bay, MS	1999	18,400	28.1	72.8	Louisianian (12)
GTM, FL	1999	55,000	85.9	222.6	Carolinian (8)
San Francisco Bay, CA	2003	3,710	5.8	15.0	Californian (16)
*Mission-Aransas Estuary, TX	(2005)	200,137	312.7	809.9	Louisianian (13)

† Acreage based on current, federally approved management plans.

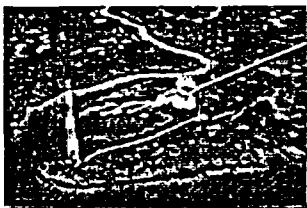
\* Proposed NERR site



ACE Basin, S.C.



Elkhorn Slough, CA



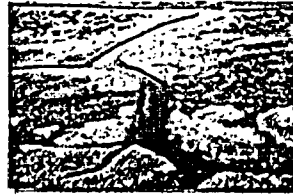
Jacques Cousteau, NJ



North Carolina, NC



South Slough, OR



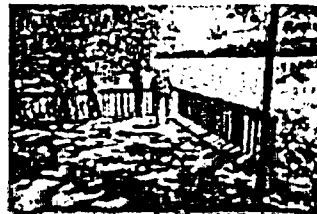
Apalachicola, FL



Great Bay, NH



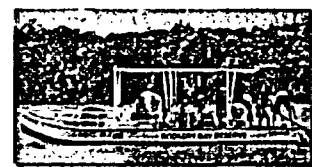
Jobos Bay, PR



Old Woman Creek, OH



San Francisco Bay, CA



Rookery Bay, FL



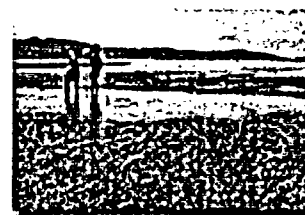
Delaware, DE



Hudson River, NY



Katchemak Bay, AK



Padilla Bay, WA



Sapelo Island, GA



Wells, ME

Figure 5. Diversity of environments embodied in the NERRS.

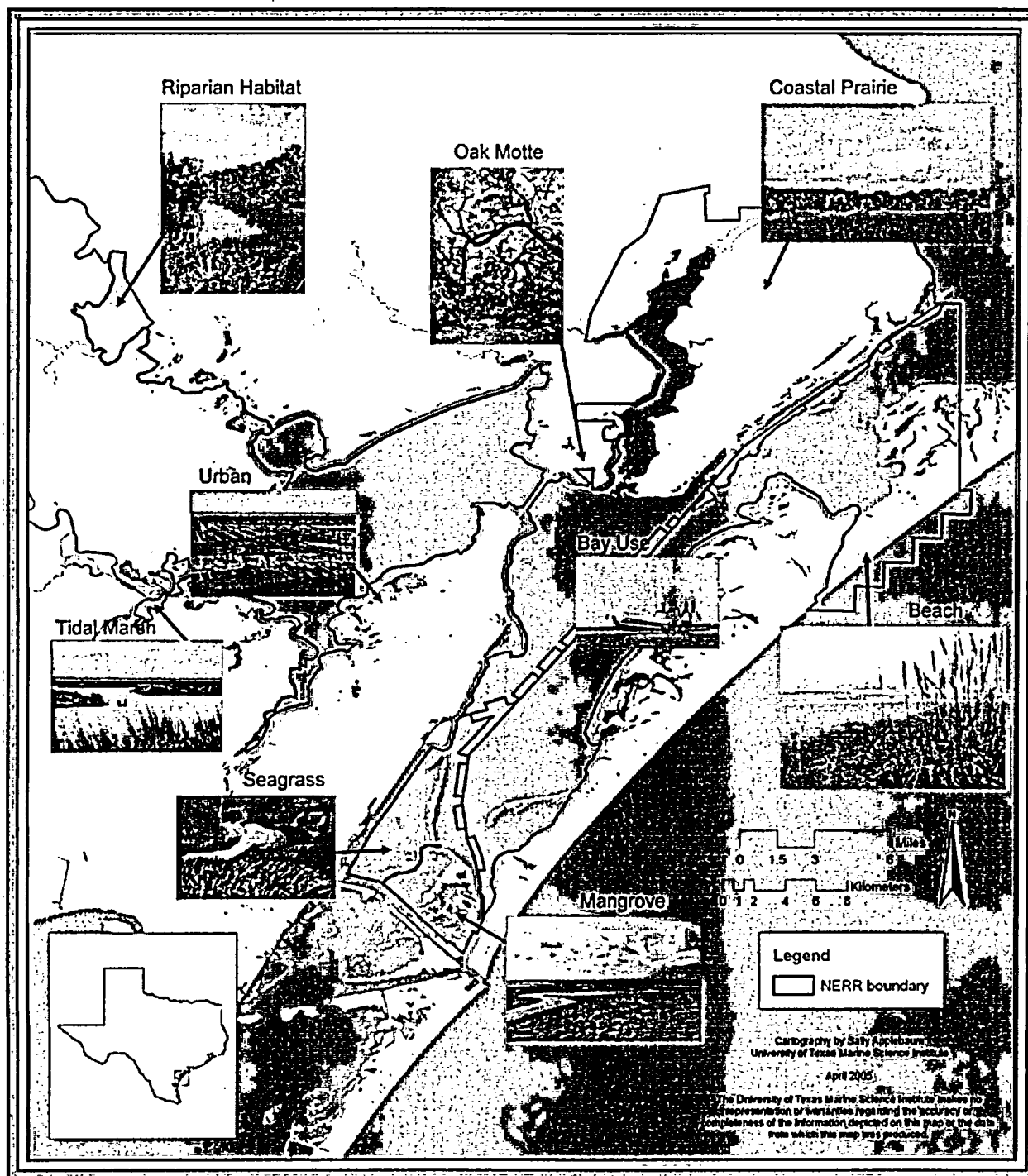


Figure 6. Habitats and uses within the Mission-Aransas Estuary.

### 1.3 Proposed Mission and Goals of the Reserve

The mission of the proposed Reserve is to provide opportunities for long-term research, education, and interpretation. To meet this end, the following goals that are similar to other NERR designated sites and support the goals of the NERRS are identified:

- Ensure a stable environment for research through long-term protection of important estuarine habitat;

NERR sites serve as living laboratories for on-site staff, visiting scientists and graduate students. Since its inception, a main goal of the program has been to ensure a stable environment for research through long-term protection of reserve system resources. The reserves serve as platforms for long-term research and monitoring, as well as reference sites for comparative studies.

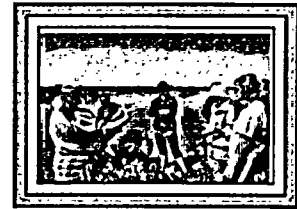


Figure 7. Students learning estuary science.

- Address coastal management issues identified as significant through coordinated estuarine research within the System;

The National Estuarine Research Reserve System-wide Monitoring Program tracks short-term variability and long-term changes in estuarine waters to understand how human activities and natural events can change ecosystems. It provides valuable long-term data on water quality and weather at frequent time intervals on a continuous basis.

The Coastal Training Program provides up-to-date scientific information and skill-building opportunities to individuals who are responsible for making decisions that affect coastal resources. Through this program, National Estuarine Research Reserves can ensure that coastal decision-makers have the knowledge and tools they need to address critical resource management issues of concern to local communities.

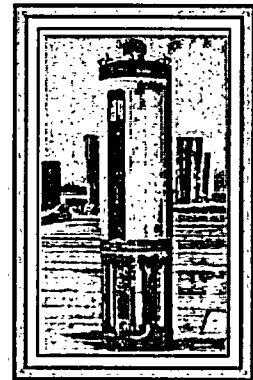


Figure 8. Monitoring buoys used in NERRs.

- Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;

National Estuarine Research Reserves are federally designated "to serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation." The reserve system is one of only three programs within NOAA in which education is federally mandated, and the reserve system provides a range of educational programming to key audiences in reserve watersheds.



Figure 9. Elderhostel activity studying natural resources.

- Promote Federal state, public and private use of the proposed reserve when conducting estuarine research;

Stewardship is a functional role at each reserve, involving aspects of research, monitoring, education, policy and implementation of resource management actions. Many reserves have stewardship coordinators that work as an integrated team with other staff. Since reserve resources are often affected by activities on adjacent waters and watershed lands, stewardship involves close cooperation with stakeholders outside the reserve.

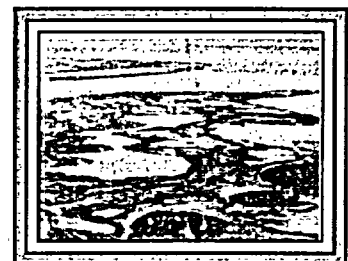


Figure 10. Bay wetlands.

- Conduct and coordinate estuarine research within the national system and provide information necessary for improved understanding and management of estuarine areas.

As living laboratories, National Estuarine Research Reserves are ideal settings to investigate the restoration and protection of estuarine and coastal habitats. The reserve system offers habitat diversity, scientific expertise, monitoring programs and education. Many reserves are engaged in restoration science and have experience in planning and conducting small to medium-scale restoration projects (0.5 to 250 acres). They have explored both engineering and natural approaches to return areas to approximate natural conditions.

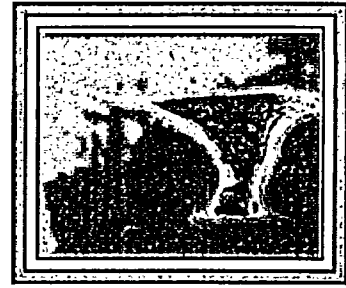


Figure 11. Man made island in Aransas Bay.

Coastal Training Programs offered by reserves focus on issues such as coastal habitat conservation and restoration, biodiversity, water quality and sustainable resource management. Programs target a range of audiences, including land-use planners, elected officials, regulators, land developers, community groups, environmental non-profits and coastal businesses. These training programs provide a range of opportunities for professionals to network across disciplines, and develop new collaborative relationships to solve complex environmental problems.

## **2.0 PURPOSE OF AND NEED FOR ACTION**

### **2.1 Purpose of NERR Designation**

The purpose of this action is to designate the Mission-Aransas Estuary in Texas as a site in the NERRS. The proposed site will involve the cooperation and interaction of a unique combination of Federal, state, local and private partners. The proposed Texas site will protect representative natural habitats through joint Federal-state partnerships and utilize operation and management plans developed to increase awareness and stewardship of the resources assures benefits that can be enjoyed by the people of Texas and visitors to the area. The designation of the Mission-Aransas NERR would also represent a significant addition to the national network of NERR sites because of unique estuarine types not currently represented in the NERR system. The Mission-Aransas NERR will use existing authorities to ensure a stable environment for long-term research and provide a coordination oversight mechanism to achieve this goal.

A NERR site will represent an area where long-term and short-term research projects and programs can be initiated, thereby contributing to a better understanding of the biotic and physical nature of these habitats. The existence and proposed use of a NERR site (including the use of available facilities) will be an attractive aspect of research proposals submitted for funding by potential researchers. As part of the national NERR network of sites, the Mission-Aransas NERR will also be part of long-term water quality and biotic monitoring programs that represent an unprecedented effort to compare similar aspects of multiple sites. An additional benefit is that the Mission-Aransas NERR will provide opportunities to study the interactions between human activities and natural estuarine processes to develop better methods to further minimize future impacts.

An established reserve will also allow for the development of interpretive and educational programs that will be attractive to both local and regional school systems. Schools of all levels can be encouraged to use the site's physical facilities and associated interpretive areas for single or multiple field trips. Tours of more remote portions of the proposed reserve can be developed and offered. Local schools may be encouraged to use the site's facilities and habitats as sites for long-term monitoring and assessment programs that can be coordinated with the site's educational programs. As for any use of the site for research, the value of the establishment of a NERR site lies in the long-term presence of the site and the availability of facilities.

The proposed Mission-Aransas NERR is composed of a combination of state, Federal, and privately owned properties that will allow for shared resources (e.g., personnel, technical assistance) among respective agencies. Additional resources (e.g., personnel, funds) will undoubtedly be contributed by many other governmental agencies, non-governmental organizations, industries, and citizens groups that have supported the Mission-Aransas NERR initiative. These groups have been highly supportive of the NERR process through their participation in the site selection process, and will continue to contribute to the remaining tasks required to designate and operate a Mission-Aransas NERR.

### **2.2 The Proposed Action and Decision to be Made**

Based on a recommendation from UTMSI acting on behalf of the State of Texas, NOAA proposes that a NERR be established for the Mission-Aransas Estuary. A site nomination proposal for the establishment of this research reserve was approved by the State of Texas and by NOAA in 2004. NOAA is following the procedures for nominating a NERR site in accordance with the established regulations that are found in Attachment A, Appendix 1: 15 CFR - NERRS Regulations. From the onset, considerable effort was made to include broad and diverse public and private participation in the site selection process. This approach reflected the view that any future Mission-Aransas NERR would benefit from the creation of a broad base of support from the beginning. Participatory groups and individuals would have had the opportunity to provide input and support in the process from the beginning and would, therefore, develop a sense of "ownership" in the process and the future of the NERR project. The composition of both the Site Selection Committee (SSC) and Site Evaluation Subcommittee (SES) reflected this effort to include a diverse range of participants. Invitations to participate in the process through membership in the SSC were sent to 374 people, representing a wide range of public and private groups and individuals that were believed to have interests in this effort. The resulting SSC included representatives from local, state and Federal agencies, private sector business (industrial and agricultural), environmental groups, and local, state and Federal level elected officials. The SES is a smaller, technical working group. Included in this committee are representatives of regulatory agencies (State and Federal), local governments, environmental interests, and private industry. The SES has been extremely valuable to the process through their active participation in subcommittee meetings and verbal and written support of the project.

The Mission-Aransas NERR as defined in this document, includes the submerged bays and estuaries (below mean high tide) including Redfish, Aransas, Copano, Port, Mission, St. Charles, Mesquite, and Ayers Bay. The Mission-Aransas NERR also includes uplands in the Aransas National Wildlife Refuge, Goose Island State Park, Fennessey Ranch, and Buccaneer Cove Preserve. (See Reference Map, inside Front Cover and Table 2, Inventory of Habitat Areas).

Table 2. Inventory of habitat areas (in acres) for each Reserve partner's lands. Abbreviations: General Land Office (GLO), Aransas National Wildlife Refuge (ANWR), Coastal Bend Land Trust (CBLT), Goose Island State Park (GISP), and University of Texas at Austin, and Marine Science Institute (UTMSI).

Habitat	Total Boundary	GLO	ANWR	Fennessey Ranch	CBLT	GISP	UTMSI
Bay/Gulf of Mexico	118,786	117,041	1,625	0	108	12	0
Beach	332	90	242	0	0	0	0
Impounded Area	126	0	126	0	0	0	0
Intermittent Lake	16	16	0	0	0	0	0
Lake	540	124	135	281	0	0	0
Mangrove Area	65	65	0	0	0	0	0
Mud/Tidal Flat	1,961	600	1,320	0	41	0	0
Oyster Reef	96	96	0	0	0	0	0
River or Stream	62	0	62	0	0	0	0
Seagrass	9,727	8,091	1,435	0	141	60	0
Wetland	28,316	3,208	24,456	266	343	40	3
Terrestrial	40,110	236	36,815	2,777	95	159	28
<b>Total Area</b>	<b>200,137</b>	<b>129,567</b>	<b>66,216</b>	<b>3,324</b>	<b>728</b>	<b>271</b>	<b>31</b>
<b>%of Area</b>	<b>100%</b>	<b>64.74%</b>	<b>33.09%</b>	<b>1.66%</b>	<b>0.36%</b>	<b>0.14%</b>	<b>0.02%</b>

The purpose of this draft programmatic environmental impact statement (DPEIS) and draft management plan (MP) is to provide information for decision makers and the interested public on the potential impacts associated with designation as a NERR under Federal authorities and providing Federal funding to support the implementation of the MP. The MP describes an organizational framework for the Mission-Aransas National Estuarine Research Reserve (NERR) and articulates proposed policies that will protect the ecological integrity of proposed sites while improving their value for research, monitoring, education, and stewardship purposes. The plan will provide guidance to the development of the Mission-Aransas NERR over the next five years, or until the plan is revised and updated.

### 2.3 The Scoping Process

In an effort to better understand what the concerns of interested parties might be with respect to the designation of the Mission-Aransas NERR, considerable effort was made to include broad and diverse public and private participation through the NEPA scoping process. This approach reflected the view that any future Mission-Aransas NERR would benefit from the creation of a broad base of support from the beginning. Participatory groups and individuals would have had the opportunity to provide input and support in the process from the beginning and would, therefore, develop a sense of "ownership" in the process and the future of the NERR project.

Although Federal regulations require one public scoping meeting, three were held because of the large geographical distance encompassing the proposed Mission-Aransas NERR. One scoping meeting was held in Austin, Texas on November 16, 2004 at 10 a.m. at the Texas State Capitol Extension. One was held in Port Aransas, Texas on November 17, 2004 at 9 a.m. at UTMSI and the final meeting was held on November 17, 2004 at 4 p.m. at the Saltwater Pavilion in Rockport, Texas. The public was notified of the meetings through posting in the Federal Register and advertisement in local newspapers. The Federal Register notice was posted 16 days in advance, on November 1, 2004. The first newspaper advertisement was posted 14 days in advance and a total of 17 different runs were made in ten different papers serving local towns and cities. In addition, approximately 470 letters were sent to affected landowners and user groups.

The first scoping meeting held in Austin was primarily attended by representatives of state, Federal, legislative, and non-governmental organizations. The second meeting in Port Aransas was primarily attended by local state and non-governmental organizations. The third meeting in Rockport was primarily attended by non-governmental organizations and local government officials and citizens. The scoping meetings were well attended with a total turnout of 143 individuals.

Comments were largely supportive of the proposed nomination. Several significant issues were raised at the scoping meetings some of which are addressed in the DPEIS and some are addressed in the draft MP. The US Army Corps of Engineers and the Gulf Intracoastal Canal Association both stated that they supported the Mission-Aransas NERR initiative, but requested that the Gulf Intracoastal Waterway (GIWW) be removed from the proposed boundary because of the long-standing established use and operation and maintenance requirements associated with this transportation corridor. After careful consideration, the GIWW has been removed from the boundary. Several questions involving the technical aspects of management were brought up, such as future and current boundary modifications, perpetual designation, university partnerships, and restrictions. Legalities behind future boundary modifications were addressed. There was also a large amount of concern in opposition of the 1000' boundary setback. This issue has been addressed by the Texas General Land Office. More information can be found in the MP, section 4.2 (Attachment A). There were also other concerns about the effects on oil and gas within the Mission-Aransas NERR boundary. This issue is discussed in great detail in the draft MP (Attachment A, Appendix 2). During the public scoping meeting, a question about water flow manipulation on Fennessey Ranch was raised. This question is discussed in Section 5.2.1. A summary of the issues raised and where the concerns are addressed is listed in Table 3.

**Table 3. Issues raised during scoping process.**

<b>Issue</b>	<b>Where Discussed in MP, unless otherwise noted</b>
Freshwater inflow	2.0 Resource Description 8.2 Research Program Goals and Objectives Objective 1-7 Appendix 2
University partnerships	Mission statement 3.2 Administrative Program Goals and Objectives Objective 1-1, 2-1, 3-1, Action 6
Influence of oil and gas activities	8.2 Research Program Goals and Objectives Objective 1-8, Action 1 Appendix 2
Sensitivity of historical and archeological resources	2.0 Resource Description
Ecotourism	5.2 Stewardship Program Goals and Objectives Objective 2-3
Education outreach for communities in watershed (Refugio and San Patricio Counties)	9.2 Education Program Goals and Objectives Objective 2-12
Restoration and clean-up	5.2 Stewardship Program Goals and Objective Objective 3-7
Continued use of dredging and spoil islands	4.1 Boundary Description and Rationale
Include transportation opportunities for education programs	9.2 Education Program Goals and Objectives Objective 2-13
Exclusion of GIWW from boundary	4.1 Boundary Description and Rationale
Inclusion of TxDOT and USACOE on Reserve Advisory Board	3.2 Administrative Program Goals and Objectives
GIWW effects on currents and passes	8.2 Research Program Goals and Objectives Objective 1-8
Erosion	8.2 Research Program Goals and Objectives Objective 1-8
Coliform bacteria levels in Copano Bay (water quality)	8.2 Research Program Goals and Objectives Objective 1-7
Seagrass health	8.2 Research Program Goals and Objectives Objective 1-7
Fish and oyster populations	8.2 Research Program Goals and Objectives Objective 1-7
Emergency response mechanisms for GIWW barges	Appendix 2
Water quality	8.2 Research Program Goals and Objectives Objective 1-7



Issue	Where Discussed in MP, unless otherwise noted
Educational Center located in Rockport	8.2 Facility Program Goals and Objectives Objective 3-11
Acquisition Plan	4.0 Boundaries/Acquisition Plan
Legal defense of potential conservation easements in stewardship plan	4.0 Boundaries/Acquisition Plan
Emphasize the diversity of the system	2.0 Resource Description
Map with land ownership	Inside cover
Socioeconomic research on marine transportation	5.2 Stewardship Program Goals and Objective Objective 2-2, Action 1
Impacts of recreational and commercial fishing activities (trawling)	8.2 Research Program Goals and Objectives Objective 1-8
Climate change effects	8.2 Research Program Goals and Objectives Objective 1-8
NERRS effect on oil and gas development	EIS
Core and buffer management	4.2 Boundaries/Acquisition Goals and Objectives Objective 1-2
Management activities in UTMSI property and other areas	5.2 Stewardship Program Goals and Objective Objective 3-5
Impact of NERR on ship channel commerce	EIS

After the public comment period for the draft PEIS/MP, there will be a final PEIS/MP made available for further public comment with a 30 day waiting period prior to taking Federal action.

#### **2.4 Federal Permits, Licenses, and Entitlements Necessary to Implement the Action**

A coastal lease for scientific purposes, authorized under the Texas Natural Resource Code (Ch 33.105(4)), between UTMSI and GLO for the all state submerged lands (open bays and estuaries) within the proposed NERR boundary is necessary to implement the proposed Mission-Aransas NERR (Attachment A, Appendix 5). The coastal lease has a 5-yr term that is renewable in perpetuity. This lease will be approved and renewed by the Public School Land Board at the end of each 5-year term on the same timeline used to review and revise the Mission-Aransas NERR MP. Every five years the revised MP will be submitted to the Public School Land Board along with a request to renew the lease.

Memorandums of understanding that describe the role and responsibilities between UTMSI and landholders are held by UTMSI, GLO, USFWS, CBLT, Fennessey Ranch, TNC, TPWD, and a local governmental representative mutually agreed upon by Aransas County and the city of Rockport (Attachment A, Appendix 4).

## 3.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

### 3.1 Summary of Alternatives

The Federal action proposed by NOAA is the recommendation from the State of Texas to establish a NERR in the Mission-Aransas Estuary. That action includes formal approval and joint designation by the NOAA Administrator and the Governor of Texas and will result in the awarding of annual grants for up to 70 percent for operation and maintenance costs, and additional funding for acquisition and construction of facilities in the years to come. The alternatives described include the preferred alternative (i.e., to designate the proposed site and fund MP implementation), a review of possible alternative sites or boundary configurations (i.e., other estuaries, larger or smaller boundaries than currently proposed), and the no action alternative (i.e., take no action to designate the proposed NERR).

### 3.2 Preferred Alternative

Generally speaking, the preferred alternative is to approve a site nominated by an applicant like the UTMSI. NOAA requires applicants to go through a rigorous site selection screening process prior to coming up with what they consider to be the best site to meet the requirements of the CZMA and implementing regulations (Attachment A, Appendix 1). The site selection process the UTMSI undertook can be found in their Site Nomination document at <http://www.utmsi.utexas.edu/nerr/>. The proposed site and implementation program are described at length in Attachment A and are summarized below.



Figure 12. Vessel traffic on the Gulf Intracoastal Waterway.

#### 3.2.1 Boundary

1) Water: State submerged lands of the Mission-Aransas Estuary (including Copano, Mission, Port, St. Charles, Aransas, and northern Redfish Bays and the mouth of the Aransas River and tidal segments of the Mission River). To the south, the boundary would start north of the Aransas Pass shrimp channel. Part of Lydia Ann Channel would be included. All navigation channels, legally designated maintenance dredge disposal sites along the Intracoastal Waterway are excluded from the boundary and traditional and existing uses are expected to continue in the future (Figure 12). This means that stations for long-term research/monitoring projects will not be set up in channels where maintenance dredging or disposal related impacts are expected to occur in the future. This, however, does not imply that the impacts of disposal on the estuary will not be a subject of research interest.

2) Land: The Aransas National Wildlife Refuge (ANWR), Goose Island State Park, Fennessey Ranch (adjacent to the Mission River), and parcels owned by The Coastal Bend Land Trust (near the mouth of Aransas River), and The Nature Conservancy (tract adjacent the ANWR) include excellent upland sites allowing land/water interface studies. NOAA rules state that federally protected lands can make up to 50% of total area of a NERR site. The federally protected ANWR make up 33% of the total area. Mesquite Bay is included so that Cedar Bayou, which connects to the Gulf of Mexico, can provide access to research offshore.

The proposed boundary includes at this point nearly 200,137 acres of uplands, lakes, and freshwater wetlands; riparian and riverine habitat; tidal marshes and bays; mangrove forest, seagrass and oyster beds, and productive mud/tidal flats. The area is highly contiguous and can be subject to expansion through future donations or acquisitions by willing sellers. The boundary reflects a willingness of multiple partners to join into the program to form a NERR site. The proposed site is shown in the Reference Map inside the front cover. In places the boundary includes inland areas and in other places there is a 1,000 ft. setback from the waters edge providing the capability to conduct research, monitoring, and education activities in a variety of settings representative of a complete estuarine system.

#### 3.2.2 Management

The UTMSI will serve as lead management agency and have a NERR Manager with staff to assist in running the day-to-day activities of the Reserve. Staff would include an education, research, and stewardship coordinator who in turn receive advice from various Advisory Committees. Reserve partners including the land owners and managers within the Reserve will serve on the Reserve Advisory Board and provide guidance and direction for key activities identified in the MP (Attachment A). The management system is tied together through various memoranda of understanding, state leases,

conservation easements. The MP contains sub-plans for important components of management including: administration, boundaries/acquisition, stewardship, public access, facilities/construction, research and monitoring, education/interpretation and outreach, and volunteer work. The MP will be a living document and subject to review and updating every 5-years. For the most part, a variety of alternatives are not available for evaluation although changes are possible for any component.

### **3.2.3 Goals and Objectives**

The Reserve will strive to achieve a number of goals and objectives in the years ahead supported by a number of actions to help achieve the objectives. This sets the tone for the types of activities that are likely to take place in the future and important for understanding the types of impacts that will be associated with program implementation. The three chosen goals include: improving the knowledge of Texas coastal zone ecosystem structure and functions that addresses research and monitoring needs; to promote understanding of coastal ecosystems by diverse audiences that gets to the needs for conducting education of diverse audiences; and to promote public appreciation and support for stewardship of coastal resources that focuses on good management and outreach activities. A more thorough description of these goals and objectives and proposed activities can be found in the draft MP (Attachment A, Table 1). Dedicated personnel with an annual budget will help achieve these goals that are environmentally friendly and will result in positive benefits to the communities in which the reserve sites are found.

### **3.3 Other Alternatives Considered**

As part of the NERR site selection process for Texas, several alternative sites were discussed including a proposal for a multi-site NERR. For the purposes of this environmental impact statement and reserve MP, these alternatives are briefly described along with a no action option of not siting a NERR in Texas, and alternative site and boundaries for the NERR site.

#### **3.3.1 Alternative Sites and Boundaries**

There are usually a number of ways to delineate a reserve site and management options. The NOAA required preliminary site selection process (Attachment A, Appendix 1, Section 921.11, p. 97) helps to filter out many sites through a rigorous review that includes discussions with potential property owners, include public participation, etc. in order to meet the requirements of the Federal program. The UTMSI has undergone this process and the documentation describing the estuaries reviewed, why sites were not preferred can be found as background information and is incorporated by reference in this document at: <http://www.utmsi.utexas.edu/nerr/>.

To summarize, two committees were formed to assist UTMSI with the numerous tasks associated with identifying, evaluating, and selecting a candidate site or sites, as well as identifying and developing appropriate local, state, Federal, and private partnerships that will ultimately define the Mission-Aransas NERR. The Site Selection Committee (SSC) was formed to provide overall guidance to the process and the Site Evaluation Subcommittee (SES) was formed to provide technical guidance to site selection process. The overall approach taken toward the formation of these committees was to identify and invite participation from as many agencies, organizations, groups, and individuals as possible, such that the broadest possible base of expertise and input could be drawn upon during this and future steps in the NERR process.

Because the Western Gulf Biogeographic Subregion is large, the preliminary site screening process began by looking at 65 sites within the major estuarine ecosystems at Matagorda Bay, San Antonio Bay, Corpus Christi Bay, Upper and Lower Laguna Madre, and the Aransas Bay. Thus, it was appropriate to use a simplified procedure to screen proposed sites to eliminate those areas that are clearly not suitable candidates prior to the application of the full suite of site selection criteria. A preliminary screening was desirable to reduce the sites considered to three to five sites, thus reducing the amount of time and effort required to apply the full suite of criteria to all sites. A candidate site which did not appear to meet each of the site selection criteria was eliminated from the site selection process. These sites are not considered as viable alternatives for current consideration.

##### **3.3.1.1 Example of Alternative Sites**

The Nueces River and Delta were initially included within the boundary as a multi-site NERR. The Nueces Delta was the only site to receive unanimous recommendations at the first site selection meeting. However, the Delta is primarily in private ownership and has been degraded because of freshwater inflow diversion, thus it did not score as highly as the

Mission-Aransas Estuary. The Delta did rank third among all sites considered during the SES ranking. The reasons the Delta was unanimously nominated in the first SSC meeting are compelling. The Delta probably has the most extensive long-term research programs than any where else in the Western Gulf Biogeographic Region. The Delta is also the focal point for restoration projects in the Coastal Bend region. The City of Corpus Christi has spent nearly \$5,000,000 to restore freshwater inflow to the Delta by diverting fresh water from the Nueces River to Rankin Bayou, which is the main stem of the Delta. The Coastal Bend Bay and Estuary Program (in partnership with The Nature Conservancy) has nearly \$3,000,000 of local (non-Federal) funds to purchase land in the Delta for conservation purposes. Since the Estuary Program recently made its first land purchase, there are wetlands now available in the Delta to include in the Proposed Mission-Aransas NERR. After discussion over the merits of having non-contiguous boundaries in the NERR, the SES agreed to recommend a satellite site in the Nueces Delta using two parcels owned by the State of Texas and the parcel owned by the Estuary Program. Although the SES recommended the Nueces Delta as a satellite site, the Delta was not included in the final site boundary because of its degraded condition, lack of representativeness, and existing water uses.

### **3.3.1.2 Example of Boundary Alternatives**

There are three potential alternatives that can be considered that differ from the preferred alternative.

#### **3.3.1.2.1 Include the Gulf Intracoastal Waterway and Transportation Corridors**

The GIWW along with maintenance dredging upland and open water disposal sites and the Copano Bay Bridge right-of-way are excluded from the proposed boundary. The reasons are for the longstanding justification and use of these areas to achieve important transportation needs that are local, regional and national in scope and that require constant maintenance and operation to stay fully functional. Excluding them from the boundary ensures no additional requirements are placed on these facilities such as those associated with a Nationwide Permits (Section 5.2.2.3) affecting a "designated critical resource water". Including these areas in the boundary would not in any way put a halt to the transportation activities currently taking place but the additional requirements placed on permit applicants like State or Federal agencies could require additional assessment, time to conduct operations, or meet additional mitigation requirements. This may or may not result in a greater level of resource protection, and require additional scientific investigation.

#### **3.3.1.2.2 Extend the Reserve Boundary an additional 1,000 feet to the Mean High Tide Line**

The current Reserve boundary and lease stop in most instances 1,000 feet from the mean high tide line (MHTL). The GLO feels that this protects private property owners from the conduction of Reserve research and monitoring activities in areas where property owners are often given permission for the placement of private piers and docks (Figure 13) and thus help to avoid potential conflicts. A number of private property owners have provided special permission for the UTMSI to extend their research should that be desirable and upon notification of the property holder to the MHTL. Consequently, in some selected sites and along with other sites associated with NERR partners, research can be undertaken along the land/water interface sector as needed. This provides UTMSI and associated research partners sufficient core site study areas while allowing GLO to continue to lease and permit nearshore activities. Over time, additional property owners who support the NERR may also give permissions for the conduct of research activities to the MHTL. This alternative would extend the boundary to the MHTL throughout the NERR site. Since uses are not prohibited in the NERR site, the impact would be mostly for the UTMSI to receive permission to conduct related buffer research from individuals or corporations who have facilities in the water and any proposed new uses would be affected at the time of getting a U.S. Army Corps of Engineers permit. NERR sites are "designated critical resource water" and receive additional consideration when applicants seek to obtain a nationwide permit. Piers, for example, are general permits and are not affected by such designation (Section 5.2.2.3).

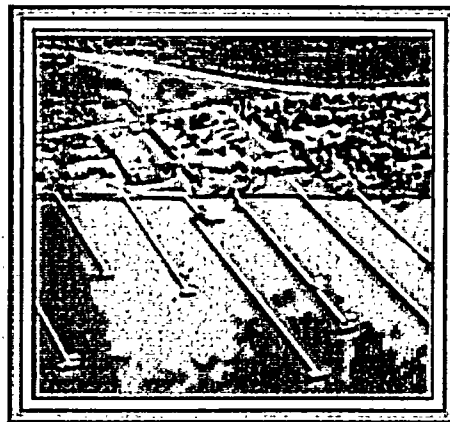


Figure 13. Illustration of piers and docks in a shallow bay that extend almost 1,000 feet offshore.

### **3.3.1.2.3 Inclusion of Additional Key Land Areas**

While it may be desirable to include an entire watershed with complete management control in a NERR site to achieve optimal research results of a pristine ecosystem, there are usually many limitations to achieving such a goal. Reserve sites are limited by the amount of property that can be acquired either through funding limitations, willing sellers, the total size of the ecosystem, and the actual needs for research and management goals. Therefore, there is a great deal of diversity in the size of NERR sites as shown in Table 1. Many NERR sites after initial designation have continued to acquire additional property when such property becomes available. Key areas consist of river or stream corridors or submerged wetlands. The draft MP indicates there are additional wetland and watershed areas that would be acquired should circumstances permit (Attachment A, Section 4.0). Consequently, elements of this alternative remain viable into the future. Additional environmental assessment would be needed with future boundary acquisitions and changes should they occur.

### **3.4 No Action**

Nationally, there are still many sites not represented in the NERRS and Federal funding is potentially a limiting issue. It is possible that in the process of decision making trade-offs may be made for one new site over another. While NOAA provides funding to applicants to undertake a site evaluation process, there are no guarantees that a site will be selected so the no action alternative is considered a viable alternative. Under this option the Mission-Aransas Estuary would not be designated as part of the NERRS or placed on hold and there would be no change in current management of the proposed reserve site. The no action alternative for a Mission-Aransas NERR would leave the publicly-owned lands within the Mission-Aransas Estuary under their current status within: a) the subtidal waters operated by the GLO, b) the Aransas National Wildlife Refuge operated by the USFWS, and c) the Goose Island State Park operated by the TPWD. The no action alternative for a Mission-Aransas NERR would leave the privately-owned lands within the Mission-Aransas Estuary under their current status within: a) Buccaneer Cove Preserve operated by the CBLT, and b) Fennessey Ranch. Under these separate programs, these habitats are managed differently and on a basis as dictated by varying available resources and priorities of the respective agencies involved. Although each major portion of this site would continue to be protected and managed, these efforts would be additionally benefitted by association with a NERR designation and additional funds provided for the conduct of studies, additional acquisitions, etc. The potential pressures for the Fennessey Ranch to subdivide the property for the sale of recreational properties in the absence of a conservation easement would be great (personal communication with S. Crofutt, 11/17/2004) and potentially lead to a change in land use of the existing property.

The designation of the Mission-Aransas NERR would provide a clear alternative to the current management of these lands by bringing these different components of a relatively intact watershed under a single advisory program. This designation would also combine and magnify the resources of each of the main public and private land-holding agencies, as well as those of the other partners for the NERR. The no action option would, therefore, provide for only minimal and incomplete management of these important examples of estuarine and associated non-estuarine habitats. Additionally, there would be the loss of funds, the loss of opportunities for public education, and there would be no Coastal Training program for facilitating science based management. Reserve sites serve to draw many tourists, researchers, and other visitors adding to the positive economic impact in the Reserve area. No action would lead to a forgone opportunity. The many organizations and individuals who provided comments during the scoping meetings in favor of the Reserve would also be disappointed in the no action alternative based on their comments of support.

### **3.5 Summary of Environmental Consequences of Alternatives**

The details regarding all of the predictable environmental consequences of establishing the Mission-Aransas NERR are provided in section 5.0 of this document but are briefly summarized as follows. The environmental impact of establishing the Mission-Aransas NERR will be to coordinate the protection and management of the habitats currently held within the boundaries of the proposed reserve. This action will offset any minor environmental impacts by providing a comprehensive program for the coordinated management of the site. The development of programs in research, monitoring and environmental education will further benefit the site by generating additional scientific knowledge and public support and appreciation for the roles played by these natural areas.

The facilities for the site (Attachment A, Section 7.0) will be built in the designated buffer area and will be placed to minimize adverse impacts to existing habitats and other natural resources. There will be little physical alterations to the present environmental conditions in the Reserve apart from those associated with activities for basic scientific activities

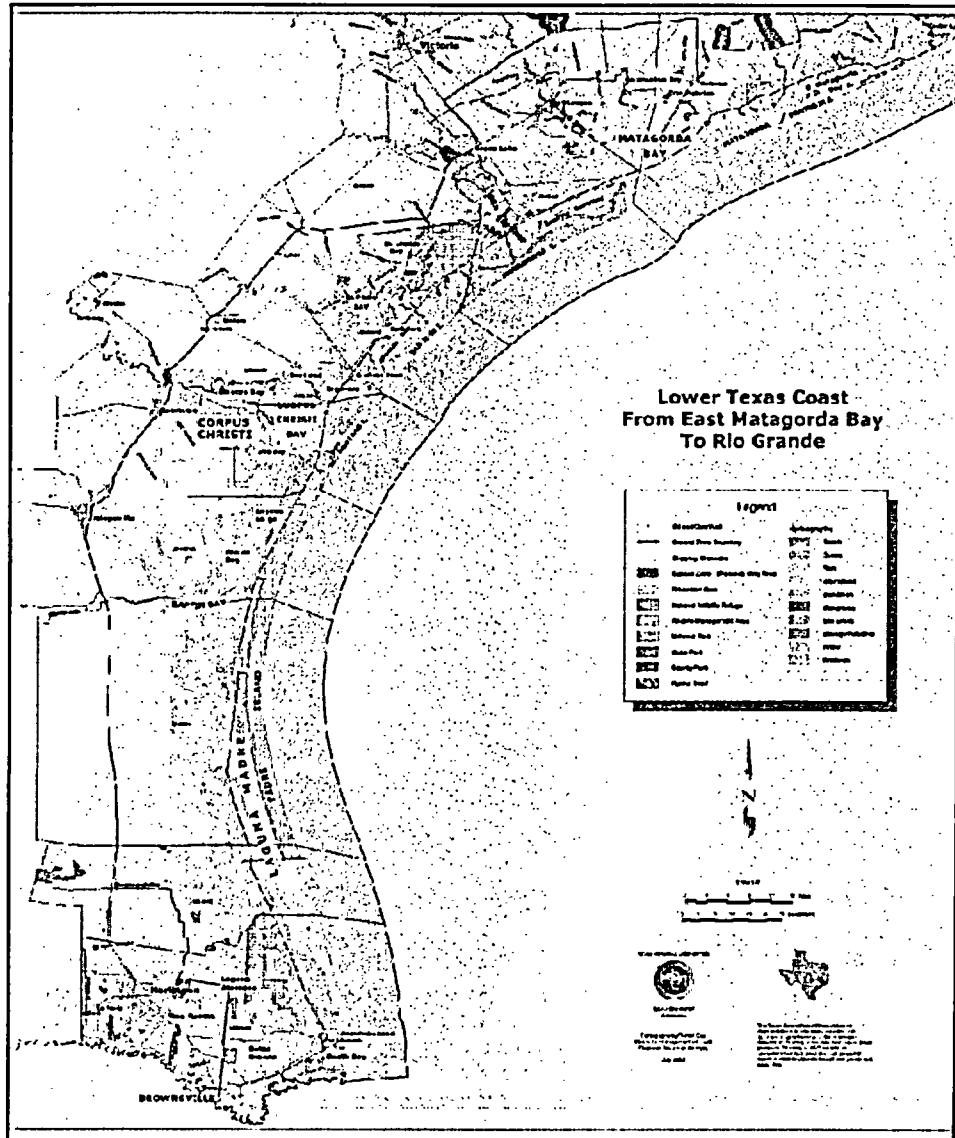
associated with research and monitoring outlined in the Stewardship Plan (Attachment A, Section 5.0). Traditional uses of the site will remain unchanged (Attachment A, Appendix 2) including recreational and commercial fishing (finfish, oyster, shrimp, and crab), recreational hunting, camping, and oil and gas operations.

## 4.0 THE AFFECTED ENVIRONMENT

This section describes the current Mission-Aransas Estuary and proposed Reserve's habitats. Description of these habitats provides baseline information of the environment for analytical purposes.

#### 4.1 Biogeographic Region Analysis

There are currently 26 sites in the NERRS scattered among 16 of a total of 29 recognized biogeographic subregions of the country. The Texas site will represent the Western Gulf Biogeographic Subregion (Figure 14). The area considered lies wholly in Texas, and comprises most of the Texas coast. The Subregion is bounded by the border with Mexico to the southwest and the border of Galveston Bay to the northeast. This area includes six major bay-estuarine systems and two river systems (Figure 15). The major bay-estuarine systems are Lavaca-Colorado Estuary, Guadalupe Estuary, Mission-Aransas Estuary, Nueces Estuary, and Laguna Madre Estuary. Laguna Madre is actually two different systems: Upper Laguna Madre/Baffin Bay and Lower Laguna Madre. Texas follows the traditional system of naming an estuary for the river(s) that dilute sea water. In NOAA publications, these systems are named after the primary bay (Matagorda Bay, San Antonio Bay, Aransas Bay, Corpus Christi Bay, and Laguna Madre, respectively). The two riverine estuaries are: the Brazos River and the Rio Grande. Three of the ecosystems (Mission-Aransas Estuary, Nueces Estuary, and Laguna Madre Estuary) were included in the Corpus Christi Bay National Estuary Program study area. Redfish Bay, within the Mission-Aransas Estuary, is considered a high priority site for conservation in the Northern Gulf of Mexico by The Nature Conservancy (Beck et al. 2000).



**Figure 14. Map of the major estuaries of the Western Gulf Biogeographic Subregion.**

## 4.2 Physical Aspects

The Mission-Aransas Estuary is a typical Western Gulf of Mexico estuary (Diener 1975) (Figure 15). The estuarine system is composed of tertiary, secondary, and primary bays. Mission Bay is the only tertiary bay, and Copano, Port and St. Charles Bay are secondary bays. Mesquite, Aransas and Redfish Bay are primary bays because they are adjacent to the oceanic outlets. Copano Bay is a coastal plain estuary, composed of two drowned river mouths of the Mission and Aransas Rivers. Aransas, Redfish and Mesquite Bays are bar-built estuaries, in which an offshore sand bar partially encloses a body of water. Aransas Bay is the largest bay, followed by Copano and Mesquite Bay. The bay systems are shallow and the mean low water varies from 0.6 m in Mission Bay to 3 m in Aransas Bay (Chandler et al. 1981).

The land within the Mission-Aransas NERR is comprised of state and privately owned land. The Fennessey Ranch is privately owned and is designed to be environmentally sound as well as an economically viable business. The current economic base incorporates hunting, wildlife tours, photography, and cattle enterprises (Croft and Smith 1997). It is composed of native tree/brush, prairie, freshwater wetlands, and Mission River riparian corridor. Wetlands at the Fennessey ranch cover about 500 acres, of which are temporarily, seasonally and semi-permanently flooded (White et al. 1998).

Buccaneer Cove Preserve is located at the mouth of the Aransas River and contains 856 acres of wetlands such as estuarine tidal flats and brackish marshes. This area is owned and managed by the Coastal Bend Land Trust whose primary goals are preserving and enhancing native wildlife habitat in the Coastal Bend. Johnson Ranch is located on Lamar Peninsula adjacent to St. Charles Bay. The Johnson Ranch contains 245 acres of marshland, coastal prairie and oak mottle habitat. These are valuable habitats for the whooping cranes, sandhill cranes, reddish egrets and other waterfowl. The state parcel of land in Mission Bay is also comprised of valuable wetland habitat. The Mission Bay state parcel, Buccaneer Cove Preserve, and Johnson ranch add 1159 acres of habitat that is essential to the ecological functioning of the system.

Goose Island State Park is 321.4 acres and is located between Aransas and St. Charles Bay. The state park contains several habitats including live-oak thickets, tidal salt marshes, and mud flats, which support migrant birds including rails, loons, grebes, common goldeneyes, red-breasted mergansers, and redheads. The park also is home to the "Big Tree", which is the national champion Live Oak estimated to be around 2000 years old. The park was acquired in 1931-1935 by deeds from private owners and Legislative Act setting aside the state-owned Goose Island as a state park. The earliest park facilities were constructed by the Civilian Conservation Corps (CCC) in the early 1930s. The park also has a coastal lease of submerged land adjacent to the park that includes seagrass beds and oyster reefs.

The Aransas National Wildlife Refuge (ANWR) is comprised of land on the Black Jack Peninsula (Aransas proper), Tatton Unit (NW of St. Charles Bay) and Matagorda Island. The refuge was established in 1937 to protect the endangered whooping crane and was created through an executive order signed by Franklin D. Roosevelt. Matagorda Island Wildlife Management area and State Park, became part of the ANWR in 1982 and is managed through a memorandum of agreement by Texas Parks and Wildlife Department (TPWD) and U.S. Fish and Wildlife Service (USFWS). The ANWR has a large portion of tidal and deltaic marshes. Upland vegetation is predominately coastal plain grasses interspersed with oak mottes, swales and ponds (Stevenson and Griffith 1946, Allen 1952, Labuda and Butts 1979). Vegetation and wetlands at the refuge support wildlife such as the brown pelican, Attwater's prairie chicken, peregrine falcon, white-tailed deer, javelina, coyote, wild pig, Rio Grande turkey, raccoon, armadillo, and the threatened American alligator (CCBNP 1996, Figure 16).

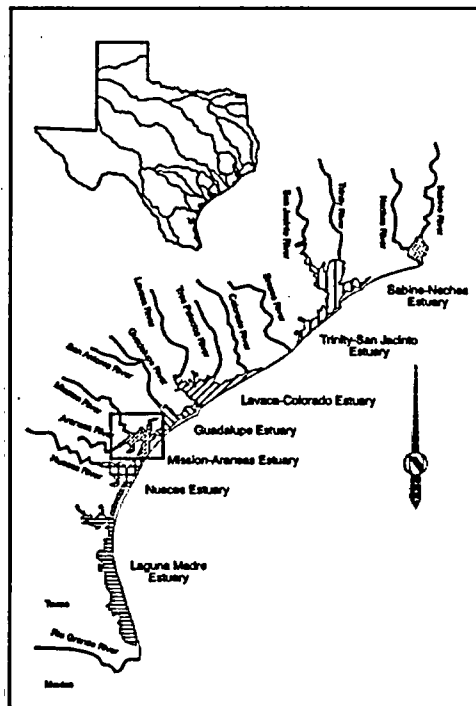


Figure 15. Major estuaries on the Texas Coast.

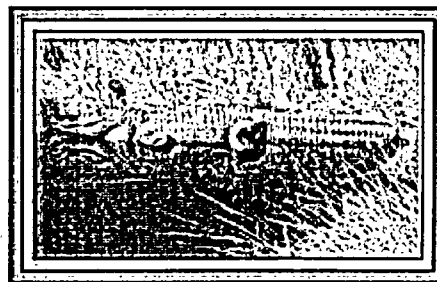


Figure 16. American alligator in the ANWR.



### 4.3 Climate

There are several published accounts pertaining to the climate within the Mission-Aransas NERR and this section is largely based on a wetland conservation plan done by Smith and Dilworth (1999). The proposed site has a "subhumid-to-semiarid east coast subtropical climate, with extreme variability in precipitation" with generally high humidity and infrequent but significant killing frosts (Fulbright et al. 1990). Generally, the area experiences high temperatures along with deficiencies in moisture. Major climatic influences are temperature, precipitation, evaporation, wind, tropical storms and hurricanes.

Temperatures within the Mission-Aransas NERR range from an average winter minimum range of 8.3 - 8.9 °C to an average summer maximum range of 33.3 - 35.6 °C. The major impacts of temperature within the proposed site are frosts or freezes. Average annual rainfall ranges from 91.4 cm in the north to 77.4 cm in the south. Annual precipitation values alone are not necessarily significant unless compared with precipitation deficiency caused by evapotranspiration and transpiration from plants (Orton 1996). These deficit values range from 7.6 to 40.6 cm, and coupled with this deficient rainfall budget is the seasonal bimodal distribution of precipitation, with most rainfall occurring in the spring and summer months.

Two principle wind regimes dominate the Mission-Aransas NERR: persistent, southeasterly winds from March through September and north-northeasterly winds from October through March (Behrens and Watson 1973, Brown et al. 1976). Sedimentologists stress the importance of winds affecting coastal processes along the Texas coast, noting that it is perhaps the most important agent that influences coastal development. The strongest winds occur during tropical storms and hurricanes generating high velocity currents which move vast quantities of sediment in relatively short periods of time (Morton and McGowen 1980).

### 4.4 Hydrography / Oceanography

There are several published accounts pertaining to the hydrography within the Mission-Aransas NERR and this section is largely based on a wetland conservation plan by Smith and Dilworth (1999). Hydrographical conditions in the proposed site are influenced primarily by climatic conditions, freshwater inflow and to a lesser extent tidal exchange. The Mission and Aransas rivers contribute the major freshwater inflows into the Mission-Aransas NERR. All drainages of the Mission-Aransas Estuary share the major Gulf of Mexico connection at Port Aransas (Aransas Pass). Minimum and maximum annual inflows, median inflows, and mean inflows from surface runoff are compared to those of the central Coastal Bend and south Texas in Table 4.

Other hydrological parameters such as precipitation and evaporation, along with inflows, provide a better understanding of the water balance and estuarine salinity levels within the area (Table 5). The Aransas estuary receives most of its inflow from adjacent ungauged areas, with a net positive input of freshwater. A salinity gradient is normally present, where there is decreasing salinity from the Aransas inlet to the upper bays.

Table 4. Comparison of freshwater inflows in acre-feet per year in three estuaries along the lower Texas coast. Data is the estimated annual flows based on values from 1941 - 1991 ([http://hyper20.twdb.state.tx.us/data/bays\\_estuaries/hydrologypage.html](http://hyper20.twdb.state.tx.us/data/bays_estuaries/hydrologypage.html)).

Estuary	Minimum Annual Inflow	Maximum Annual Inflow	Median Inflow	Mean Inflow
Aransas	7503	1542142	317720	439486
Nueces	42551	2744260	349945	569198
San Antonio	275082	7696573	2067302	366148

Table 5. Comparison of estuarine hydrology in acre-feet for three estuaries along the lower Texas coast. Data is the estimated annual flows based on values from 1941 - 1991 ([http://hyper20.twdb.state.tx.us/data/bays\\_estuaries/hydrologypage.html](http://hyper20.twdb.state.tx.us/data/bays_estuaries/hydrologypage.html)).

Estuary	Gauged Inflow	Ungauged Inflow	Evaporation	Precipitation	Inflow Balance
Aransas	135537	317193	584038	366667	215209
Nueces	522430	194855	659314	331996	241881
San Antonio	2009889	435961	642512	435707	2159344

Tidal exchange in the Mission-Aransas Estuary is driven by astronomical tides, meteorological conditions, and density stratification (Armstrong 1987). Because of shallow bay depths (1 - 4 m at mid-tide) and a relatively small tidal prism, wind exerts a much greater influence on bay circulation than astronomical tides (Morton and McGowen 1980, Armstrong 1987, NOAA 1990a). Substantial exchange of water between the Gulf of Mexico and the Mission-Aransas Estuary occurs from wind-generated tides (Ward 1997). Astronomical tides are predominantly diurnal, but also have a semi-diurnal component. The greatest influence on the bay system by astronomical tides is at the tidal inlet. Seasonal high tides occur during the spring and fall, while seasonal lows occur during winter and summer.

This estuarine system has a large salinity gradient, with high salinities in Redfish Bay to lower salinities in Mission Bay. Salinity gradients occur with low salinities at the mouth of the Aransas and Mission Rivers, to higher salinities at the primary bays. Salinity structure within the proposed site is determined by "isolated freshwater pulses that, once introduced are retained within the system" (NOAA 1993). Freshwater pulses tend to lower salinities for long periods of time because of the shallowness of the bay and the restricted inlet connection. Salinity stratification is common following fresh water impulses and usually occurs in Copano Bay (NOAA 1993). Salinity stratification can occur in secondary bays (e.g., Aransas Bay), in summer when winds subside and evaporation causes dense water to sink (Morehead et al. 2002).

#### 4.5 Geology

The shorelines of Copano and Aransas Bay are in a state of erosion; whereas the bay side shoreline of San Jose is in a state of equilibrium or accretion (Chandler et al. 1981). The Mission/Aransas estuary system is in an intermediate stage of geological succession with the final stage being the filling of the estuary by riverine deposits. There are three sources of sediment in the proposed site: 1) suspended and bedload material from the Mission and Aransas rivers, 2) Gulf of Mexico deposits from storms and inlets, and 3) dredge spoil from channels (Tunnell et al. 1996). The most common sediment type in the Mission/Aransas estuary is mud, which is comprised of silt and clay (White et al. 1983). Mesquite Bay and St. Charles Bay most common sediment type is sand to sandy silt (White et al. 1989). Aransas, and northern Copano Bay have a higher portion of clay, while the southern portion of Copano Bay has a higher portion of silt. Copano Bay also has areas where the sediments have as high as 75% shell material occurring near oyster reefs. The margins of Copano and Aransas Bay have a higher percentage of sand (White et al. 1983).

Along the southern Texas coast, growth faults occur sub-parallel to the coast. Most faults along the southern Texas coast are down-to-the-basin, but up-to-the-basin are common (McGowen and Morton 1979). These faults belong to the Willamar system (McGowen and Morton 1979, CCGS 1967). Faulting is concentrated outside the proposed boundary on South Padre Island (Rio Grande - Port Mansfield Ship Channel), Mustang Island (Malaquite Beach - Port Aransas), Brazos-Colorado Delta (Colorado River - Bolivar Peninsula), and near Sabine Pass (McGowen and Morton 1979). Faulting is a result of structural activity, and gravity sliding, motile salt beds, or basin subsidence are suspected to be the causes of Gulf coast faults (McGowen and Morton 1979, Link 1982). On the southern Texas coast, most oil and gas reservoirs are hydrocarbon traps associated with down-to-the-basin gravity faults and related closures to their down thrown sides (Brown et al. 1976). On the south Texas coast, the principal accumulations of hydrocarbons are associated with major or concentrated fault zones (CCGS 1967). These hydrocarbon reservoirs are, in general, shallow water sands (CCGS 1967).

#### 4.6 Water Quality

Concerns about the quality of the Aransas-Copano-Mission bay system has risen more recently than for the urbanized and industrialized bays on the upper Texas coast. Up to World War II, there were few reports or indications of perceived

pollution problems in the area, in contrast to the upper coast. In the last two decades, public attention and concern for the Aransas-Copano Bay system has changed. With accelerating urban development, awareness of the potential impacts on the system has increased, and maintenance of the health of the system has become a major issue (Smith and Dilworth 1999). Nuisance and toxic blooms are observed, but hypoxia is not. Nitrogen and phosphorus concentrations range from low to medium (Table 6) (NOAA 1977). Ambient nutrient concentrations are important factors in determining agricultural pollution via runoff. Nitrogen is the primary limiting nutrient to Texas estuaries and is supplied to the Mission-Aransas Estuary by the Aransas and Mission rivers (24%), and precipitation (28%). The final nutrient concentration, however, is determined more by the estuarine processes than by inputs to the system. The processes being geochemical trappings within sediments, regeneration by biological communities, and benthic-pelagic coupling (Tunnell et al. 1996). Sewage treated water from the City of Rockport is used as irrigation at the Rockport Country Club Golf Course and is released into Tule Creek, which flows into Little Bay.

Table 6. Predicted annual pollutant loads to Copano and Aransas Bay (Smith and Dilworth 1999).

Stream Outlet Point	Total Phosphorus (kg/yr)	Total Nitrogen (kg/yr)	Total Cadmium (kg/yr)	Fecal Coliform (trillion col./yr)
Copano Creek	9320	67152	45.4	941
Medio Creek	60594	369122	173.5	1469
Mission River	57781	239843	76.8	550
Aransas River	60900	213314	56.1	503
Chiltipin Creek	19524	66252	15.3	43
Aransas Sub-Basin*	138205	519409	148.2	1099
Copano Bay*	208119	955683	367	3509

\*Note: The Aransas Sub-Basin entry represents a sum of the Aransas River, Chiltipin Creek, and Taft Drainage entries. The Copano Bay entry represents the sum of all five major outlets to the bay.

The Texas Commission on Environmental Quality (TCEQ) tests the water quality of all water bodies on the Texas Coast as required by the Clean Water Act. The TCEQ applies Texas Surface Water Quality Standards to determine which water bodies are impaired. Bodies of water can be designated impaired because of low dissolved oxygen levels, high bacteria concentrations, high mercury concentrations, and many other conditions. Once a body of water is determined impaired a Total Maximum Daily Loads (TMDLs) is scheduled by TCEQ for priority impaired waters. There is one segment in the Mission-Aransas Estuary that is listed as impaired (2002, 303(d) List). The TCEQ segment 2472 entailing Copano Bay, Port Bay, and Mission Bay is impaired by bacteria and does not support oyster use. The locations of impairment include the area along southern shoreline, Port Bay, and the area near the town of Bayside. This segment of the proposed site is listed as a low urgency for a TMDL. Even though there are areas in the proposed site that are impaired by bacteria, the Mission-Aransas Estuary has a small area of impairment in comparison to other estuarine systems along the Texas coast (Table 7). There is also impaired waters along the Gulf coast (including Port Aransas area). These waters have shown high concentrations of mercury in king mackerel greater than 43 inches, and this impairment is listed as a high priority of a TMDL ([http://www.tnrc.state.tx.us/water/quality/305\\_303.html](http://www.tnrc.state.tx.us/water/quality/305_303.html)).

Table 7. Number of segments in Texas estuaries listed as impaired by the TCEQ in 2002.

Estuarine System	Number of Segments	Parameters
Trinity-San Jacinto	14	bacteria, dioxin, low DO
Lavaca-Colorado	5	bacteria, low DO, mercury
Guadalupe	1	bacteria
Mission-Aransas	1	bacteria
Nueces	3	bacteria, low DO, zinc
Laguna Madre	1	low DO

#### 4.7 Habitat Types and Descriptions

Along with open-water habitats, the Mission-Aransas NERR includes several types of wetlands: freshwater (palustrine), brackish, and salt marshes, and mangrove communities. The wetland and open water habitats also support benthic and nektonic populations, as well as large areas of oyster reefs. Large areas of seagrass are present in southern boundaries of the site, and mangroves are abundant in the northern boundaries. Beach and flat habitats are located along the ocean side of Matagorda Island. Several maritime forests are also located within the Mission-Aransas NERR including coastal prairies, oak mottes, and riparian woodlands. All these habitats support endangered and culturally important species, such as shrimp and fish. Further information on habitats, significant species, and archaeological sites within the proposed NERR boundary is given in the following sections.

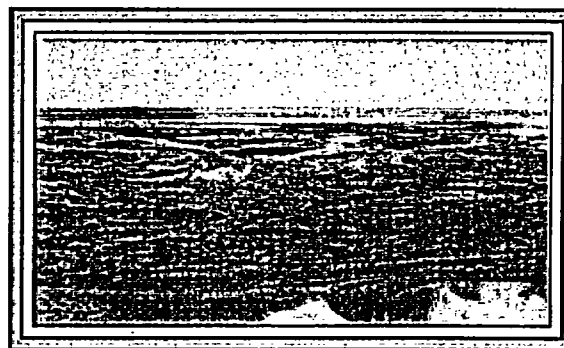


Figure 17. Image of typical estuarine marshes.

##### 4.7.1 Coastal Marshes

Coastal marshes are important habitats that support diverse communities of producers, decomposers, and consumers. There are two types of coastal marshes within the Mission-Aransas NERR: deltaic and tidal marshes (Figure 17, 18). Deltaic marshes occur where there is riverine freshwater and sediment flows, and are found at the Nueces (Rincon Bayou), Mission and Aransas river delta plains (Brown et al. 1976). Tidal marshes occur on flood-tidal deltas near natural passes and along bay shorelines, and are found on the bay side of Matagorda, St. Joseph, and Harbor Islands (Tunnell et al. 1996). There are also marshes exhibiting both characteristics of a deltaic and tidal marsh that have developed between bay-estuary-lagoon system passes at Harbor Island, Cedar Bayou, Redfish, Aransas, Mission and Copano Bay (Brown et al. 1976). Harbor Island is the largest tidal-deltaic marsh in the Mission-Aransas NERR, followed by Cedar Bayou. Wetland plant composition and abundance in deltaic and tidal marshes are controlled by salinity ranges, which break the marsh into three community types: salt, brackish and freshwater marshes. The motility of fish and birds

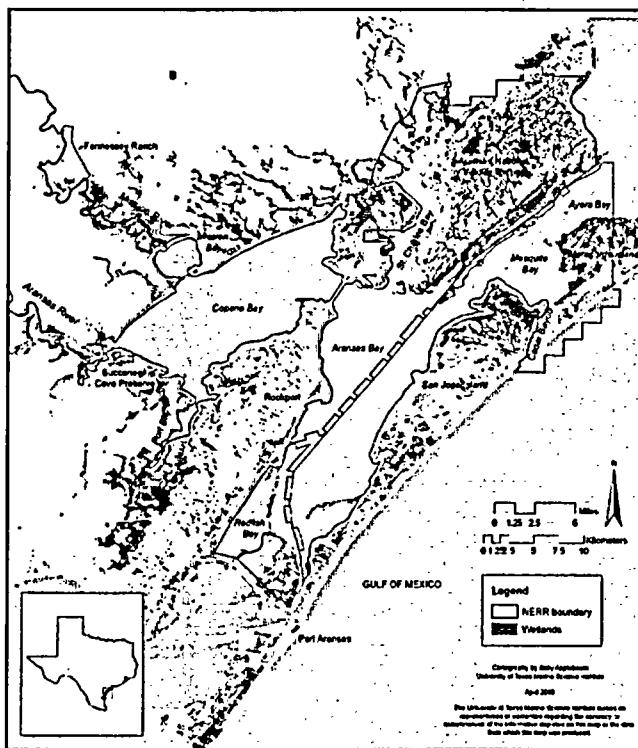


Figure 18. Location of coastal marshes in the Mission-Aransas NERR.

results in the absence of zonation patterns of these organisms within the three marsh types.

#### 4.7.1.1 Salt Marsh

Salt marshes receive daily tidal inundation and typically maintain a salinity between 20 and 35 psu (Tunnell et al. 1996). Producers inhabiting low salt marshes, at low elevations, are dominated by monotypic stands of smooth cordgrass (*Spartina alterniflora*) (Brown et al. 1976). In addition to smooth cordgrass in the low marsh, salt marshes along bay margins also have *Batis maritima*, *S. bigelovii*, *S. perennis*, *S. spartinae*, and *Distichlis spicata* at higher elevations (Brown et al. 1976). In addition to smooth cordgrass in the low marsh, salt marshes along the back side of St. Joseph, and Matagorda Island also have *B. maritima*, *Borrchia* sp., *Monanthochloa* sp., *Suaeda* sp., and *Distichlis spicata* at higher elevations (Brown et al. 1976). Among others, consumers typically include the salt-marsh periwinkle (*Littorina irrorata*), fiddler crabs (*Uca pugnax*), and the clapper rail (Stewart 1951, Kerwin 1972, Tunnell et al. 1996).

#### 4.7.1.2 Brackish Marsh

Brackish marshes receive seasonal tidal inundation, storm surges, and typically maintain a salinity between 5 and 19 psu (Tunnell et al. 1996). Brackish marshes are found in tidal creeks and tributaries of Port Bay. The producers in brackish marshes are usually composed of coastal sacahuista, marshhay cordgrass, big cordgrass, bulrush and cattail (Brown et al. 1976). Among others, consumers typically include the ribbed mussel (*Geukensia demissa*), salt-marsh periwinkle (*Littorina irrorata*), fiddler crabs (*U. minax*), Virginia rail (*Rallus limicola*), and the king rail (*Rallus elegans*) (Stewart 1951, Kerwin 1972, Tunnell et al. 1996).

#### 4.7.1.3 Freshwater Marsh

Freshwater marshes receive tidal inundation only during extreme storm surges such as hurricane, which increase water levels but may not change salinity levels (0 - 0.5 psu) (Tunnell et al. 1996). Freshwater marshes are found in the Mission Delta, on Fennessey Ranch (Fennessey Flats), and along the Aransas, and Mission Rivers. The producers in freshwater marshes are composed of rushes, bulrush, cattail, and slough grass (Brown et al. 1976). A large 200 acre freshwater lake, McGuill Lake, is also found on the Fennessey Ranch. Among others, consumers found in freshwater marshes typically include *Melampus bidentatus*, Virginia rail (*Rallus limicola*), and the king rail (*Rallus elegans*) (Stewart 1951, Tunnell et al. 1996).

### 4.7.2 Open-water Habitats

Open-water habitats for the Mission-Aransas NERR include benthos, both infauna and epifauna, oyster reefs, and seagrass. All of these habitats provide food and shelter for not only benthos, but also plankton, nekton, birds, and mammals.

#### 4.7.2.1 Benthos

Macrobenthic infauna are organisms that live within the sediment and are composed of organisms such as nematodes, polychaetes, molluscs, and crustaceans. Macrobenthic infauna (> 0.50 mm) are dominated by polychaetes and mollusk assemblages in most estuarine systems. Historical studies indicate that in the Mission-Aransas Estuary, the polychaetes *Mediomastus californiensis* and *Streblospio benedicti* are the most abundant macrobenthic organisms (Montagna, unpublished data). Combined together, the abundance of these species has a range of 800 - 2500  $n\ m^{-2}$  in Aransas Bay and 180 - 5000  $n\ m^{-2}$  in Copano Bay (Holland et al. 1975, Armstrong 1987). Historical studies indicate that within Aransas Bay, the polychaete *Praprionospio pinnata* is the most dominant macrobenthic organism, and in Copano Bay the dominant polychaete species are *Glycinde solitaria* and *P. pinnata*. The open bays in the proposed site dominate is small bivalves, which typically represent two-thirds of the molluscan community (Montagna and Kalke 1995). In Copano Bay the dominant epibenthos are *Macoma mitchelli* and *Mulinia lateralis* (molluscs), and *Lepidactylus* sp. (crustacean) (Calnan et al. 1983, Tunnell et al. 1996). The small bivalve *M. lateralis* is a primary food source of the commercially fished black drum (Montagna and Kalke 1995).

Epibenthos are invertebrates that live on the surface of the sediment and include organisms such as shrimp, crabs, and molluscs. Epifauna densities range from less than 1 to over 100 organisms per square meter (Montagna et al. 1998). They are an important group of organisms because they are a high trophic level, and are the primary consumers of macrobenthic infauna. Molluscan epifauna common to the proposed site include species such as whelks, murexs, quahogs, conchs, and scallops. Epifauna also contains economically important species that are commercially harvested such as shrimp and

crabs. The shrimp species in the proposed site that are harvested include the brown, pink, and white shrimp. These species can be found in high abundances throughout the bays and support a large shrimping industry, which is discussed later in under the heading "recreational and commercial fishing." Blue crabs (*Callinectes* sp.) are one of the more abundant brachyuran crabs found in the bays and are most abundant during spring and summer (Hammerschmidt 1985, Britton and Morton 1989). One of the reasons blue crabs are so abundant in the proposed site are because the adults are tolerant of environmental extremes (1-27 ppt, 10-35 °C), which is typical of Texas bays (Britton and Morton 1989). Blue crabs are active foragers during the day and night, and is also a major predator of estuarine infauna (Britton and Morton 1989).

Salinity is the primary factor in determining distribution of benthos. There are three zones defined in the south Texas estuarine systems: freshwater zone, and estuarine zone and a marine zone (Kalke and Montagna 1984). The freshwater zone resides in the upper portion of the estuary that receives the most freshwater inflow. The estuarine zone occurs when the freshwater inflow and saltwater are mixed, creating intermediate salinities. The marine zone resides near the outlets of an estuary, where salinities approach those of an open ocean.

#### 4.7.2.2 Oyster Reefs

Oyster reefs within the Mission-Aransas NERR are concentrated in Copano, Aransas and Mesquite Bay (Figure 19). The reef structure is usually long and narrow orientating perpendicular to prevailing water currents or parallel to channels, and has a tendency to grow out at a right angle from shore in order to maximize feeding and waste removal (Price 1954). Oyster reef development is dependent on hydrological variables such as salinity, water temperature, current flow, dissolved oxygen levels, and sedimentation. *Crassostrea virginica* is the primary species creating the oyster reefs in the Mission-Aransas NERR and is found in bays with a salinity range of 10 - 30 psu. Mean salinities for Aransas Bay range from 10 - 20 psu and 10 - 15 psu in Copano Bay (White et al. 1989). A thin algal film usually forms on the surfaces of oyster reefs and provides an additional source of primary production to consumers that live in the reef habitat (Bahr and Lanier 1981). Invertebrates are the most abundant consumers associated with oyster reef habitats. Of these invertebrates, arthropods, such as amphipods, brachyuran crabs, and caridean shrimp are the most abundant. Molluscs, aside from *C. virginica*, also inhabit the reefs with the dominant species are *Odostomia impressa* and *Ischadium recurvum* (Calnan et al. 1983). Oyster reefs are also one of the substrates that is most frequented by the commercially viable fished redfish *Sciaenops ocellatus* (Miles 1950). Birds are also primary consumers of oyster reefs (A. Drumright, unpubl. data), and feral hogs have also been reported using oyster reefs as crossings during low tides and they appear to forage as they cross (McAlister and McAlister 1993).

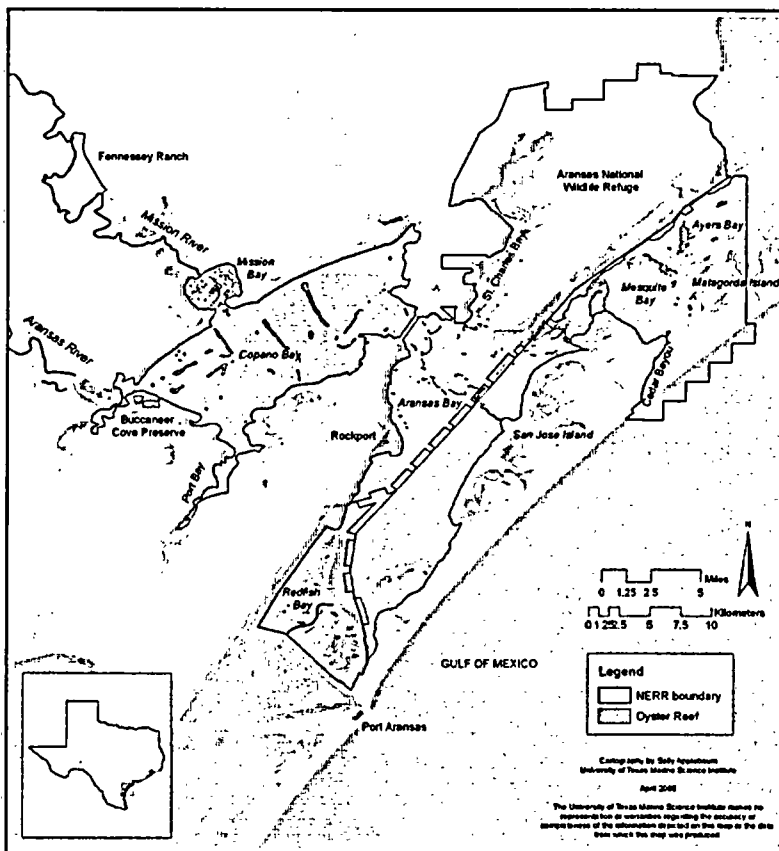


Figure 19. Location of oyster reefs in the Mission-Aransas NERR.

#### 4.7.2.3 Seagrass

Seagrass beds are critical coastal nursery habitat for estuarine fisheries and wildlife. They are also direct food sources for fish, waterfowl, and sea turtles, as well as major contributors of organic matter to estuarine and marine food web. Seagrass beds can act as stabilizing agents for coastal sedimentation and erosion, and also biological indicators of water quality and ecosystem health. Harbor Island and Redfish Bay contain the one of the most extensive area of pristine seagrass beds and comprises 6% abundance of all Texas seagrass (57 km<sup>2</sup>) (Table 8) (Pulich et al. 1997; 1999) (Figure 20). The TPWD currently operates a Seagrass Conservation Management Plan. Redfish Bay was established as a scientific area under this conservation management plan.

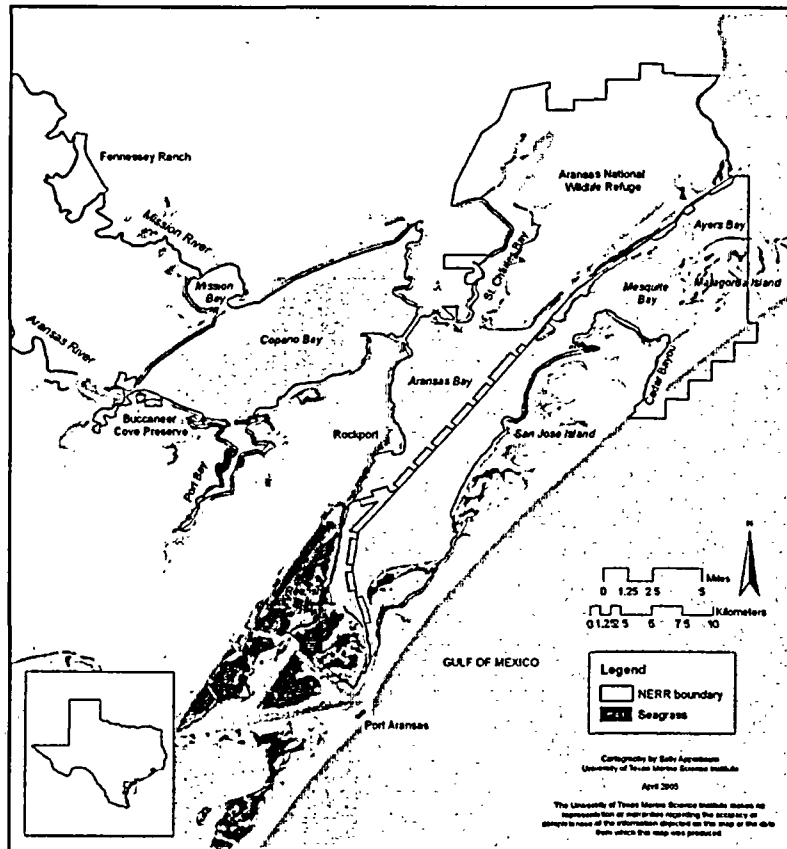


Figure 20. Location of seagrass beds in the Mission-Aransas NERR.

Table 8. Current status and trends in seagrass at proposed site (Pulich et al. 1999).

Bay System	Current Acreage	Percent of Coastwide	Species*	Trends
Copano	8000	3.4	Hd, Rup	Fluctuates with inflow
St. Charles			Hd, Rup	
Aransas			All five	
Nueces	24600	11.2	Hd, Rup	Acreeage stable, some bed fragmentation
Corpus Christi			All five	
Redfish			All five	

\*Hd - Halodule, Rup = Ruppia, Hph = Halophile, Th = Thalassia, Syr = Syringodium

#### 4.7.2.4 Plankton

Open-water habitats of the estuaries are subtidal and unvegetated, in which case primary production is dominated by phytoplankton. The phytoplankton community in the northern portion of the Mission-Aransas Estuary is dominated by blue-green and green algae, while the southern portion of the estuary is dominated by diatoms (Holland et al. 1975, Tunnell et al. 1996). In Aransas Bay, *Coscinodiscus* sp. is the dominant genera (Freese 1952). Average chlorophyll concentrations for the Mission-Aransas Estuary are 3.1 µg/L (Powell and Green 1992). High chlorophyll concentrations are found near Aransas Pass and Cedar Bayou gulf exchanges which may be caused by nutrient additions from adjacent estuaries (Powell and Green 1992). In Aransas Bay, the minimum abundance during summer is 6 cells/mL and the maximum abundance during the winter is 381 cells/mL (Armstrong 1987).

As principal consumers of primary production, zooplankton are abundant in open-water habitats. The dominant zooplankton in Mission-Aransas Estuary is the calanoid copepod *Acartia tonsa*, with 40 - 60% of total zooplankton abundance (Holland et al. 1975, Tunnell et al. 1996). Freshwater inflows have a large positive effect on zooplankton abundances in the Mission-Aransas and Nueces estuaries because these estuaries receive little inflow in terms of bay volumes (Powell and Green 1992).

#### 4.7.2.5 Nekton

Fish are the dominant secondary consumers and constituents of the nektonic community (Table 9). The dominant nekton species of Aransas Bay, based on a seven year study, are Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), bay anchovy (*Anchoa mitchilli*), hardhead catfish (*Arius felis*), pinfish (*Lagodon rhomboides*), and sand seatrout (*Cynoscion arenarius*) (Moore 1978). The TPWD has had a continuous monthly monitoring programs in place since 1977. Thus, an enormous amount of data is available for nekton.

Table 9. Abundance of estuarine species in Aransas and Corpus Christi Bay. Values are relative abundance of adults or juveniles in any salinity zone, in any month (Nelson et al. 1992).

Species	Aransas Bay	Corpus Christi Bay
Bay scallop	rare	rare
American oyster	low	low
Common rangia	rare	rare
Hard clam	low	low
Bay squid	low	low
Brown shrimp	high	high
Pink shrimp	low	low
White shrimp	medium	medium
Grass shrimp	medium	high
Blue crab	high	high
Gulf stone crab	low	low
Bull shark	low	low
Tarpon	rare	rare
Gulf menhaden	medium	medium
Gizzard shad	rare	low
Bay anchovy	high	high
Hardhead catfish	medium	medium
Sheepshead minnow	medium	medium
Gulf killifish	medium	low
Silversides	medium	medium
Snook	rare	rare
Bluefish	rare	rare
Crevalle jack	low	low



Species	Aransas Bay	Corpus Christi Bay
Florida pompano	low	low
Gray snapper	rare	rare
Sheepshead minnow	low	low
Pinfish	medium	medium
Silver perch	low	low
Sand seatrout	low	medium
Spotted seatrout	low	low
Spot	medium	medium
Atlantic croaker	medium	medium
Black drum	low	low
Red drum	low	low
Striped mullet	medium	medium
Code goby	low	low
Spanish mackerel	rare	rare
Gulf flounder	rare	rare
Southern flounder	low	low

#### 4.7.3 Terrestrial Habitats

Terrestrial habitats within the Mission-Aransas NERR include coastal prairies, oak mottes, spoil islands, riparian woodlands, tidal flats, and mangroves. All of these habitats provide shelter and food for many significant flora and fauna.

##### 4.7.3.1 Coastal Prairies

There are four types of coastal prairies in the Mission-Aransas NERR: 1) cordgrass prairie with gulf cordgrass (*Spartina spartinae*) and marshhay cordgrass (*Spartina patens*); 2) sand mid-grass prairie with seacoast bluestem and panamerican balsamgrass (*Elyonurus tripsacoides*); 3) clay mid-grass prairie with little bluestem (*Schizachyrium scoparium*) and trichloris (*Chloris pluriflora*); and 4) short-grass prairie with sliver bluestem (*Bothriochloa saccharoides*), buffalo grass (*Buchloe dactyloides*), and trichloris as dominants. Usually clumps of mesquite (*Prosopis glandulosa*), oak (*Quercus* sp.), huisache (*Acacia farnesiana*), and prickly pear cactus (*Opuntia lindheimeri*) are found in any these coastal prairies (McLendon 1991, Chaney et al. 1996).

##### 4.7.3.2 Tidal Flats

Wind-tidal flats are found along the bay sides of San Jose Island (Figure 21), deltas of the Mission and Aransas Rivers, and scattered along the bay margins of Copano and Redfish Bay (Withers and Tunnell Jr. 1998, Brown et al. 1976, Morton and McGowen 1980) (Figure 22). Wind-tidal flats are halophilic ecosystems generally inundated by wind and storm tides and are found at elevations between mean sea level (MSL) and 1 m above MSL. Wind-tidal flats major primary producers are mats of filamentous blue-green algae that support a large array of consumers of the blue-green algae. These flats are one of the most significant feeding

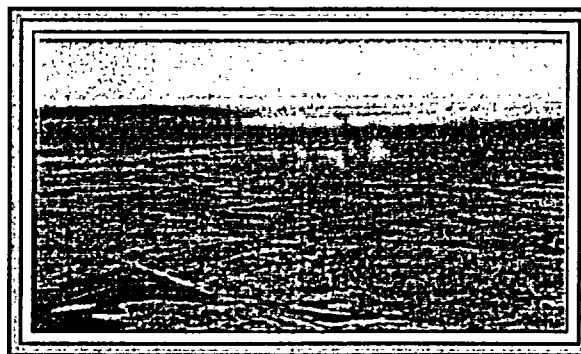


Figure 21. Image of tidal flats in the Mission-Aransas NERR.

areas for aquatic bird life on the Gulf coast. Tidal flats also act as flood basins which protect vegetation in adjacent bay habitats (Withers and Tunnell Jr. 1998).

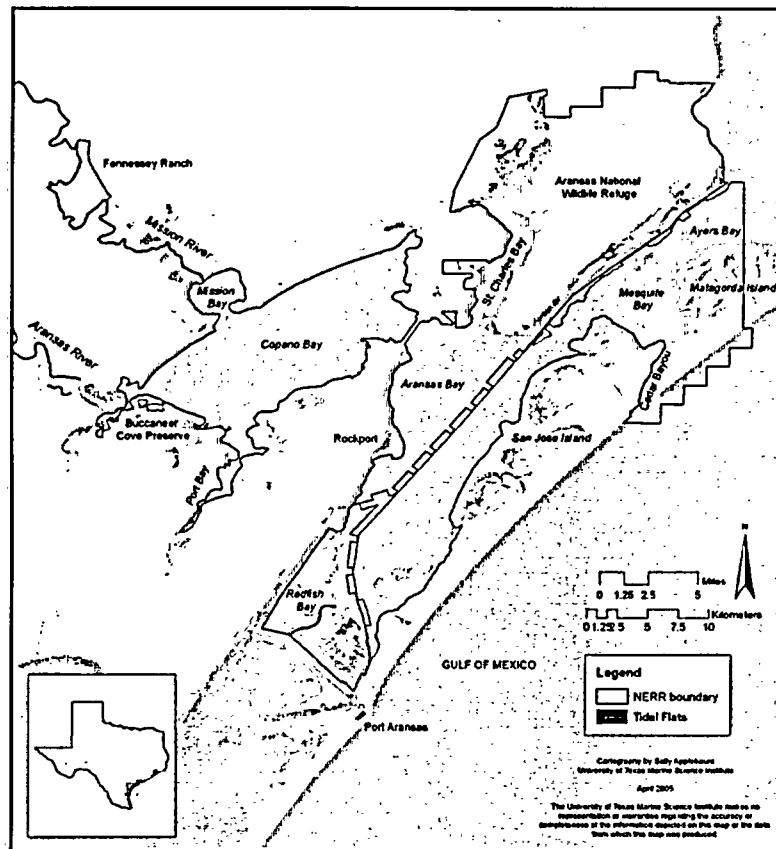


Figure 22. Location of tidal flats in the Mission-Aransas NERR.

#### 4.7.3.3 Mangroves

The black mangrove (*Avicennia germinans*) is the primary mangrove found in the Coastal Bend (Figure 23). Dense stands of black mangrove are found on Harbor Island in Redfish Bay and dominants approximately 600 hectares on this island. Black mangroves are also found in scattered stands on bay margins and islands in Redfish and Aransas Bay as well as along Matagorda and St. Joseph Island (Sherrod 1980) (Figure 24). Black mangrove stands are usually interspersed with *Spartina* spp., *Salicornia* spp., and *Batis* spp. (Sherrod and McMillian 1981). Seasonal freezes are the largest threat to black mangroves. A large freeze in 1989, decreased abundance of black mangrove stands, but since then populations have recovered (Everitt et al. 1996).

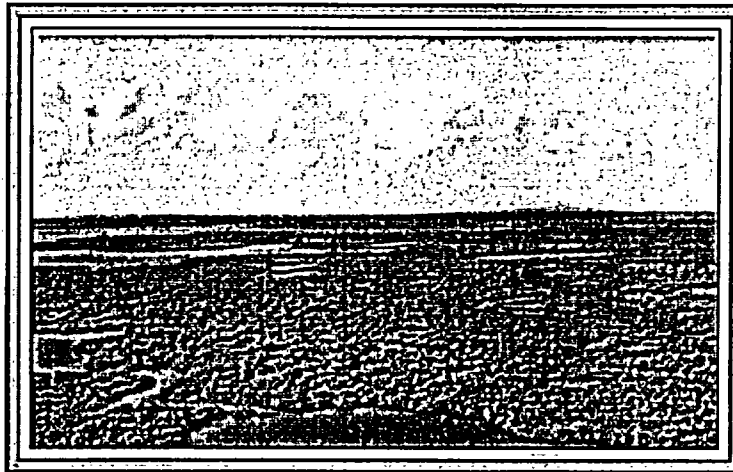


Figure 23. Image of mangrove stand in the Mission-Aransas NERR.

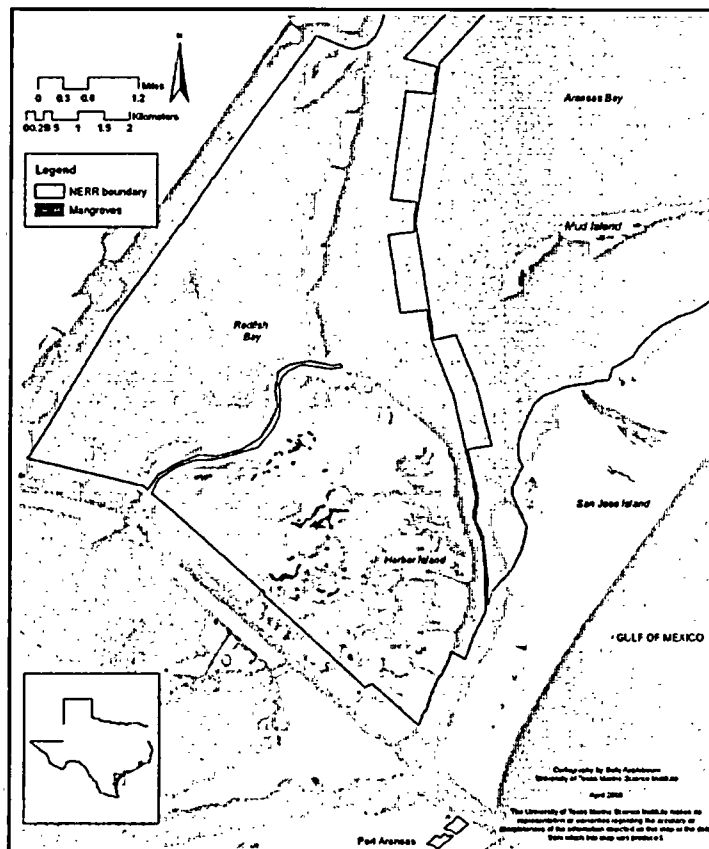


Figure 24. Location of mangroves in the Mission-Aransas NERR.

#### 4.7.3.4 Other Terrestrial Habitats

Oak mottes are isolated groves of live oaks (*Quercus virginiana*) that exist as remnants of oak forests that occurred on sand sheets and barrier islands (Figure 25). These mottes are interspersed with little bluestem, yaupon (*Ilex vomitoria*), beautyberry (*Callicarpa americana*), greenbriar (*Similax* sp.), mustang grape (*Vitis mustangensis*), and muscadine (*Vitis rotundifolia*) (Chaney et al. 1996).

Natural and dredged spoil islands are also present in the Mission-Aransas NERR (Figure 26). These islands are ideal nesting for several species of birds and usually contain plant communities of mesquite, salt cedar (*Tamarix* spp.), popinac (*Leucaena leucocephala*), granjeno (*Celtis laevigata*), and oleander (*Oleander* spp.) (Chaney et al. 1996).

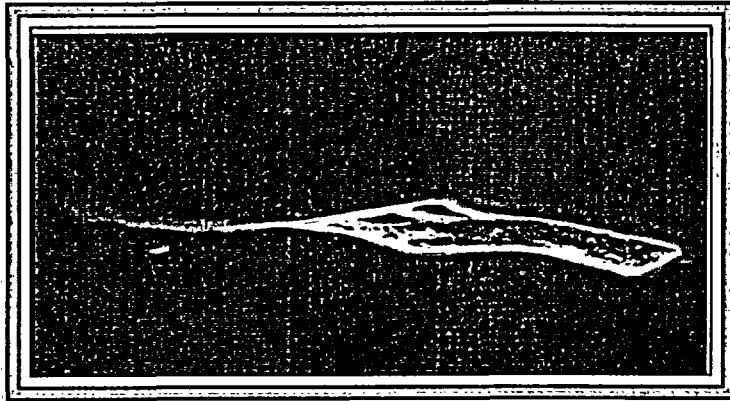


Figure 26. Spoil island within the Mission-Aransas NERR.

Riparian woodlands are found along rivers and streams and are important stopovers for migrating birds (Figure 27). These woodlands are communities of tall trees with a dense to sparse understory. The understory is usually dwarf palmetto (*Sabal minor*) and common trees are: anaqua (*Ehretia anacua*), cedar elm (*Ulmus crassifolia*), live oak, sugar hackberry (*Celtis laevigata*), net-leaf hackberry (*Celtis reticulata*), Mexican ash (*Fraxinus berlandieriana*), and black willow (*Salix nigra*) (Chaney et al. 1996).

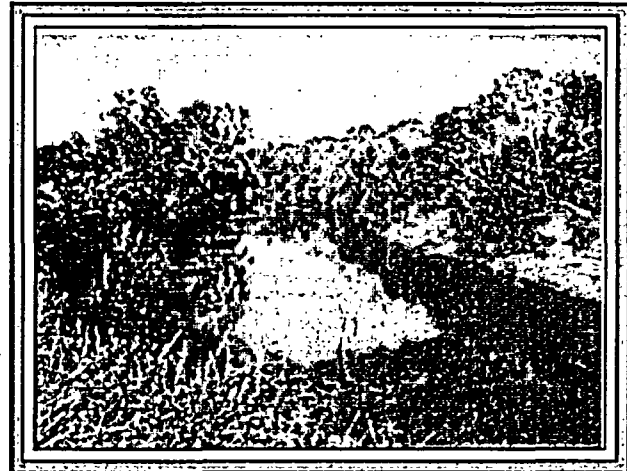


Figure 27. Riparian habitat found along the Mission River.

## 4.8 Significant Fauna and Flora

### 4.8.1 Birds

Birds are high level consumers of open-water habitats. Waders such as the great blue heron (*Ardea herodias*), reddish egret (*Egretta rufescens*), great egret (*Casmerodius albus*) and the tricolor heron (*E. tricolor*) frequent the peripheral areas of the bays. Floating and diving birds such as cormorants, loons, gulls, terns, and grebes feed on fish in the bays, while ducks such as the lesser scaup (*Aythya affinis*), redhead (*A. americana*), and ruddy duck (*Oxyura jamaicensis*) feed on benthic fauna and submerged vegetation (Tunnell et al. 1996). A common bird of prey to the Mission-Aransas area is the osprey (*Pandion haliaetus*), which nests along the shorelines and feed off fish from the open-water habitats (Armstrong 1987).

### 4.8.2 Mammals

The only resident mammal in the open-water habitat within the estuaries is the Atlantic bottlenose dolphin (*Tursiops truncatus*). This species is most frequently found in the Aransas Pass, shallow areas inside barrier islands and near shorelines (Barham et al. 1979). The winter populations in the area are often twice the size of the summer populations and are known to move against ebb and flood tides (Shane 1980).

### 4.8.3 Endangered Species

The Texas Parks and Wildlife Department (TPWD) and the U.S. Fish and Wildlife Service (USFWS) provided lists of threatened and endangered species that may occur in the Reserve. Table 10 lists Federally and State-endangered species and species of concern (SOC) that may occur in region of the Reserve. Species listed by the USFWS have confirmed sightings in Nueces, Refugio, Aransas, San Patricio, or Calhoun County. Statewide or area-wide migrants are also included. Inclusion in the list does not imply that a species is known to occur in the Reserve, but only acknowledges the potential for occurrence. State-endangered or threatened and federally- and state- listed SOC's have no legal status under Federal law and are not protected under the Endangered Species Act, however they are presented in this environmental impact statement.

Table 10. Listed species of concern, and endangered and threatened species within the proposed NERR site. USFWS<sup>1</sup> = US Fish and Wildlife Service, TPWD<sup>2</sup> = Texas Parks and Wildlife Department.

Common Name	Scientific Name	USFWS	TPWD
<b>Plants</b>			
South Texas ambrosia	<i>Ambrosia cheiranthifolia</i>	E	E
Lilia de los llanos	<i>Echeandia chandleri</i>	SOC	
Texas windmill-grass	<i>Chloris texensis</i>	SOC	
Black lace cactus	<i>Echinocereus reichenbachii</i> var. <i>albertii</i>	E	E
Slender rush-pea	<i>Hoffmannseggia tenella</i>	E	E
Welder machaeranthera	<i>Psilactis heterocarpa</i>	SOC	
Thieret's skullcap	<i>Scutellaria thieretii</i>	SOC	
Roughseed sea-purslane	<i>Sesuvium trianthemoides</i>	SOC	
<b>Fish</b>			
Opossum pipefish	<i>Microphis brachyurus</i>		T
<b>Amphibians</b>			
Sheep frog	<i>Hypopachus variolosus</i>		T
Black-spotted newt	<i>Notophthalmus meridionalis</i>	SOC	E
Rio Grande lesser siren	<i>Siren intermedia texana</i>	SOC	E
<b>Reptiles</b>			

Common Name	Scientific Name	USFWS	TPWD
American alligator	<i>Alligator mississippiensis</i>	TSA	
Loggerhead sea turtle	<i>Caretta caretta</i>	T	E
Texas scarlet snake	<i>Cemophora coccinea lineri</i>		T
Green sea turtle	<i>Chelonia mydas</i>	T w/CH†	T
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E w/CH†	E
Indigo snake	<i>Drymarchon corais</i>		T
Speckled racer	<i>Drymobius margaritiferus</i>		E
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	E w/CH†	E
Texas tortoise	<i>Gopherus berlandieri</i>		T
Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	E	E
Northern cat-eyed snake	<i>Leptodeira septentrionalis septentrionalis</i>		E
Texas diamondback terrapin	<i>Malaclemys terrapin littoralis</i>	SOC	
Gulf salt marsh snake	<i>Nerodia clarkii</i>	SOC	
Texas horned lizard	<i>Phrynosoma cornutum</i>	SOC	T
<b>Mammal</b>			
Maritime Texas pocket gopher	<i>Geomys personatus maritimus</i>	SOC	
Gulf Coast jaguarundi	<i>Herpailurus yagouaroundi cacomitli</i>	E	E
Southern yellow bat	<i>Lasiurus ega</i>		T
Ocelot	<i>Leopardus pardalis</i>	E	E
Atlantic Spotted Dolphin	<i>Stenella frontalis</i>		T
Rough-toothed Dolphin	<i>Steno bredanensis</i>		T
West Indian manatee (=Florida)	<i>Trichechus manatus</i>	E	E
<b>Insect</b>			
Maculated manfreda skipper	<i>Stallingsia maculosus</i>	SOC	
<b>Bird</b>			
Texas Botteri's sparrow	<i>Aimophila botterii texana</i>	SOC	T
Texas olive sparrow	<i>Arremonops rufivirgatus rufivirgatus</i>	SOC	
Aransas short-tailed shrew	<i>Blarina hylophaga plumbea</i>	SOC	
Mathis spiderling	<i>Boerhavia mathisiana</i>	SOC	
White-tailed hawk	<i>Buteo albicaudatus</i>		T
Zone-tailed hawk	<i>Buteo albonotatus</i>		T
Northern gray hawk	<i>Buteo nitidus maximus</i>	SOC	
Ferruginous hawk	<i>Buteo regalis</i>	SOC	
Northern Beardless-Tyrannulet	<i>Camptostoma imberbe</i>		T
Piping plover †	<i>Charadrius melodus</i>	T w/CH	T
Mountain plover	<i>Charadrius montanus</i>		
Black tern	<i>Chlidonias niger</i>	SOC	
Cerulean warbler	<i>Dendroica cerulea</i>	SOC	
Reddish egret	<i>Egretta rufescens</i>	SOC	T

Common Name	Scientific Name	USFWS	TPWD
American swallow-tailed kite	<i>Elanoides forficatus</i>		T
Northern aplomado falcon	<i>Falco femoralis septentrionalis</i>		E
American peregrine falcon	<i>Falco peregrinus anatum</i>		E
Arctic peregrine falcon	<i>Falco peregrinus tundrius</i>		T
Whooping crane †	<i>Grus americana</i>	E w/CH	E
Bald eagle †	<i>Haliaeetus leucocephalus</i>	T	E
Sennet's hooded oriole	<i>Icterus cucullatus sennetti</i>	SOC	
Audubon's oriole	<i>Icterus graduacauda audubonii</i>	SOC	
Loggerhead shrike †	<i>Lanius ludovicianus</i>	SOC	
Black rail	<i>Laterallus jamaicensis</i>	SOC	
Wood stork	<i>Mycteria americana</i>		T
Eskimo curlew	<i>Numenius borealis</i>		E
Rose-throated becard	<i>Pachyrhamphus aglaiae</i>		T
Brown pelican	<i>Pelecanus occidentalis</i>	E	E
White-faced ibis †	<i>Plegadis chihi</i>	SOC	T
Least tern †	<i>Sterna antillarum</i>	E	E
Sooty tern	<i>Sterna fuscata</i>		T
Attwater's greater prairie-chicken	<i>Tympanuchus cupido attwateri</i>	E	E

- 1 US Fish and Wildlife Service: E- Endangered; T- Threatened; SOC- Species of concern; CH- Critical habitat; CH†- Critical habitat proposed; † - Migratory; TSA- Threatened due to similarity of appearance. Because similarity of appearance of the Texas American alligator hides and parts are protected crocodilians, it is necessary to restrict commercial activities involving alligator specimens taken in Texas to ensure the conservation of the alligator populations, as well as other crocodilians that are threatened or endangered. (Personal communication with Mary Orms, USFWS Corpus Christi Ecological Services Field Office, updated April 7, 2004)
- 2 Texas Parks and Wildlife Department: E- endangered; T- threatened (Campbell 2003, and TPWD website).

One of the most well known endangered species that inhabits the Mission-Aransas NERR is the whooping crane. This species winters along the south Texas coast at the ANWR (Figure 28). Historically the winter range of the whooping crane extended from Mexico up to Louisiana. Extremely low populations of this species were first noticed in the late 1930's. The ANWR was established in 1937 and the whooping crane is making a comeback from a low of 15 birds in 1941 to individuals 185 in 2003 (Tom Stehn, personnel communication).

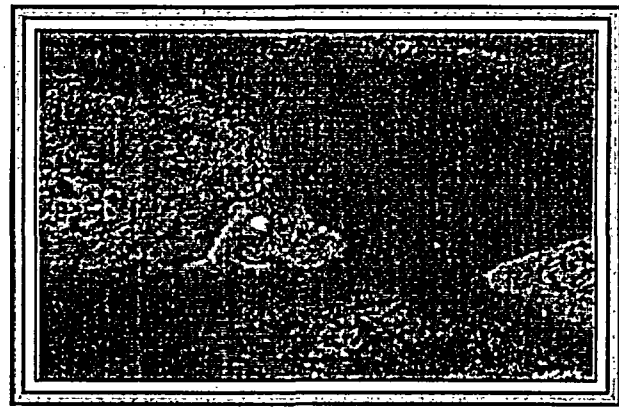


Figure 28. Whooping cranes on an isolated island in ANWR.

The brown pelican is also a well known endangered bird species that is present within the proposed site. Brown pelican populations began declining in the 1930's and numbers dropped dramatically between 1952 and 1957 (Tunnell et al. 1996). Less than 100 individuals were believed to be present on the Texas coast from 1967 to 1974 (King et al. 1977). The drastic decline in numbers were due to hurricanes, disease and pesticides. Populations have been increasing since the 1970's and the increase is correlated with the discontinued use of DDT in 1972, along with conservation efforts. The primary nesting sites for brown pelicans are located on the outskirts of the proposed site at Sundown Island in Galveston Bay and at Pelican Island in Corpus Christi Bay (Tunnell et al. 1996)

#### 4.9 Historical, Cultural and Archeological Resources

Karankawa, Tamaulipecan, and Coahuiltecan Indians are the first known inhabitants of the proposed site (Martin 1972, Hester 1980) (Table 11). It is estimated that they lived here for at least 20,000 years and disappeared by the mid-1800's. The Karankawan tribe and those within their linguistic family had the highest population within the proposed site with their range extending from Matagorda to Corpus Christi Bay (Hester 1980). There are several locations of archaeological sites from these tribes surrounding and within the proposed boundary (Hester 1980, Ricklis 1996) (Figure 29, Table 12). Analysis of these sites determined that tribes inhabited the large shoreline fishing camps from March to August and then moved inland to the smaller prairie-riverine hunting camps from September to March. Estuarine fauna, such as *Rangia* clams and fish, made up the bulk the diet at the shoreline camps, and large game, such as deer, made up the bulk of the diet at the inland camps (Ricklis 1996). Analysis of these archaeological sites have also determined that there have been three major periods of prehistoric fishery use: 1) about 7,500-7,000 YBP shellfish harvest, 2) Mid-Holocene about 5,900-4,200 YBP shellfish harvest and limited finfish harvest, and 3) Late Holocene after about 3,000 YBP heavy shellfish and finfish harvest (Ricklis 1993). The Corpus Christi Bay area was first discovered by Europeans in 1519, due to the efforts of Spanish Explorer Alonso de Pineda (CCBNEP 1996). The decline of indigenous populations correlates with arrival of Spanish settlers when the first trading posts were established during the 1700's. Development and industrialism continued in the region resulting in the present day society.

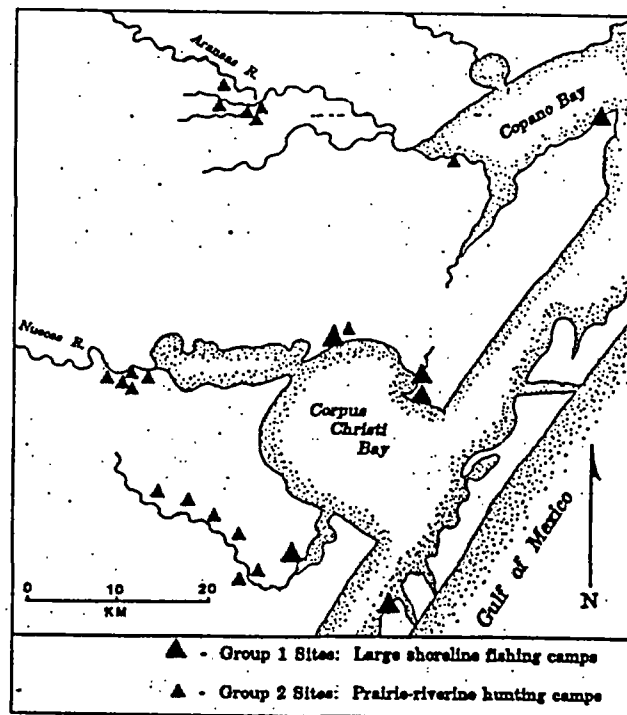


Figure 29. Locations of known large shoreline fishing camps (Group 1 sites) and smaller prairie-riverine camps (Group 2 sites) in Corpus Christi and Copano Bay. From *"The Karankawa Indians of Texas: an Ecological Study of Cultural Tradition and Change"* by Robert A. Ricklis, Copyright 1996. Courtesy of the University of Texas Press.



Sites of historical interest are also present in the proposed site. The Aransas Pass Lighthouse was established as a lighthouse in 1855, and is listed in the National Historical Registry. The lighthouse is located in the Lydia Ann Channel. It was seriously damaged during a Confederate attack in December 1862, in which the top twenty feet of the tower was destroyed. It was rebuilt in 1867 and was decommissioned in 1952 (Holland 1972). The current private owner had the light re-commissioned in 1988. The banks of the Cedar Bayou inlet also have remains of 19<sup>th</sup> century brickyards. At this site, large complexes of brick kilns, huge open cisterns, and associated brick foundations are present to account for relics of the industrial age (Fox 1983).

Table 11. Indian tribes of the South Texas coast.

Linguistic Family	Tribe	Range
Karankawan	Copane	Mission River, San Jose Island
Karankawan	Coapite	Goliad; San Antonio River
Karankawan	Coco	Nueces River to Brazos River
Karankawan	Cujan	Aransas and Copano Bays; San Jose Islands
Tamaulipecan	Malaguite	Nueces to Baffin Bay
Tamaulipecan	Araname	San Antonio River
Tamaulipecan	Lipan	Nueces to Baffin Bay
Coahuiltecan	Pajalache	San Antonio River, Gulf coast
Coahuiltecan	Piguique	Nueces River and coast
Coahuiltecan	Atanaguaypacam	Gulf Coast Bays
Coahuiltecan	Cacaxtle	South bend of Nueces River
Coahuiltecan	Chayopin	East of Nueces River, near coast
Coahuiltecan	Pajaseque	Near Corpus Christi Bay
Coahuiltecan	Pamoque	Mouth of Nueces River; Nueces and Corpus Christi Bays
Coahuiltecan	Papanac	Nueces River
Coahuiltecan	Pastaloca	Nueces River valley

Table 12. Archaeological sites presently known in the proposed Mission-Aransas NERR.

Site	Location	Site Type	Camp Type	Items Found
41CL3	Mustang Lake (ANWR)	Midden	Large shoreline fishing and hunting camp	Shells, fish bones, pot shards, animal bones, perforated oysters, shell tools, chert flakes
41CL84	North of Mustang Lake (ANWR)	Midden	Prairie-riverine hunting camp	Shells, fish bones, pot shards, animal bones, perforated oysters, shell tools, chert flakes
41CL48	South of Mustang Lake (ANWR)	Midden	Prairie-riverine hunting camp	Shells, fish bones, pot shards, animal bones, perforated oysters, shell tools, chert flakes
41SP159	Aransas River Mouth	Midden	Large shoreline fishing camps	Arrow points, small unifacial end scrappers, prismatic blades, pottery, Rangia clams, fish and animal bones
41SP160 thru 41SP171	Moody Creek (Aransas R.) flood plain	Midden	Prairie-riverine hunting camps	Cultural debris, Rangia clams, fish and animal bones

## 5.0 ENVIRONMENTAL CONSEQUENCES

### 5.1 General Impacts

The overall impact of designating the Mission-Aransas NERR and implementing the MP in the years to come will be environmentally beneficial and result in positive social, economic, and ecosystem impacts. From a national perspective, this will result in the establishment of the 27<sup>th</sup> NERR providing a more complete network of estuarine systems that represent the biodiversity found in the U.S. and its territories. Estuaries are heavily used for many purposes and subject to continuous degradation. The ability to focus research and increase an appreciation for the role and health of estuaries will help to achieve the national goals set forth in the CZMA, namely, to provide a stable environment for research and enhance public awareness and understanding of estuarine areas. Federal funds along with matching funds provided to the UTMSI will support increased and more coordinated efforts with its partners towards this end.

Impacts of the education and research programs will be positive (Figure 30). Pre-existing uses won't conflict with long-term research and education within the proposed reserve. Designation of the Mission-Aransas NERR will provide the opportunity to obtain better scientific information on which to accomplish a more comprehensive, integrated approach to the management of the Texas coastal ecosystems. Data and other information resulting from these programs will provide reserve managers, regulatory agencies and local and regional policy-makers with the necessary tools to make informed decisions that ensure the wise use and management of natural and estuarine resources. In this sense, designation could eventually lead to other resource management agencies modifying their regulatory practices and requirements because of research results, for example, the impact of certain activities at certain times of the year on water quality. This has been demonstrated in the past in the case where dredging operations associated with maintenance of the GIWW within the Aransas National Wildlife Refuge is held in abeyance during the presence of the whooping crane to ensure there is no disturbance to their winter habitat.

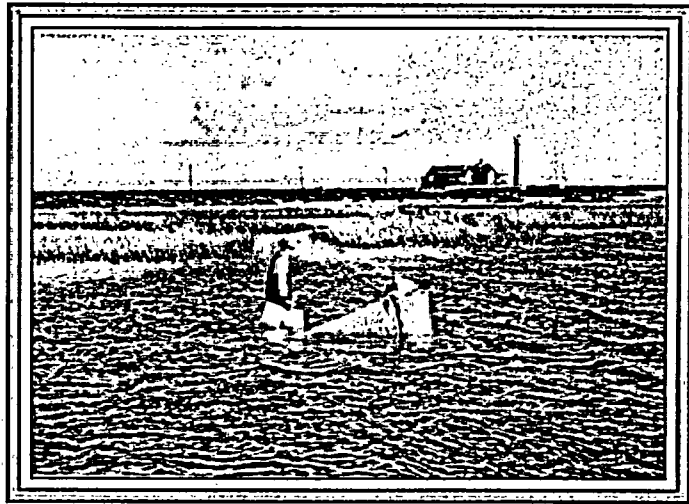


Figure 30. UTMSI researcher in view of the historic Aransas Pass Lighthouse.

Designation and MP implementation do not require prohibition on the traditional uses of the area (Attachment A, Appendix 2). Hunting, fishing, and oil and gas exploration and production will continue to be administered by the appropriate regulatory resource agencies. Important transportation corridors such as the GIWW along with the necessary dredge disposal sites, and the Copano Bridge corridor have been excluded from the boundaries of the Reserve. These corridors bisect the NERR site and will continue to be heavily used and modified/disturbed through maintenance activities. Designated core research areas are sufficiently protected to ensure a stable environment for research. Access to the area for recreation and education will be enhanced through the proposed visitor, welcome centers, and nature trails. (Attachment A, Section 6.0).

Construction of future facilities required to support NERR objectives for research and education will be relatively minimal. Anticipated construction of several support facilities will be on shore or within the reserve buffer areas and will result in minimal environmental disturbance as necessary. There will be little or no physical alteration of the present environmental conditions in the reserve except for those activities described in the Research and Monitoring Plan (Attachment A, Section 8.0). Any future projects after designation that may include construction will be reviewed and assessed for potential impacts according to NEPA procedures and within the context and scope of this programmatic environmental impact statement.

Establishment of the Reserve Advisory Board (RAB) upon NERR designation will help provide a mechanism to mitigate conflicts between uses within the reserve and guide the implementation of reserve programs. Resolution will be sought

through research, and discussion of the RAB members. All decisions by the RAB must be consistent with the NERRS MP and policies and with existing state and Federal regulations.

## 5.2 Specific Impacts

### 5.2.1 Natural Environment

Physical impacts on the natural environment through the designation of the Mission-Aransas NERR will be minor, including those areas within the buffer where the facilities will be located. No extensive habitat manipulations are planned based on designation of the NERR and limitations to the conduct of such activities apply (Attachment A, Appendix 1, Sec. 921.1.(d) Habitat Manipulation). Buildings and other facilities will be designed and constructed with minimal visual or environmental impact and as the MP suggests, as "green" as possible. UTMSI has been in the process for more than four years to expand their campus to include a Wetlands Education Center (WEC) (Figure 31). The expansion includes the restoration of a fishery and waterfowl (aquatic and wetland) habitat adjacent to their existing research and laboratory facilities. Appropriate permits and environmental assessment studies (Environmental Assessment and Finding of No Significant Impact, August 2003) have been undertaken by the U.S.

Army Corps of Engineers, Galveston District, under Section 206 Ecosystem Restoration Project authority (Water Resources Development Act of 1996, as amended). The expansion also includes a 5 year license to use the 9+ acres east of the University's property line bounded on the south by Cotter street and on the north by the south jetty. These leased acres can be used for habitat creation, ie dunes, staging the WEC construction, and eventually for an additional parking lot to support the increase in visitors to the WEC. This projected change to the campus would occur with or without NERR designation consequently no further assessment is necessary at this time. Once completed, however, this change will be incorporated into the overall NERR site designation. The project will incorporate tidal flushing of the wetlands, boardwalks to enhance access, creation of a new dune system, and provide enhanced research capabilities. This man-made created environment represents a portion of the estuarine ecosystem complex and will add significantly to the scientific and educational capabilities of the WEC and undoubtedly to the enjoyment of all who visit the future facility.

There will be temporary but minor impacts associated with the installation and use of instruments for research and data gathering. The National Estuarine Research Reserve System-wide Monitoring Program tracks short-term variability and long-term changes in estuarine waters to understand how human activities and natural events can change ecosystems. It provides valuable long-term data on water quality and weather at frequent time intervals. Usually, four automated data loggers are strategically placed in each NERR site (Figure 32). Coastal managers use this monitoring data to make informed decisions on local and regional issues, such as "no-discharge" zones for boats and measuring the success of restoration projects. The reserve system currently measures physical and chemical water quality indicators, nutrients and the impacts of weather on estuaries. Reserve research policies indicate that: "all field work will be performed in the least destructive way with minimal or no impact on the environment, and when a destructive impact of significant size to the environment is unavoidable, restoration of the impact is required (Attachment A, Section 8.0).

The University of Texas at Austin Marine Science Institute, the lead state agency for the Reserve, will hold the conservation easement for Fennessey Ranch. The easement will protect native plants, animals, or plant communities on Fennessey Ranch and prevent any use that will significantly impair or interfere with the conservation values and assure

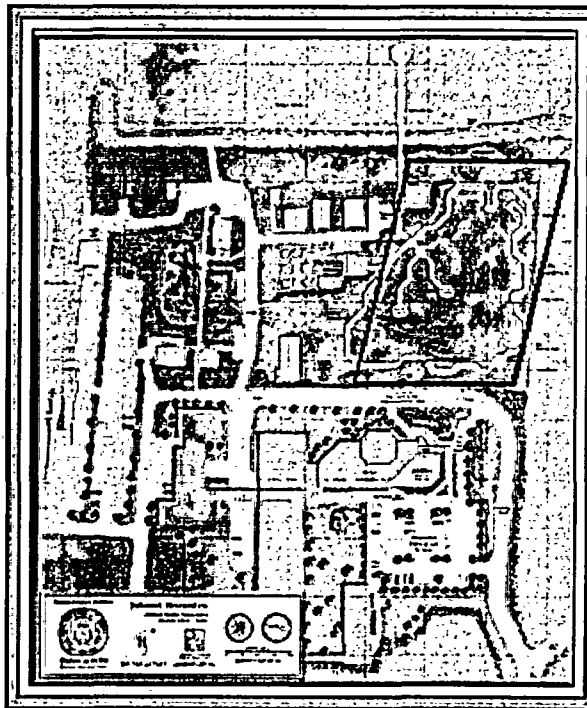


Figure 31: Diagram of proposed additions to Wetland Education Center.

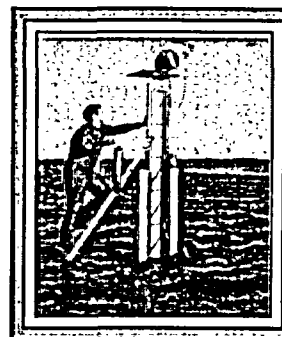


Figure 32. Typical NERR data logger.

that traditional uses are compatible with the conservation values of Fennessey Ranch. The conservation easement will ensure that future water manipulation or restoration projects, such as the Fennessey Ranch Mitigation Bank Proposal, be reviewed and approved on a project basis by Reserve staff. Other management practices on Fennessey Ranch, such as grazing and brush control, will be subject for review by Reserve staff through a five year revision of the Fennessey Ranch management plan. Consequently, at this time no additional assessment is made of specific impacts that might be generated for projects that are not approved at this time in the MP.



Figure 33. Scientific observation and data entry.

As a result of reserve designation, research programs will be better coordinated. Better coordination of research programs will promote a multi-disciplinary understanding of estuaries in general and, specifically, the Mission-Aransas Estuary (Figure 33). This will also assist in a greater understanding of the life cycles of commercially important species within the ecosystem, natural or anthropogenic changes to the system, and provide more comprehensive information potentially leading to better management decisions by responsible resource and regulatory agencies.

Organized educational opportunities and efforts will also be created upon reserve designation. Expansion of the current programs and newly developed programs will encourage local school and citizen participation from South Texas, which leads to a greater understanding and appreciation of estuarine systems. Increased awareness often fosters a sense of stewardship toward the natural environment and a desire to protect and preserve the flora and fauna within the ecosystem.

#### 5.2.2 Human Environment

The research and educational activities outlined in the MP will help address current management issues through a better understanding of estuarine processes. Designation of this Reserve will provide an opportunity for long-term scientific observations. Future studies can begin to address the spatial and temporal scales essential to support informed management practices and decisions. The site's boundaries encompass a large portion of an intact coastal watershed that includes both estuarine and adjacent non-estuarine areas. As such, the site's size will ensure an adequate level of conservation and management.

Developing educational and interpretive activities that bring scientific research into the public sector will be a strong component of this reserve. As our society becomes more aware of the need to protect the environment, it is important to involve teachers and students in the process of scientific research (adjacent Text Box). The Reserve will serve as an outdoor classroom for direct experiences with science. Currently, there exist a variety of marine science education programs at the UTMSI that target selected adult groups such as K-12, teachers, and the retired general public. Additional programs designed for local decision makers will also logically benefit from the site. Increased public awareness also may have a positive economic benefit for the region leading to new opportunities for ecotourism and other activities compatible with reserve goals. It is not unusual for NERR sites to see a 10 fold increase in student and visitor visitations to NERR facilities. As the MP points out, approximately 67,000 students were involved in NERRS education programs in 2002 and nearly 2,000 K-12 educators were involved in professional development programs offered at NERR sites (Attachment A, Section 9.0).

#### Alabama High School Sea Grass Restoration Day at the Weeks Bay National Estuarine Research Reserve

On Tuesday, April 19, 2005, thirty-five Gulf Shores High School students teamed up with staff from the Weeks Bay National Estuarine Research Reserve to restore underwater grass beds near Fairhope, Alabama. The students planted *Vallisneria americana*, or tape grass, one of five common species of submerged aquatic vegetation (SAV) in Weeks Bay. The planting project is a culmination of several local efforts to restore native underwater grasses from the damaging impacts of coastal runoff containing high levels of nutrients and toxic pollutants, boat propellers, and dredging. Submerged grasses are a critical food source and protective habitat in coastal waters. The leaves and roots provide excellent food sources for aquatic birds, fish, and invertebrates, and sea grass beds provide refuge from predators and wave action.

Recent example of students working with Alabama NERR staff in an educational restoration project. (NOAA)

Designation of this reserve will also increase collaborations among Texas universities and colleges. Designation will create a focal point for estuarine studies and increase the amount of funding opportunities for researchers from Texas universities and colleges. The availability of two national fellowships, local fellowships, and travel assistance to Texas scientists will further help develop strong partnerships among Texas universities and colleges.

#### 5.2.2.1 State and Federal

Although many state and Federal resource protection programs and regulatory requirements exist, improved measures at coordination between the different responsible agencies and/or the programs designed to protect and manage the resources is often a goal. Establishment of the Mission-Aransas NERR will facilitate bringing these programs together through the Reserve Advisory Board and advisory committees to consider comprehensive management needs of the estuary, its resources and resource users without the need for establishing new regulations or programs. The ability to identify research priorities and coordinate research work among the various partners is a potential benefit of program approval. NERRS provides opportunities for greater collaboration in research, education and outreach between agency programs. As pointed out in the draft Memorandum of Understanding (MOU) between the UTMSI and the cooperating parties-in-interest, nothing in the MOU diminishes their independent authority, respective statutory or legal obligations. However, their purpose of participating in the program is to "assist Reserve land managing entities to develop site-specific activities consistent with the MP" including "identifying and conserving sensitive ecological resources, promoting on-site research and long term monitoring, engaging local communities in stewardship activities that support the conservation of sensitive reserve resources" (Attachment A, Appendix 4).

#### 5.2.2.2 Socioeconomic Impacts

The Texas area is largely rural; the designation of the Mission-Aransas NERR will have little direct impact on the communities within the site (Table 13). The majority of the land surrounding the proposed site is used for agriculture and rangeland for cattle. Land use around the Mission-Aransas Estuary is divided into six categories: developed lands, cultivated lands, grasslands, woodlands, shrublands, and bare lands.

Table 13. Estimated population density in counties surrounding the Mission-Aransas Estuary. Data generated from the U.S. Census Bureau, <http://www.census.gov/>. Area and persons per square mile are calculated based on census data from the year 2000.

County	2003 Population Estimate	Area, Square Miles	Persons per Square Mile
Aransas	23,574	252	89.3
Calhoun	20,454	512	40.3
Refugio	7,625	770	10.2
San Patricio	68,050	692	97.1
Nueces	315,206	836	375.3
State of Texas	22,118,509	261,797	79.6

San Patricio County, which encompasses a very small portion of the site including Buccaneer Cove Preserve and the southern tip of Port Bay, has the highest percentage of cultivated lands followed by Refugio and Aransas County, respectively. The Aransas River watershed includes Chiltipin Creek and other unnamed tributaries which drain approximately two-thirds of San Patricio County including the cities of Sinton, Odem, and Taft. This drainage includes more than 250,000 acres of intensely managed cotton and grain sorghum row crop farms. Much of the Aransas River watershed lies within the land holdings of the Welder Wildlife Foundation (7,800 acres), whose primary purpose is wildlife management and conservation. In contrast, Aransas County has the highest percentage of both bare lands and developed lands. Most bare lands in this area are delineated as bay shoreline beaches, creating a significant tourism focus in the county and extensive urban development. Refugio has the most rural land use of the three counties, with the majority of the land identified as agriculture or ranching; limited urban development is centered around the towns of Refugio, Woodsboro, Bayside, Tivoli, and Austwell. The city of Corpus Christi with a population of over 250,000 is the largest city in the area and as a result, the Nueces Estuary generally has more anthropogenic activities than the

Mission-Aransas or Baffin Bay-Laguna Madre Estuary (Montagna et al. 1998). The Port of Corpus Christi is the sixth largest port in the United States, making marine transportation a dominant industry in the area. The Port of Corpus Christi houses several facilities including: liquid bulk docks, cargo terminals, Rincon Industrial Park, Ortiz Center, and a cold storage terminal. All ship traffic enters through the Aransas Pass, which lies just south of the proposed site.

Designation of the reserve will not result in new regulations and no adverse economic impact will occur to existing uses. The primary existing uses within the proposed reserve include oil and gas activities, recreational and commercial fishing, ground and surface water withdrawal, tourism, and shipping (Table 14).

**Table 14. Annual economic estimates for the state of Texas of the primary uses within the proposed reserve.**

Industry	Amount	Estimated Value	Year and Source
Commercial Finfish	6,317,800 lbs.	\$8,023,500	1997, TPWD
Commercial Shellfish	71,811,800 lbs.	\$181,142,300	1997, TPWD
GIWW shipping	63,390,000 short tons	\$25,000,000,000	2002, TxDOT
Oil Production	390624005 bbl	\$496,111,400 in tax	2004, RRC and Texas Comptroller
Gas Production	5952623117 mcf	\$1,392,436,142 in tax	2004, RRC and Texas Comptroller

Estuaries along the Gulf of Mexico, including Texas, are rich in oil and gas deposits. Every estuary in the Western Gulf of Mexico Biogeographic Sub-region has oil and gas wells and pipelines. Much of the past production in the Mission-Aransas Estuary has been depleted. However, recent testing indicates that there is interest in deeper exploration and drilling in the area. As drilling technology continues to improve, deeper and deeper depths become prospective. Currently, the Mission-Aransas Estuary has a low number of current leases and little production in comparison to all other estuaries along the Texas coast. The Mission-Aransas Estuary has the second lowest number of leases, and Aransas county has the second lowest production rates in comparison to all Texas coastal counties.

Recreational and commercial landings of finfish, shrimp, and shellfish appear to be on an upward trend in the Mission-Aransas Estuary. Abundance of finfish, shrimp, and blue crab harvests were nearly equal to each other from 1972 - 1976. After 1976, the percentage of finfish harvests began to decrease in relation to shrimp and blue crab harvests. After 1981, and up to the present time, shrimp harvests increased in relation to finfish and blue crab harvests, and are now the major fishery for the Mission/Aransas estuary (Robinson et al. 1994).

There are several small watersheds in the Reserve. Most of these watersheds drain into Copano Bay, but one drains into Port Bay and one drains into St. Charles Bay. The Mission and Aransas Rivers are small and primarily coastal compared to other rivers in Texas. About 40% of all the water used in Texas is supplied by surface water structures. The cities and towns in the region of the Mission-Aransas Estuary are largely served by the City of Corpus Christi and ground water (well-water) systems. The City of Corpus Christi operates two dams on the Nueces River, and is the major water wholesaler to municipal and county water resellers. Neither the Mission River nor the Aransas River has dams, or is used as water supplies for cities in the region. Groundwater supplies 60% of the water used in Texas, but 81% of that use is for irrigation. The watersheds lie above the vast Gulf Coast Aquifer, which stretches the length of the entire coastal plain of Texas. The Gulf Coast Aquifer represents 15% of the groundwater in Texas and is the second largest aquifer after the Ogallala. Groundwater conservation districts are just in the beginning phases of operation in this region.

The proposed reserve has a large tourism economy due to accessible beaches, abundant recreational fishing opportunities, and a high diversity of bird species. Designation of the reserve may increase tourism to the urban centers of Corpus Christi, Refugio, and Rockport from the presence of the planned NERR facilities.

The Gulf Intracoastal Waterway (GIWW) is a major industrial water transportation canal that bisects Aransas Bay within the proposed site. The waterway is economically imperative to the Texas Coast because it facilitates transporting petrochemicals and agricultural as well as industrial products that would otherwise be too costly or impossible transport by road. The Copano Bay Causeway bisects the NERR between Aransas and Copano Bay. There are also numerous state roadways adjacent to the NERR boundary. These roadways include state highways, farm to market roads, and park roads. There will be no impact on GIWW or Corpus Christi Ship Channel commerce or the use of dredge spoil islands with

designation of the Reserve. At the request of the USACOE and the TxDOT, major transportation corridors (GIWW, Lydia Ann Channel, and Channels to Rockport and Little Bay) were excluded from the boundary. The ship channel and the majority of dredge spoil islands (600 yards west of the intracoastal) are outside of the proposed boundary. In addition, traditional uses including the disposal of dredge material will continue because they are outside the NERR boundary. Thus, the proposed reserve is adjacent to (but does not include) the GIWW, and no adverse economic or marine navigational impacts will occur.

#### **5.2.2.2.1 Tax Revenue Impacts**

No change in the tax status of the lands comprising the Reserve will result from designation of the site as a NERR. Hence, no taxes will be lost. Any future acquisitions of private in holdings within the reserve would result in minimal loss of tax revenue. The use of conservation easements to protect areas from future development, could result in some foregone economic opportunities should land be valued for development purposes.

#### **5.2.2.2.2 Traffic and Institutional Impacts**

It is anticipated that there will be a slight increase in traffic with the establishment of the Mission-Aransas NERR. The increase, however, should not be significant and adverse impacts to the site would be minimal. Reserve visitor traffic will be directed to the UTMSI visitor center. This could result in additional traffic going through the streets of Port Aransas to the WEC. The location will serve as the main contact point for visitors to receive introductory information about the reserve. Reserve staff will coordinate with other educational groups to minimize traffic impacts. Other sites (ANWR, Fennessey Ranch, the Aransas Bay Multi-purpose Public Outreach Facility in Rockport, etc) are all likely to see an increase in visitors in the years to come leading to some increase in traffic but not likely to cause congestion problems for local residents.

Apart from increased traffic to and from the NERR facilities, few adverse impacts are expected. The development of on-site educational and research programs will, however, have a potentially large impact on the local and regional school systems and research communities. Research facilities throughout the state of Texas will also benefit from the site. Although exact estimates of the economic benefits to the area are not available, it is not expected to be large due to the rural character of the area and the increased draw of tourism.

#### **5.2.2.3 US Army Corps of Engineer Permits**

Reserve designation can potentially impact on a few proposed future activities if they require Federal permits including those issued by the USACOE in wetlands and waterways.

There are three permits that one can use to carry out construction-like activities: nationwide permit (NWP), general permit, or individual permit. NWPs are pre-approved permits for activities that have already been approved by state and Federal levels. Designation of a NERR will affect some NWPs, because under General Condition 25, a NERR site is defined as a "designated critical resource water". Designation of a NERR will not affect general or individual permits. General permits are pre-approved permits for specific activities that have already been approved at the state level. Some of these include permits for piers 14392(05), and spur jetties 17466(02), 14533(04) (<http://www.swg.usace.army.mil/reg/permitgp/general.asp>). Individual permits are required for activities that exceed the thresholds of NWP or for those that the district engineer identifies after preconstruction notification process. The individual permit requires that a public notice be sent to organizations, such as TCEQ, who can comment on the permit within 30 days of the notice. Once the NERR is designated, a representative from the NERR will likely be on this mailing/notification list (Lloyd Mullins, personal communication).

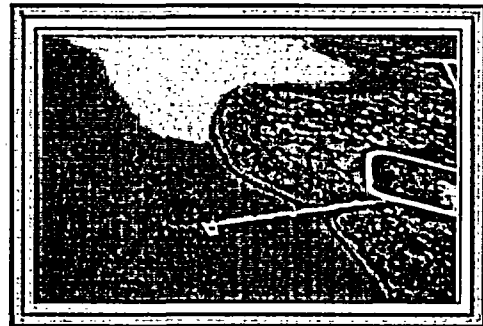


Figure 34. Oil and gas related facilities in estuary.

Designation of a NERR will mean that some NWP activities will require a preconstruction notification (PCN) to the district engineer (Federal Register / Vol. 67, No. 10 / January 15, 2002 / Notices, <http://www.usace.army.mil/inet/functions/cw/ccwo/reg/2002nwps.pdf>). A PCN requires that the permittee submit



notification to the District Engineer before construction. Submittal of the PCN may include several requirements, such as delineation of affected aquatic sites. The District Engineer has 30 days to ask for additional requirements and can only do so once. If the permittee does not receive written notice from the District Engineer within 45 days then the permittee can proceed with the activity. After the PCN requirements are approved by the district engineer, there is a 45-day waiting period for comments. During the 45-day waiting period, Federal and State agencies can submit comments to the district engineer concerning compliance with the terms and conditions of the NWP and the need for mitigation to reduce the project's adverse environmental effects to a minimal level. If the activity will result in a loss of greater than 1/2-acre of water, the District Engineer will personally notify appropriate agencies (USFWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO), and, if appropriate, the NMFS). When this occurs, these agencies have 10 days to indicate that they intend to provide substantive, site-specific comments. If contacted by an agency, the District Engineer will wait an additional 15 calendar days before making a decision on the notification. A decision by the District Engineer may include modification of the activity or mitigation. The following activities are those that will require a PCN with the designation of a NERR:

- NWP 3 - Maintenance
- NWP 8 - Oil and Gas Structures
- NWP 10 - Mooring Buoys
- NWP 13 - Bank Stabilization
- NWP 15 - U.S. Coast Guard Approved Bridges
- NWP 18 - Minor Discharges
- NWP 19 - Minor Dredging
- NWP 22 - Removal of Vessels
- NWP 23 - Approved Categorical Exclusions
- NWP 25 - Structural Discharges
- NWP 27 - Stream and Wetland Restoration Activities
- NWP 28 - Modifications of Existing Marinas
- NWP 30 - Moist Soil Management for Wildlife
- NWP 33 - Temporary Construction, Access and Dewatering
- NWP 34 - Cranberry Production Activities
- NWP 36 - Boat Ramps
- NWP 37 - Emergency Watershed Protection and Rehabilitation
- NWP 38 - Cleanup of Hazardous and Toxic Waste
- NWP 41 - Reshaping Existing Drainage Ditches

Some of these activities (NWP 3, 13, 18, 27, 33, 34, 37, 38, 41) under certain conditions require a PCN regardless of NERR designation. Most of the activities listed above (NWP 3, 10, 13, 15, 19, 28, 34, 36, 38, and 41) will occur in areas excluded from the NERR boundary, so no change will be required. However two activities may occur within the boundary (NWP 8 and 22), and a PCN for these activities would be required with NERR designation.

Designation of a NERR site will also mean that discharges of dredged or fill material will not be authorized by some NWPs (Federal Register / Vol. 67, No. 10 / January 15, 2002 / Notices, <http://www.usace.army.mil/inet/functions/cw/cecwo/reg/2002nwps.pdf>). Discharges from the following activities will not be allowed within the NERR boundary:

- NWP 7 Outfall structures and maintenance
- NWP 12 - Utility line activities
- NWP 14 - Linear transportation Projects
- NWP 16 - Return Water From Upland Contained Disposal Areas
- NWP 17 - Hydropower Projects
- NWP 21 - Surface Coal Mining Activities
- NWP 29 - Single-family Housing
- NWP 31 - Maintenance of Existing Flood Control Facilities
- NWP 35 - Maintenance Dredging of Existing Basins
- NWP 39 - Residential, Commercial, and Institutional Developments
- NWP 40 - Agricultural Activities
- NWP 42 - Recreational Facilities
- NWP 43 - Stormwater Management Facilities
- NWP 44 - Mining Activities

UTMSI is not aware that any of these activities have ever occurred within the proposed boundary of the NERR site. Many of these activities can not occur on water. The other activities would occur only along shorelines, which are already excluded from the NERR site. Thus, the NERR designation will have no effect on NWP.

### **5.2.3 Cumulative Impacts**

As opposed to many EIS project analyses, the preferred alternative in this document does not propose any action that would significantly disrupt the landscape. There will be no change in land ownership, and current uses of the bay will continue under present regulatory authorities. Reserve designation is largely an administrative action.

The new reserve will increase attention to research and education uses of the site. There are already several research and educational programs in the area. On field outings, large numbers of visitors could have detrimental effects on fragile habitats. Rather than adding to the impacts of these groups, the reserve will seek to reduce the cumulative impacts by promoting guide/teacher training and coordinating access.

A major focus of the proposed Texas NERR research program will be to monitor biological and physical variables of the bay. These variables will provide the long-term baseline data against which the reserve may assess environmental changes over time, be they anthropomorphic or natural trends in the ecosystem. Enhancing our understanding of the spatial and temporal processes in the system will support informed management practices and improve stewardship of coastal natural resources in the future. These cumulative impacts from reserve designation are beneficial.

Regionally, the NERR designation will make UTMSI a center for estuarine research and education in South Texas. Thus, the reserve will serve resource users, coastal decision-makers, educators and visitors throughout South Texas.

Nationally, the cumulative impact of the Mission-Aransas NERR designation is to further NOAA's mission of establishing a complete system of reserves in all biogeographic subregions and estuarine types in the United States.

### **5.3 Unavoidable Adverse Environmental or Socioeconomic Impacts**

Because of the nature of this Federal action, it is anticipated that adverse environmental or socioeconomic impacts will be minimal, nonexistent or avoidable. Future construction of NERR facilities should minimally impact surrounding environments. The reserve MP does not attempt to change existing local, state or Federal laws/regulations relating to current and traditional uses. There will be continued growth and development surround the Reserve and possibly in the Reserve such as future oil and gas exploration and development activities but these are unrelated to the Reserve and MP. The MP is designed to encourage good stewardship and better understanding of the estuarine resources. Currently, there will be no change in land ownership or of tax revenue with the designation of the Mission-Aransas NERR. Future donations or acquisitions could result in a change in land use (e.g., donated wetlands or agriculture lands change to conservancy or preservation use) but these changes would not be considered adverse. The plan can only be rewritten or the boundaries changed with a complete public review process using NOAA guidelines.

### **5.4 Relationship between the Proposed Action on the Environment and the Maintenance and Enhancement of Long-term Productivity**

The stated purpose of the NERR program is to guarantee the long-term stability of the natural resources for research and education. All traditional uses of the area will continue under present regulations. There will be no exploitative use of the natural resources at the expense of long-term productivity or continued public use; nor will there be any recognizable negative consequences on the natural resources from establishment of the reserve. In fact, by providing education and support for applied research, establishment of the reserve has the potential to foster ecosystem productivity through improved resource stewardship and informed decision making. Designation of the reserve also empowers the reserve staff to research, maintain and potentially improve the ecosystem's productivity.

### **5.5 Irreversible and Irretrievable Commitment of Resources**

The designation of the Mission-Aransas NERR and implementation of the MP should not result in any irreversible or irretrievable commitment of environmental resources. No environmental change is anticipated or permitted through the program (other than minor disturbances associated with research). The Mission-Aransas NERR will be operated and

managed with advice of the land holding partners. Each of these partners has a vested interest in the NERR in the form of land ownership, or in terms of conserving natural resources. This partnership is voluntary. Any partner could, if they choose, withdraw from the partnership. However, MOU's specifying the relationships between the partners and each partner's commitment to the reserve have been developed and are available to review in the MP. It is not anticipated that this arrangement will result in a withdrawal of resources. No significant construction is anticipated except for those structures outlined in the facilities plan. Sport and commercial fishing, shellfish and game harvesting, oil and gas operations, and other traditional uses will continue under current regulatory authorities, but are not activities associated with the NERR implementation or management. It is one of the goals of the program through better understanding of the estuarine ecosystem to ensure appropriate agencies, decision makers and the public have better science to help ensure irreversible or irretrievable commitment of resources does not occur.

#### **5.6 Possible Conflicts Between the Proposed Action and the Objectives of Federal, State, Regional, Local, and Native Land Use Plans, Policies and Controls for the Areas Concerned**

It is not anticipated that establishment of the Reserve will conflict with the objectives of Federal, state, regional or local land use plans, policies or controls for the areas concerned. The MP described the activities that take place in and around the Reserve and the authorities that govern those uses (Attachment A, Appendix 2). The majority of land comprising the Mission-Aransas NERR is currently under Federal and state ownership with small, private in holdings. Staff will coordinate with these and adjacent private landholders on an as needed basis to address any issues that may arise after the Reserve is designated. Any advice or action will be consistent with NERRS, local, state or Federal regulations or policies. The Reserve will schedule meetings as necessary with the various landholders to share ideas, promote efficiency, and resolve conflicts. Core research sites are protected through the GLO leases where parcels that have been designated as seagrasses, coastal wetlands, tidal flats are identified and included as Coastal Natural Resource Areas (CNRAs) where future activities must avoid, minimize, restore, enhance, protect or mitigate for impacts. Consequently, reference core sites should not be subject to competing requests such as from oil and gas activities.

##### **5.6.1 The Texas Wetlands Conservation Plan**

The Texas Wetlands Conservation Plan was initiated in 1994 to focus on nonregulatory, voluntary approaches to conserving Texas' wetlands. Although development of the Texas Wetlands Conservation Plan ("the Plan") was coordinated by Texas Parks and Wildlife Department, the Plan is intended as a guide for wetlands conservation efforts throughout the state. The Plan focuses on:

- Enhancing the landowner's ability to use existing incentive programs and other land use options through outreach and technical assistance;
- Developing and encouraging land management options that provide an economic incentive for conserving existing wetlands or restoring former ones; and,
- Coordinating regional wetlands conservation efforts.

This conservation plan will be used when designing programs that affect the wetlands in the Mission-Aransas NERR such as on the Fennessey Ranch. Further information on the Texas Wetlands Conservation Plan for Texas can be found on the TPWD website (<http://www.tpwd.state.tx.us>).

##### **5.6.2 The Coastal Bend Bays Plan**

The Coastal Bend Bays Plan was developed in 1998 by the Corpus Christi Bay National Estuary Program (CBBEP 1998a). This plan is a long-term, comprehensive management tool designed to complement and coordinate existing resource management programs and plans. Fifty specific actions were developed in the plan to address human uses, maritime commerce and dredging, habitat and living resources, water and sediment quality, public education and outreach, and freshwater resources. The plan coordinates resource management of the Coastal Bend Estuaries, which include (Mission-Aransas, Nueces, and the Upper Laguna Madre). This bays plan will be used by the proposed Reserve when designing programs that affect the Mission-Aransas Estuary.

##### **5.6.3 The Mission-Aransas Watershed Wetland Conservation Plan**

The Wetlands Conservation Plan was developed in 1999 to:

- 1) Provide voluntary alternatives for local government and public use;

- 2) Facilitate the meeting of local government with natural resource agency personnel, academic staff, and non profit organizations, and
- 3) Develop goals, objectives, and alternatives to serve as tools for local government, and economic/ecologic planning (Smith and Dilworth 1999).

This conservation plan will be used by the proposed reserve when designing programs that affect the Mission-Aransas Watershed.

#### **5.6.4 The Seagrass Conservation Plan**

The Seagrass Conservation Plan for Texas was finished in 1998 by the lead agencies of TPWD, GLO, and TCEQ. This conservation plan prioritizes issues affecting the health and quality seagrasses and was used to identify and help implement strategies and actions to protect seagrasses. Some of those strategies and actions that were developed in the conservation plan include:

- Determine status and trends of seagrass beds on a regular basis
- Public education and outreach
- Coordination of the permit review process between GLO, TCEQ, USFWS, NMFS, and USACOE
- Establishment of coastal preserve areas to protect seagrass habitat
- Coordination of watershed management programs to protect seagrass habitat

This conservation plan will be used by the proposed reserve when designing programs that affect seagrass habitat. Further information on the Seagrass Conservation Plan for Texas can be found on the TPWD website (<http://www.tpwd.state.tx.us/texaswater/coastal/seagrass/conservation.phtml>).

### **5.7 Compliance with Other Environmental and Administrative Review Requirements**

The approval of the Reserve and MP and award of future financial assistance are Federal actions subject to authorities such as the National Environmental Policy Act, Endangered Species Act, and the Federal consistency provisions of the CZMA. NOAA is responsible for ensuring that projects comply with these and other relevant authorities. Compliance with these authorities will result in few environmental, social, and economic negative impacts.

#### **5.7.1 National Flood Insurance Program (NFIP) and Executive Order 11988, Floodplain Management**

The NFIP prohibits the use of funds for acquisition or construction of buildings in special flood hazard areas in communities that are not participating in the Flood Insurance Program, as identified in the NFIP's Community Status Book. Any future construction of buildings or facilities that use NOAA funds will be subject to review and compliance with appropriate building standards should such structure be located in a flood hazard area. E.O. 11988 directs Federal agencies to evaluate the potential effects of proposed actions on floodplains. Many actions associated with the Reserve will occur in the waters or surround lands in floodplains in order to achieve their research, monitoring or educations objectives. However, these are considered to be temporary or minor and not contribute to increased future flood damages.

#### **5.7.2 Coastal Barriers Resource Act (CoBRA)**

In order to receive Federal funds, all proposed projects located on undeveloped coastal barrier islands designated in the CoBRA system must be consistent with the purposes of minimizing: the loss of human life; wasteful Federal expenditures; and damage to fish, wildlife, and other natural resources. No adverse impacts as a result of implementation of the MP or expended funds are anticipated to occur to undeveloped barrier islands. San Jose Island is privately owned and not included in the Reserve and portions of Matagorda Island are under the control of the U.S. Fish and Wildlife Service and not subject to future development. Some future studies under the NERRS program may result in studies to help determine the important role of undeveloped coastal barrier islands on interior

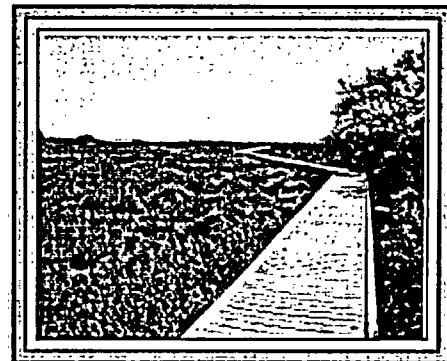


Figure 35. New boardwalk in ANWR allowing public to view wildlife.

estuarine ecosystems. Future NERR related projects may assist public access and viewing (Figure 35, example of construction) but will meet CoBRA requirements.

#### **5.7.3 Endangered Species Act**

Neither program implementation or Federal funding of activities will negatively impact any endangered or threatened species listed under the Endangered Species Act (ESA). The purpose of the Reserve and NERRS is to conduct research, monitoring, finding solutions to problems plaguing estuarine environments such as invasive species, diseases, and improved scientific knowledge and understanding. Some future studies will likely focus on endangered or threatened species within the Reserve but researchers are required to follow appropriate research protocols when conducting such studies. In some cases, a new boardwalk providing access to the public will encourage some encroachment into habitat by the public but under controlled conditions with appropriate signage to educate the participant in observing nature. The U.S. Fish and Wildlife Service that manage the Aransas National Wildlife Refuge to protect the whooping crane and other species are a Reserve partner and will help to ensure research and construction activities will meet the requirements of the ESA.

#### **5.7.4 Magnuson-Stevens Fishery Conservation and Management Act**

The Magnuson-Stevens Act requires that Federal agencies consult with NMFS regarding any action authorized, funded, or undertaken that may adversely affect essential fish habitat (EFH) for federally managed fish. The Reserve will have positive impacts on EFH by improving the science associated with better understanding the important role of EFH. Should any form of manipulative research in the future be undertaken in EFH that has the potential to cause temporary adverse impacts within EFH, appropriate consultations between the granting agency and NMFS Office of Habitat Conservation will be undertaken to avoid, minimize or offset any adverse impacts associated with the research or monitoring ensuring no long-term or cumulative impacts result from the research. Any consultation procedures will follow the procedures outlined at 50 CFR 600.920. Reserve research policy requires researchers to have secured all outside approvals/permits (Federal/State) prior to obtaining written approval from the research coordinator.

#### **5.7.5 Coastal Zone Management Act (CZMA) and Consistency**

The proposed Mission-Aransas NERR is within the boundary of the Texas Coastal Management Program (TCMP). The TCMP maintained the coastal management plan (CMP), which is based primarily on the Coastal Coordination Act of 1991 (33 TEX. NAT. RES. CODE ANN. §201 et. seq.) as amended by HB 3226 (1995), which calls for the development of a comprehensive coastal program based on existing statutes and regulations. Key elements of the Coastal Coordination Council and its implementation regulations (31 TAC §§ 501-506) detail the general provisions, goals and policies, boundaries, state procedures, and Federal procedures for the Coastal Management Plan. NOAA's Office of Ocean and Coastal Resource Management approves coastal management plans under the authorization provided by the Coastal Zone Management Act. On January 10, 1997, the state of Texas received Federal approval of the CMP (62 Federal Register pp. 1439-1440). The proposed Mission-Aransas NERR is consistent to the maximum extent practicable with the Texas coastal management program (Attachment A) (15 C.F.R. Part 921.13(a12)).

Section 307 of the CZMA requires that Federal activities (to include financial assistance projects) should be certified by coastal states and territories with approved coastal management programs under the Act that the activity is consistent with the enforceable policies of the program. Prior to the Reserve approval, annual grants being awarded, future acquisitions or construction projects associated with Reserve implementation, all proposals must be certified by the Texas Coastal Management Agency that such activities are consistent with the policies of the respective coastal management programs.

The TCMP has closely followed the nomination process and is represented on the Reserve Advisory Board and will be the recipient of much of the data and studies undertaken in the Reserve. Analysis of the proposed action by NOAA finds that designation of the Mission-Aransas Estuary as a NERR site will help the TCMP achieve many of its goals, including goals 1, 2, 4, 5, 8, 9, and 10. The results of future research, monitoring, and education/outreach efforts will potentially have positive impacts or influences on all of the Coastal Natural Resource Area (CNRA) found within the Reserve and have potential transferability of information useful to other CNRA's throughout the State. NOAA concludes that the proposed Federal action is consistent to the maximum extent practicable with the approved TCMP.

### 5.7.6 National Historic Preservation Act (NHPA)

Under the provisions of Section 106 of the National Historic Preservation Act of 1966, the Secretary of the Interior has compiled a national register of sites and buildings of significant importance to USA history (Figure 36). The Reserve and associated activities will not impact registered sites or buildings on shore or any such submerged site that might alter or deface such a site. The draft Coastal Lease (Attachment A, Appendix 5) has a specific provision requiring the UTMSI to cease any operation if site, object, location, or artifact of archaeological, scientific, education, cultural, or historical interest is encountered during their activities and to notify the proper authorities so that appropriate action can be taken to protect or recover the findings.

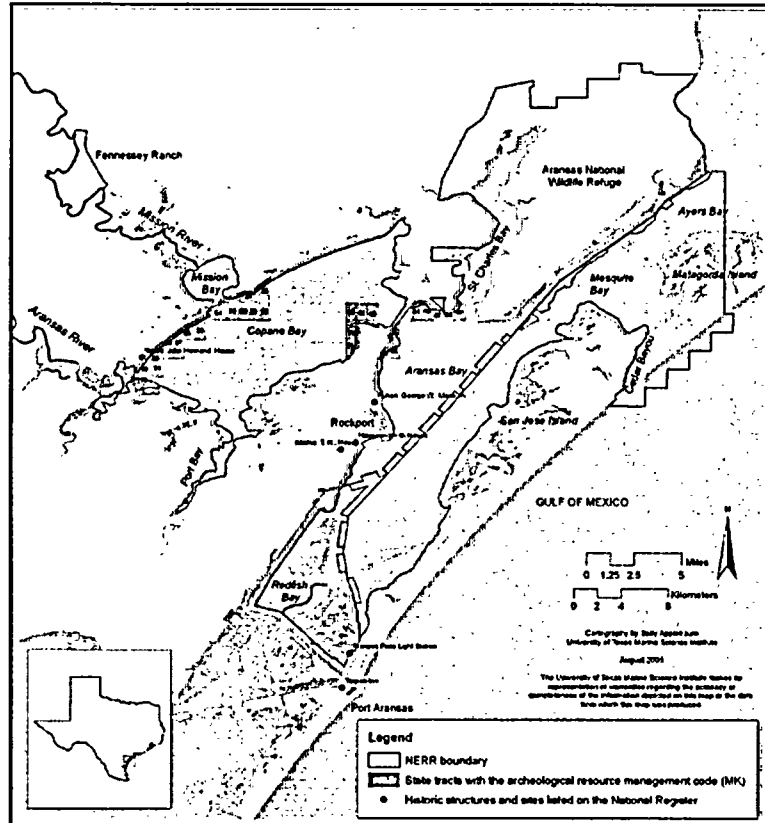


Figure 36. Locations of historic structures and sites listed on the National Register and General Land Office state tracts with the archeological resource management code.

### 5.7.7 Environmental Justice

Consistent with the President's Executive Order on Environmental Justice (Feb. 11, 1994) and the Department of Commerce's Environmental Justice Strategy, the designation of the Mission-Aransas NERR will not have disproportionately adverse human health or environmental effects on minority or low income populations. No action will displace minority or low-income populations but many of the actions such as the education program to bring K-12 children to the Reserve will benefit all populations with active measures being taken into consideration to ensure that all schools have the opportunity to visit specific sites and participate in educational activities.

### 5.7.8 Executive Order 12866

Implementation of the Reserve and MP does not constitute a "significant regulatory action" as defined by Executive Order 12866 because: (1) it will not have an annual effect on the economy of \$100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities; (2) it will not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) it will not materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; and (4) it will not raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

## 6.0 COORDINATION AND CONSULTATION WITH OTHERS

This document is a product of the combined efforts and inputs of numerous individuals. Dr. Sheldon Ekland-Olson (Executive Vice President and Provost), Dr. Juan Sanchez (Vice President for Research), Dr. Mary Ann Rankin (College of Natural Sciences Dean), Ms. Mary Abell (College of Natural Science), Ms. Joni Goan (University of Texas Office of Sponsored Projects), and Ms. Gwen Grigsby (The University of Texas System) provided advice and consultation throughout the environmental impact statement and management plan process to help navigate through Federal, State, and University policies and procedures.

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The scoping meetings began with a brief introduction by UTMSI director Lee Fuiman. The introduction was followed a description of the environmental impact statement process by Ben Mieremet of NOAA. Laurie McGilvray of NOAA then gave an overview of the NERR system, which was followed by a description of the Mission-Aransas NERR process by Dr. Paul Montagna from UTMSI. A question and answer session was then facilitated by Ben Mieremet. Court reporters were present at all three meetings to accurately document public comment and concerns raised.

## **7.0 LIST OF PREPARERS**

**Richard B. "Ben" Mieremet**  
Senior Program Analyst  
B.S. Conservation and Resource Development  
M.S. Water Resources Management  
M.A. International Relations  
Coastal Programs Division  
Office of Ocean and Coastal Resource Management  
National Ocean Service/NOAA  
Phone: (301) 713-3155 ext. 233  
E-mail: ben.mieremet@noaa.gov

**Matthew Chasse**  
Program Specialist  
B.A. Environmental Science  
M.S. Environmental Science & Policy  
Estuarine Reserves Division  
Office of Ocean and Coastal Resource Management  
National Ocean Service/NOAA  
Phone: (301) 713-3155 ext. 248  
E-mail: matt.chasse@noaa.gov

**Dr. Paul Montagna**  
Research Professor  
B.S. Biology  
M.Sc. Biology  
Ph.D. Biology  
University of Texas at Austin  
Marine Science Institute  
Phone: (361) 749-6779  
Email: paul@utmsi.utexas.edu

**Sally Applebaum**  
Research Assistant  
B.S. Marine Biology  
M.S. Marine Science  
University of Texas at Austin  
Marine Science Institute  
Phone: (361) 749-6771  
Email: sallym@utmsi.utexas.edu



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### **Attachment A. Draft Mission-Aransas NERR Management Plan**

- Appendix 1. National Estuarine Research Reserve System Federal Regulations**
- Appendix 2. Detailed information about activities on lands/waters and existing resource protection**
- Appendix 3. Draft Memorandum of Understanding between UTMSI and NOAA**
- Appendix 4. Draft Memorandum of Understanding between UTMSI, GLO, USFWS, CBLT, Fennessey Ranch, TPWD, TxDOT, CBBEP, and Aransas County**
- Appendix 5. Draft Coastal Lease for Scientific Purposes from GLO to UTMSI**
- Appendix 6. Information on Key Reserve Partners in the RAB**
- Appendix 7. Letters from property owners requesting removal of the 1000' boundary set back**
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- Appendix 9. Fennessey Ranch Acquisition Plan**
- Appendix 10. Youth environmental training area facilities at Aransas National Wildlife Refuge**

# **ATTACHMENT A**

## **Draft Management Plan**

### **TEXAS NATIONAL ESTUARINE RESEARCH RESERVE: Mission-Aransas Estuary**



#### **Prepared by:**

University of Texas at Austin Marine Science Institute  
750 Channel View Drive  
Port Aransas, Texas 78373

**August 2005**

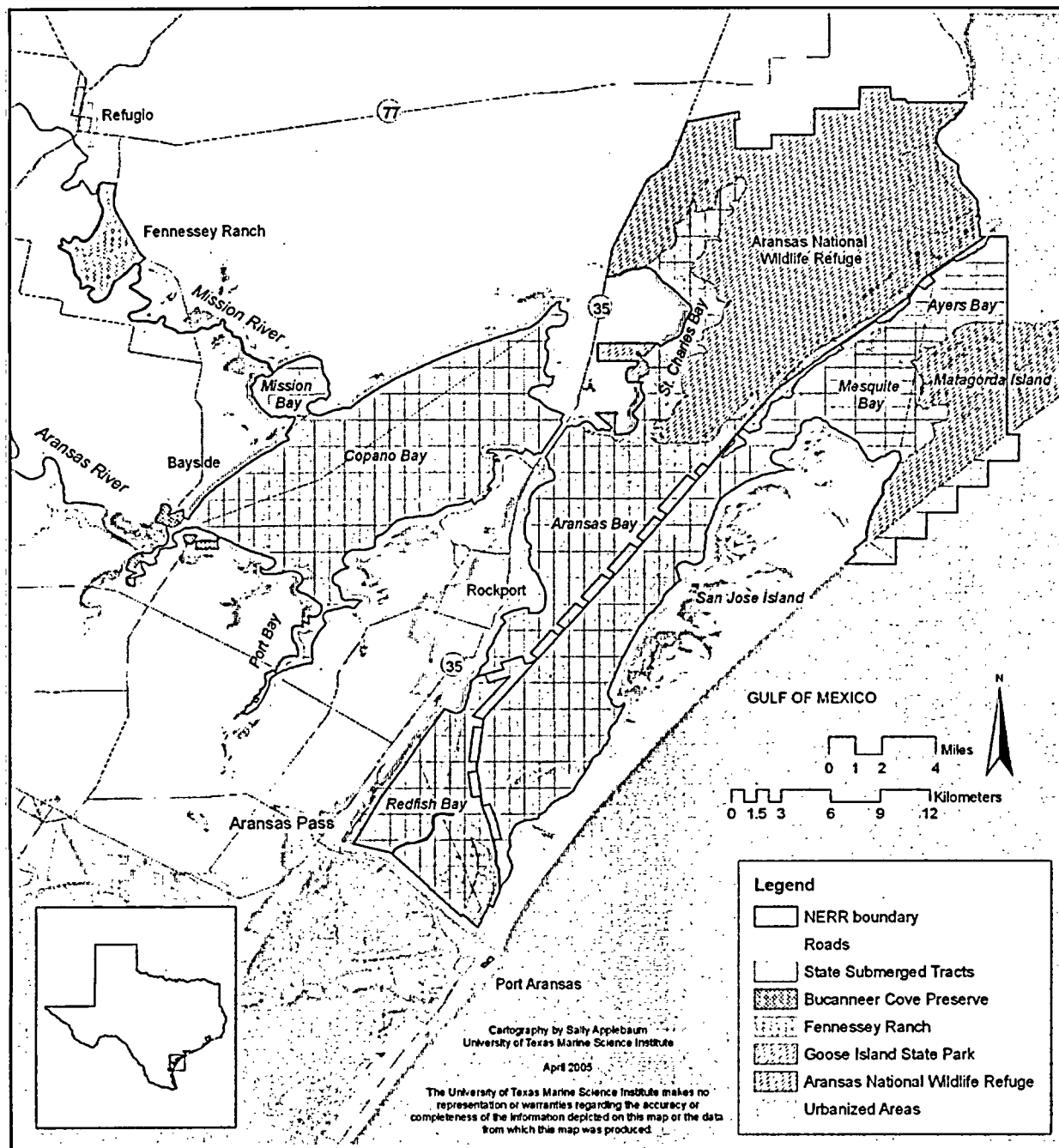
#### **Submitted to:**

National Oceanic and Atmospheric Administration  
National Ocean Service  
Ocean and Coastal Resource Division  
Estuarine Reserves Division  
1305 East-West Highway  
Silver Spring, Maryland 20910

This management plan has been developed in accordance with NOAA regulations, including all provisions for public involvement. It is consistent with the congressional intent of Section 315 of the Coastal Zone Management Act of 1972, as amended, and the provisions of the Texas Coastal Management Program.

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# Mission-Aransas National Estuarine Research Reserve





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## **LIST OF ACRONYMS**

ANWR	Aransas National Wildlife Refuge
CBLT	Coastal Bend Land Trust
CCA	Coastal Conservation Association
CCBNP	Corpus Christi Bay National Estuary Program
CFR	Code of Federal Regulations
CMP	Coastal Management Plan
CNRAs	Coastal Natural Resource Areas
CZMA	Coastal Zone Management Act
ERD	Estuarine Reserves Division
GIS	Geographic Information System
GIWW	Gulf Intracoastal Waterway
GLO	Texas General Land Office
K-12	Kindergarten through twelfth grade
MOU	Memorandum of Understanding
MRRP	Monofilament Recovery & Recycling Program
NERR	National Estuarine Research Reserve
NERRS	National Estuarine Research Reserve System
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRCS	Natural Resources Conservation Service
OCRM	Ocean and Coastal Resource Management
PSF	Permanent School Fund
RRC	Texas Railroad Commission
SLB	School Land Board
SWMP	System-wide Monitoring Program
TAMU	Texas A&M University
TAMU - CC	Texas A&M University - Corpus Christi
TCOON	Texas Coastal Oceanic Observation Network
TCEQ	Texas Commission of Environmental Quality
TNC	The Nature Conservancy
TNRIS	Texas Natural Resources Information Service
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
USACOE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTMSI	University of Texas at Austin, Marine Science Institute
YETA	Youth and Environmental Training Area

## EXECUTIVE SUMMARY

The State of Texas has proposed to designate the Mission-Aransas Estuary as a National Estuarine Research Reserve (NERR). With passage of the Coastal Zone Management Act of 1972, the federal government officially recognized the national significance of coastal resources and authorized the federal Coastal Zone Management Program (CZMP) and the National Estuarine Research Reserve System (NERRS). In response to the CZMP, the state of Texas established the Texas Coastal Management Program (CMP), which was federally approved by National Oceanic and Atmospheric Administration (NOAA) in 1997. The Texas CMP coordinates state, local, and federal programs for the management of Texas coastal resources. Both the CZMP and NERRS are administered by NOAA. Since 1972, twenty-six estuaries have been designated as part of the NERR system. The NERRS works with existing federal and state authorities to establish and operate research reserves and provide for their long term stewardship. The State of Texas has designated the University of Texas at Austin, Marine Science Institute as the State Lead Agency for the Reserve.

Research and education are the main focus of the NERRS. Major goals are to: (1) ensure a stable environment for research through long-term protection of National Estuarine Research Reserve resources, (2) address coastal management issues identified as significant through coordinated estuarine research within the System, (3) enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation, (4) promote federal, state, public and private use of one or more Reserves within the System when such entities conduct estuarine research, and (5) conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

The mission of the Mission-Aransas National Estuarine Research Reserve is to develop and facilitate partnerships that enhance coastal decision making through an integrated program of research, education, and stewardship. The mission will enable us to fulfill the vision that the Mission-Aransas National Estuarine Research Reserve will be a center of excellence to create and disseminate knowledge necessary to maintain a healthy Texas coastal zone. There are three goals that will be used to support the Reserve mission: (1) improve knowledge of Texas coastal zone ecosystems structure and function, (2) promote understanding of coastal ecosystems by diverse audiences, and (3) promote public appreciation and support for stewardship of coastal resources.

The Mission-Aransas NERR (200,137 acres or 810 km<sup>2</sup>) is located in the Mission-Aransas Estuary. The lands within the Reserve are managed by a combination of state, federal and private entities. The Texas General Land Office own the majority of submerged lands (bays and open water) within the site (129,567 acres). The United States Fish and Wildlife Service own the Aransas National Wildlife Refuge, including Matagorda Island, which contains beach, estuarine marsh, and non-tidal coastal plain habitat (66,216 acres). The Texas Parks and Wildlife Department owns the Goose Island State Park (271 acres). Other private landholders with include the Coastal Bend Land Trust and Fennessey Ranch. The Coastal Bend Land Trust owns the Buccaneer Ranch Cove Preserve (728 acres), which includes a diverse suite of estuarine and non-estuarine habitats (many of high quality) that form an intact coastal watershed. Fennessey Ranch (3,324 acres) is composed of native tree/brush, prairie, freshwater wetlands, and Mission River riparian corridor. The Mission-Aransas Estuary also includes a number of archaeological sites (i.e., Indian middens) and supports significant faunal and floral components. The site is relatively rural with limited industrial and community impacts.

The Mission-Aransas NERR will be administered by the University of Texas at Austin, Marine Science Institute (31 acres), the lead agency for the proposed reserve. Other key state partners of the Reserve include the Texas Department of Transportation (TxDOT), Coastal Bend Bays and Estuary Program, and a local governmental representative mutually agreed upon by Aransas County and the City of Rockport. The TxDOT own the intracoastal waterway that bisects the Reserve. Designation of the Mission-Aransas NERR will not introduce new state or federal regulations, nor will it alter traditional uses of the area. Current uses include boating, fishing, hunting, mining (gas and oil), shellfish harvesting, camping and other recreational activities.

## 1.0 INTRODUCTION

The management plan describes how the Mission-Aransas National Estuarine Research Reserve (NERR) will be managed by the University of Texas at Austin, Marine Science Institute (UTMSI). Upon designation, the proposed Mission-Aransas NERR shall be called the Reserve. This management plan is a compilation of subject specific plans that describe the management of the Reserve. The management plan entails how the Reserve will manage administration. The plan also describes the existing resource protection of areas within the proposed boundaries and areas adjacent to the boundary. A boundaries/acquisition plan describes the criteria, description and rationale of the boundary, as well as core and buffer areas, and future acquisitions/boundary expansion opportunities. The stewardship plan describes programs within the stewardship sector, which include site profile and ecological characterization of the Reserve, coastal training program, land management coordination, restoration and mitigation initiatives, animal rescue, and other specific types of programs and collaborations. The public access plan describes the National Estuarine Research Reserve System (NERRS) priorities for public access, the Reserve public access policy, present public access, and access needs. The facilities/construction plan describes the existing facilities and potential facility sites, facility needs, and a facility plan. The research and monitoring plan describes the research goals of the NERRS, National Oceanic and Atmospheric Administration (NOAA) research and monitoring funding priorities, background and research priorities of the Reserve, research and monitoring plan goals, objectives, and actions of the Reserve, policies and priorities, research and monitoring plan development, users and audience, evaluation and coordination procedures, research opportunities, cooperative efforts, and funding opportunities. The education/interpretation/outreach plan describes the education/interpretation/outreach goals of the NERRS, national guidelines and policies for education, background and education priorities of the Reserve, educational goals, objectives, and actions of the Reserve, framework of education, interpretation and outreach programs, existing UTMSI marine education programs, users and audience, types of programs, coordination of educational and outreach programs and initial priorities, and a needs assessment and evaluation. The volunteer plan describes the goals, objectives and actions of the Reserve volunteer program, the structure and coordination, and existing volunteer programs.

### 1.1 NERRS Mission and Goals

The National Estuarine Reserve System was created by the Coastal Zone Management Act (CZMA) of 1972, as amended, 16 U.S.C. Section 1461, to augment the Federal Coastal Zone Management (CZM) Program. The CZM Program is dedicated to comprehensive, sustainable management of the nation's coasts. The reserve system is a network of protected areas established to promote informed management of the Nation's estuaries and coastal habitats. The reserve system currently consists of 26 reserves in 21 states and territories, protecting over one million acres of estuarine lands and waters.

#### Mission

As stated in the NERRS regulations (Appendix 1), 15 C.F.R. Part 921.1(a), the National Estuarine Research Reserve System mission is:

*the establishment and management, through Federal-state cooperation, of a national system of Estuarine Research Reserves representative of the various regions and estuarine types in the United States. Estuarine Research Reserves are established to provide opportunities for long-term research, education, and interpretation.*

#### Goals

Federal regulations, 15 C.F.R. Part 921.1(b), provide five specific goals for the reserve system:

- (1) Ensure a stable environment for research through long-term protection of National Estuarine Research Reserve resources;
- (2) Address coastal management issues identified as significant through coordinated estuarine research within the System;

- (3) Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
- (4) Promote Federal, state, public and private use of one or more Reserves within the System when such entities conduct estuarine research; and
- (5) Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

#### Strategic Goals 2003 - 2008

The reserve system began a strategic planning process in 1994 in an effort to help NOAA achieve its environmental stewardship mission to "sustain healthy coasts." In conjunction with the strategic planning process, Estuarine Reserve Division (ERD) and reserve staff has conducted a multi-year action planning process on an annual basis since 1996. The resulting three-year action plan provides an overall vision and direction for the reserve system.

#### Reserve System Strategic Plan Goals (revised 2002):

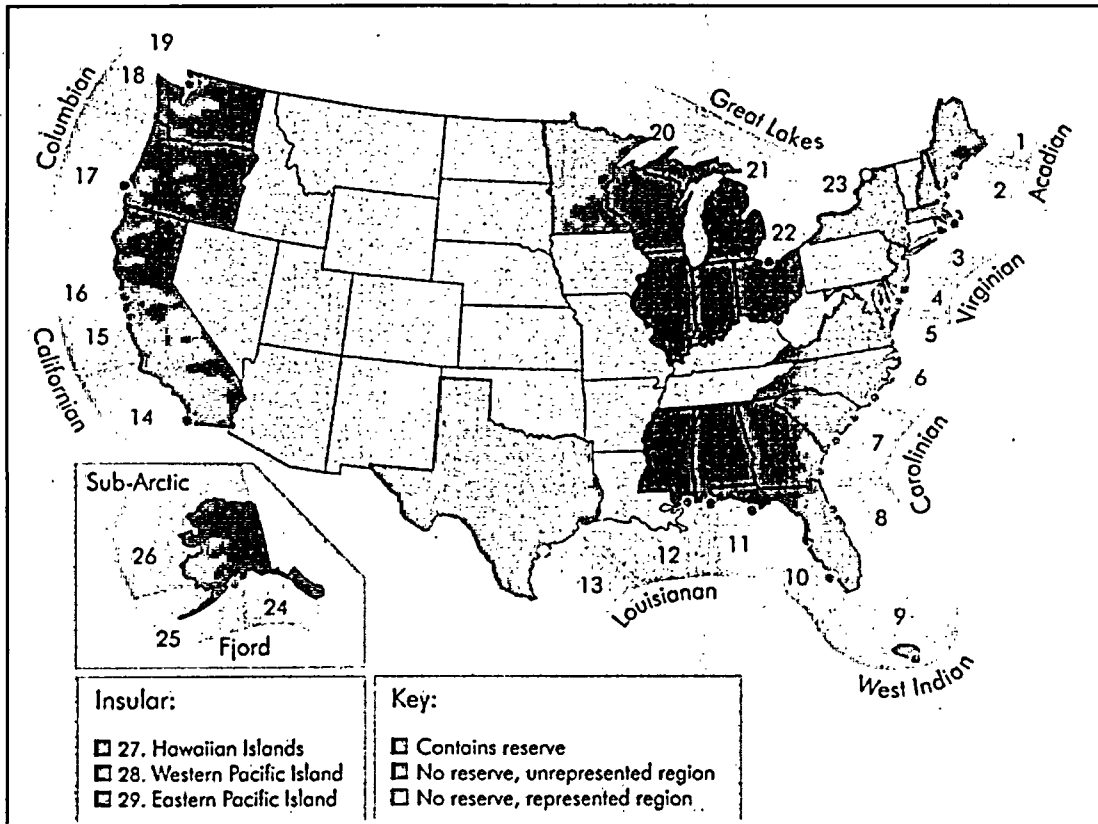
- (1) Improve coastal decision making by generating and transferring knowledge about coastal ecosystems.
- (2) Enhance and expand the National Estuarine Research Reserve System.
- (3) Increase awareness, use, and support of the reserve system and its estuarine science, education, and stewardship programs.

#### Biogeographic Regions

NOAA has identified eleven distinct biogeographic regions and 29 subregions in the U.S., each of which contains several types of estuarine ecosystems (15 C.F.R. Part 921, Appendix I and II). When complete, the reserve system will contain examples of estuarine hydrologic and biological types characteristic of each biogeographic region. As of 2004, the reserve system includes twenty six reserves and two reserves in the process of designation (Figure 1).



Figure 1. Biogeographic regions and reserves of the NERR system. The reserves are listed below with their designation date.



<p>Acadian – Southern Gulf of Maine Wells Reserve, Maine (1984) Great Bay Reserve, New Hampshire (1989)</p> <p>Virginian – Southern New England Waquoit Bay Reserve, Massachusetts (1988) Narragansett Bay Reserve, Rhode Island (1980) Hudson River Reserve, New York (1982)</p> <p>Virginian – Middle Atlantic Jacques Cousteau Reserve, New Jersey (1998) Delaware Reserve (1993)</p> <p>Virginian – Chesapeake Bay Chesapeake Bay Reserve, Maryland (1985,1990) Chesapeake Bay Reserve, Virginia (1991)</p> <p>Carolinian – North Carolina North Carolina Reserve (1985,1991)</p> <p>Carolinian – South Atlantic North Inlet-Winyah Bay Reserve, South Carolina (1992) ACE Basin Reserve, South Carolina (1992) Sapelo Island, Georgia (1976)</p> <p>Carolinian – East Florida Guana Tolomato Matanzas Reserve, Florida (1999)</p> <p>West Indian – Caribbean Jobos Bay Reserve, Puerto Rico (1981)</p> <p>West Indian – West Florida Rookery Bay Reserve, Florida (1978)</p>	<p>Louisianan – Panhandle Coast Apalachicola Reserve, Florida (1979) Weeks Bay Reserve, Alabama (1986)</p> <p>Louisianan – Mississippi Delta Grand Bay Reserve, Mississippi (1999)</p> <p>Louisianan – Western Gulf Mission-Aransas Reserve, Texas (Proposed)</p> <p>Californian – Southern California Tijuana River Reserve, California (1982)</p> <p>Californian – Central California Elkhorn Slough Reserve, California (1979)</p> <p>Californian – San Francisco Bay San Francisco Bay, California (2003)</p> <p>Columbian – Middle Pacific South Slough Reserve, Oregon (1974)</p> <p>Columbian – Puget Sound Padilla Bay Reserve, Washington (1980)</p> <p>Great Lakes – Lake Erie Old Woman Creek, Ohio (1980)</p> <p>Great Lakes – Lake Ontario St. Lawrence River, New York (Proposed)</p> <p>Fjord – Aleutian Islands Kachemak Bay Reserve, Alaska (1999)</p>
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### Reserve Designation and Operation

Under Federal law (16 U.S.C. Section 1461), a state can nominate an estuarine ecosystem for Research Reserve status so long as the site meets the following conditions:

- (1) The area is representative of its biogeographic region, is suitable for long-term research and contributes to the biogeographical and typological balance of the System;
- (2) The law of the coastal State provides long-term protection for the proposed Reserve's resources to ensure a stable environment for research;
- (3) Designation of the site as a Reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation; and
- (4) The coastal State has complied with the requirements of any regulations issued by the Secretary [of Commerce].

Reserve boundaries must include an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation.

If the proposed site is accepted into the reserve system, it is eligible for NOAA financial assistance on a cost-share basis with the state. The state exercises administrative and management control, consistent with its obligations to NOAA, as outlined in a memorandum of understanding. A reserve may apply to NOAA's ERD for funds to help support operations, research, monitoring, education/interpretation, stewardship, development projects, facility construction, and land acquisition.

### National Estuarine Research Reserve System Administrative Framework

The Estuarine Reserves Division of the Office of Ocean and Coastal Resource Management (OCRM) administers the reserve system. The Division establishes standards for designating and operating reserves, provides support for reserve operations and system-wide programming, undertakes projects that benefit the reserve system, and integrates information from individual reserves to support decision-making at the national level. As required by Federal regulation, 15 C.F.R. Part 921.40, OCRM periodically evaluates reserves for compliance with Federal requirements and with the individual reserve's Federally-approved management plan.

The Estuarine Reserves Division currently provides support for three system-wide programs: the System-Wide Monitoring Program, the Graduate Research Fellowship Program, and the Coastal Training Program. They also provide support for reserve initiatives on restoration science, invasive species, K-12 education, and reserve specific research, monitoring, education and resource stewardship initiatives and programs.

#### **1.2 Reserve Mission, Vision, and Goals**

An important part of a management plan is to state a mission for the organization, a vision on how the mission will lead to the betterment of man and society, and specific goals to accomplish the mission. The topic of potential mission, goals and objectives of the Reserve were discussed in a workshop format by the Site Selection Committee on January 23, 2003 and are described in detail in the Site Nomination document (UTMSI 2003). The Reserve planners used this workshop documentation to create the mission, vision, and goals for the initial Reserve management plan (Table 1).

*The mission of the Mission-Aransas National Estuarine Research Reserve is to develop and facilitate partnerships that enhance coastal decision making through an integrated program of research, education, and stewardship.*

*The vision of the Mission-Aransas National Estuarine Research Reserve will be to develop a center of excellence to create and disseminate knowledge necessary to maintain a healthy Texas coastal zone.*

There are three goals that will be used to support the Reserve mission:

**Goal 1:** To improve understanding of Texas coastal zone ecosystems structure and function. Understanding of ecosystems is based on the creation of new knowledge that is primarily derived through basic and applied research. New knowledge is often an essential component needed to improve coastal decision making.

**Goal 2:** To increase understanding of coastal ecosystems by diverse audiences. Education and outreach are the primary delivery mechanisms to explain what coastal ecosystems are and how they work. It is essential that information is disseminated broadly within our society.

**Goal 3:** Promote public appreciation and support for stewardship of coastal resources. In many ways, stewardship is an outcome resulting from the integration of research and education. Research creates information that is communicated through education. This information forms the basis for an appreciation of the values of an environment, and that in turn promotes a public sense of ownership of natural resources.

The chapters that follow describe each Reserve program plan. In each program plan, the objectives to meet these goals are described in detail. Under the objectives are lists of specific actions or tasks that will be accomplished to meet the objective.

Overall, adopting and executing actions leads to the accomplishment of the goals. Because many of the actions are interlined among the goals, this provides the integration necessary to accomplish the Reserve mission.

Table 1. Matrix of goals and objectives for the Reserve management plan. *Objectives in italic font* are numbered by goal and objective.

<b>Mission:</b>		To develop and facilitate partnerships that enhance coastal decision making through an integrated program of research, education, and stewardship	
<b>Vision:</b>		A center of excellence to create and disseminate knowledge necessary to maintain a healthy Texas coastal zone	
<b>Plan:</b>	<b>Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function</b>	<b>Goal 2: Increase understanding of coastal ecosystems by diverse audiences</b>	<b>Goal 3: Promote public appreciation and support for stewardship of coastal resources</b>
<b>Administrative</b>	<i>1-1 Provide oversight and support for research and monitoring activities</i>	<i>2-1 Support K-12 and stakeholder education and outreach activities</i>	<i>3-1 Provide oversight and support for stewardship activities</i>
<b>Acquisition</b>	<i>1-2 Protect the integrity of core areas for long-term research</i>		<i>3-2 Expand Reserve boundary to shorelines where adjacent property owners are agreeable</i>
			<i>3-3 Expand Reserve boundary to include key wetland habitats</i>
			<i>3-4 Expand Reserve boundary to protect key watershed areas</i>
<b>Stewardship</b>	<i>1-3 Update site profile and ecological characterization via ground-truthing of the GIS data base</i>	<i>2-2 Better inform coastal decision-makers</i>	<i>3-5 Monitor land management practices among Reserve partners</i>
	<i>1-4 Protect core areas for long-term research</i>	<i>2-3 Improve the capacity to engage in ecotourism activities</i>	<i>3-6 Develop partnerships with locally-based animal rescue programs</i>
		<i>2-4 Provide outdoor educational experiences to scouting and other community organizations</i>	<i>3-7 Support existing clean-up and recycling programs near the Reserve</i>
			<i>3-8 Promote Reserve initiatives at public events, fairs and expositions</i>
			<i>3-9 Initiate restoration and mitigation projects with appropriate partners</i>
<b>Public Access</b>	<i>1-5 Access to Reserve partner land and water areas for research activities</i>		<i>3-10 Public and group access to Reserve partner education/outreach facilities and environments</i>

<b>Plan:</b>	<b>Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function</b>	<b>Goal 2: Increase understanding of coastal ecosystems by diverse audiences</b>	<b>Goal 3: Promote public appreciation and support for stewardship of coastal resources</b>
<b>Facilities</b>	<i>1-6 Provide facilities for the research and monitoring community</i>	<i>2-4 Provide access to UTMSI facilities for reserve education programs</i>	<i>3-11 Create an Aransas Bay public outreach facility in partnership with the City of Rockport and others</i>
		<i>2-5 Create a Copano Bay public research and education center</i>	
		<i>2-6 Partner with USFWS to enhance visitor experience at the Aransas Wildlife Refuge</i>	
		<i>2-7 Complete the Wetland Education Center at UTMSI</i>	
		<i>2-8 Link Education and Outreach NERR facilities</i>	
<b>Research</b>	<i>1-7 Improve understanding of short and long-term changes within Texas coastal ecosystems</i>	<i>2-9 Disseminate coastal Texas research information and results to lay public</i>	<i>3-12 Promote public participation in research and monitoring programs</i>
	<i>1-8 Increase understanding of effects of anthropogenic activities on coastal ecosystems</i>	<i>2-10 Transfer research knowledge to K-12 teachers and classrooms</i>	<i>3-13 Increase public understanding of ecological values</i>
	<i>1-9 Increase graduate student participation in Reserve research and monitoring programs</i>	<i>2-11 Inform researchers and decision-makers of research results</i>	

<b>Plan:</b>	<b>Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function</b>	<b>Goal 2: Increase understanding of coastal ecosystems by diverse audiences</b>	<b>Goal 3: Promote public appreciation and support for stewardship of coastal resources</b>
<b>Education</b>	<i>1-10 Increase K-12 student participation in Reserve research and monitoring</i>	<i>2-12 Enhance existing formal and informal education programs</i>	<i>3-14 Promote public ownership of Texas coastal resources</i>
		<i>2-13 Increase science literacy for K-12 students by using science as a language to understand coastal habitats</i>	<i>3-15 Increase public awareness of the Reserve and the NERR System</i>
		<i>2-14 Increase public literacy about Texas coastal ecosystems</i>	<i>3-16 Provide outdoor educational experiences to scouting and other community organizations</i>
		<i>2-15 Enhance the transfer of knowledge, information, and skills to coastal-decision makers</i>	
<b>Volunteer</b>	<i>1-11 Increase the Reserve's monitoring capacity</i>	<i>2-16 Increase the Reserve's capacity to provide educational experiences to K-12 students</i>	<i>3-17 Foster a stewardship ethic within local communities</i>
			<i>3-18 Increase the Reserve's capacity to promote public appreciation of Texas coastal resources</i>

## 2.0 RESOURCE DESCRIPTION

### 2.1 General Description

The Western Gulf of Mexico consists of six major ecosystems. The Reserve contains a typical Western Gulf of Mexico estuary (Diener 1975). The estuarine system is composed of tertiary, secondary, and primary bays (Figure 2). Mission Bay is the only tertiary bay, and Copano, Port and St. Charles Bay are secondary bays. Mesquite, Aransas and Redfish Bay are primary bays because they are adjacent to the oceanic outlets. Copano Bay is a coastal plain estuary, composed of two drowned river mouths of the Mission and Aransas Rivers. Aransas, Redfish and Mesquite Bays are bar-built estuaries, in which an offshore sand bar partially encloses a body of water. Aransas Bay is the largest bay, followed by Copano and Mesquite Bay. The bay systems are shallow and the mean low water varies from 0.6 m in Mission Bay to 3 m in Aransas Bay (Chandler et al. 1981). Detailed information on the climate, geology, hydrography/oceanography, water quality, habitat types, significant fauna and flora, endangered species, and cultural aspects can be found in the site nomination document (<http://www.utmsi.utexas.edu/nerr/>).

#### Climate

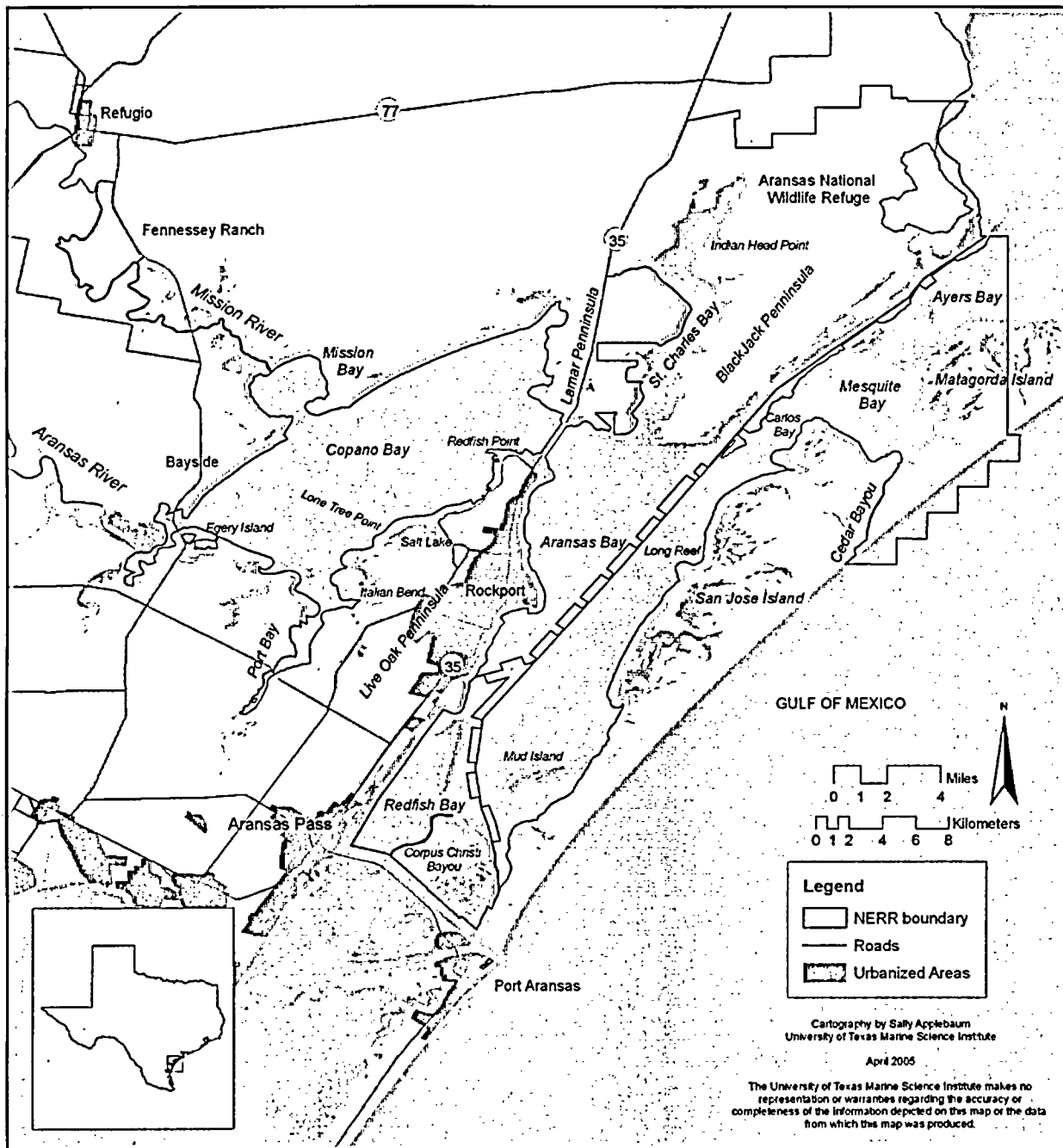
The Reserve has a subhumid-to-semiarid east coast subtropical climate, with extreme variability in precipitation with generally high humidity and infrequent but significant killing frosts (Fulbright et al. 1990). Generally, the Reserve experiences high temperatures along with deficiencies in moisture. Major climatic influences are temperature, precipitation, evaporation, wind, tropical storms and hurricanes.

#### Hydrography / Oceanography

The primary climatic conditions that influence the hydrology in the Reserve are freshwater inflow and to a lesser extent tidal exchange. The Mission and Aransas rivers contribute the major freshwater inflows into the Reserve. All drainage of the Mission-Aransas Estuary share the major Gulf of Mexico connection at Port Aransas (Aransas Pass). Tidal exchange in the Aransas estuary is driven by astronomical tides, meteorological conditions, and density stratification (Armstrong 1987). Because of shallow bay depths (1 - 4 m at mid-tide) and a relatively small tidal prism, wind exerts a much greater influence on bay circulation than astronomical tides (Morton and McGowen 1980, Armstrong 1987, NOAA 1990a).

The Reserve has a large salinity gradient, with high salinities in Redfish Bay to lower salinities in Mission Bay. Salinity structure within the Reserve is determined by isolated freshwater pulses that, once introduced are retained within the system (NOAA 1993). Freshwater pulses tend to lower salinities for long periods of time because of the shallowness of the bay and the restricted inlet connection. Salinity stratification is common following fresh water impulses and usually occurs in Copano Bay (NOAA 1993). Salinity stratification can occur in secondary bays (e.g., Aransas Bay), in summer when winds subside and evaporation causes dense water to sink (Morehead et al. 2002).

Figure 2. Geographical map with feature names of the Mission-Aransas Estuary.





### Geology

The shorelines of Copano and Aransas Bay are in a state of erosion; whereas the bay side shoreline of San Jose is in a state of equilibrium or accretion (Chandler et al. 1981). The most common sediment type in the Mission-Aransas Estuary is mud, which is comprised of silt and clay (White et al. 1983). Mesquite Bay and St. Charles Bay is primarily comprised of sand to sandy silt (White et al. 1989). Aransas, and northern Copano Bay have a higher portion of clay, while the southern portion of Copano Bay has a higher portion of silt. Copano Bay also has areas where the sediments have as high as 75% shell material occurring near oyster reefs. The margins of Copano and Aransas Bay have a higher percentage of sand (White et al. 1983).

### Water Quality

Water quality in the Reserve ranges from good to moderate. There are low to medium ambient concentrations of nitrogen and phosphorus from agricultural runoff (NOAA 1977). Copano Bay, Port Bay, and Mission Bay is currently listed by the Texas Commission on Environmental Quality (TCEQ) as having high bacteria concentrations. The locations of impairment include the area along southern shoreline near Port Bay and the shoreline near the town of Bayside. Even though there are areas in the Reserve that are impaired by bacteria, the Mission-Aransas Estuary has a small area of impairment in comparison to other estuarine systems along the Texas coast, and the bacteria impairment in the Reserve is currently listed as a low urgency for a Total Maximum Daily Load (TMDL) analysis. The Texas Department of Health and Texas A&M Corpus Christi are currently sampling Copano Bay to determine the bacteria levels and the source.

### Habitat Types and Descriptions

Along with open-water habitats, the Reserve includes several types of wetlands: freshwater (palustrine), brackish, and salt marshes, and mangrove communities (Figure 3 and Table 2). The wetland and open water habitats also support benthic and nektonic populations, as well as large areas of oyster reefs. Large areas of seagrass and mangroves are present in southern boundaries of the Reserve. Beach and flat habitats are located along the ocean side of Matagorda Island. Several maritime forests are also located within the Reserve including coastal prairies, oak mottes, and riparian woodlands. All these habitats support endangered species and culturally important species, such as shrimp and fish.

Figure 3. Habitats within the Reserve.

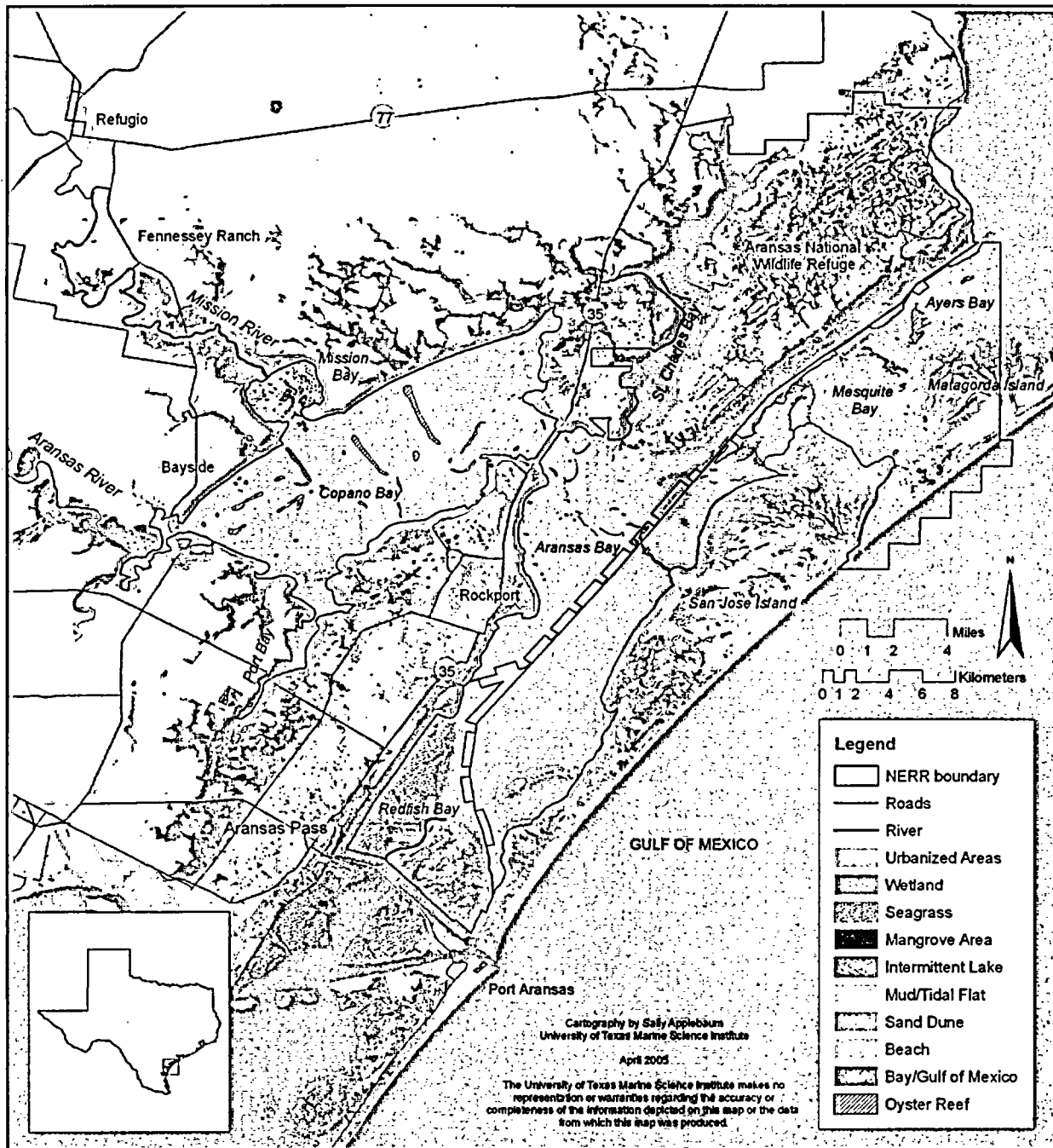


Table 2. Inventory of habitat areas (in acres) for each Reserve partner's land. Abbreviations: General Land Office (GLO), Aransas National Wildlife Refuge (ANWR), Coastal Bend Land Trust (CBLT), Goose Island State Park (GISP), and University of Texas at Austin, and Marine Science Institute (UTMSI).

Habitat	Total Boundary	GLO	ANWR	Fennessey Ranch	CBLT	GISP	UTMSI
Bay/Gulf of Mexico	118,627	116,882	1,625	0	108	12	0
Beach	332	90	242	0	0	0	0
Impounded Area	126	0	126	0	0	0	0
Intermittent Lake	16	16	0	0	0	0	0
Lake	540	124	135	281	0	0	0
Mangrove Area	65	65	0	0	0	0	0
Mud/Tidal Flat	1,961	600	1,320	0	41	0	0
Oyster Reef	96	96	0	0	0	0	0
River or Stream	62	0	62	0	0	0	0
Seagrass	9,727	8,091	1,435	0	141	60	0
Wetland	28,316	3,208	24,456	266	343	40	3
Terrestrial	40,110	236	36,815	2,777	95	159	28
Total Area	200,137	129,567	66,216	3,324	728	271	31
% of Area	100%	64.74%	33.09%	1.66%	0.36%	0.14%	0.02%

#### Endangered Species

There are several estuarine dependent species in the Reserve that are listed as endangered or threatened. One of the most well known endangered species that inhabits the Reserve is the whooping crane. This species winters along the south Texas coast at the Aransas National Wildlife Refuge (ANWR). The ANWR was established in 1937 and the whooping crane is making a comeback from a low of 15 birds in 1941 to a count of 216 in 2005 (Tom Stehn, personnel communication). The brown pelican is also a well known endangered bird species that is present within the Reserve. Brown pelican populations began declining in the 1930's and numbers dropped dramatically between 1952 and 1957 (Tunnell et al. 1996). The drastic decline in numbers were due to hurricanes, disease and pesticides. Populations have been increasing since the 1970's and the increase is correlated with the discontinued use of DDT in 1972, along with conservation efforts.

#### Cultural aspects

Karankawa, Tamaulipecan, and Coahuiltecan Indians are the first known inhabitants of the Reserve (Martin 1972, Hester 1980). It is estimated that they lived here for at least 20,000 years and disappeared by the mid-1800's. The Karankawan tribe and those within their linguistic family had the highest population within the Reserve with their core range extending from Matagorda to Corpus Christi Bay (Hester 1980). There are several locations of archaeological sites (i.e. middens) from these tribes surrounding and within the Reserve (Hester 1980, Ricklis 1996). The decline of indigenous populations correlates with arrival of Spanish settlers when the first trading posts were established during the 1700's. Development and industrialism continued in the region resulting in the present day society.

Sites of historical interest are also present in the Reserve. The Aransas Pass Lighthouse was established as a lighthouse in 1855, and is listed in the National Historical Registry. The lighthouse is located in the Lydia Ann Channel. It was seriously damaged during a Confederate attack in December 1862, in which the top twenty feet of the tower was destroyed. It was rebuilt in 1867 and was decommissioned in 1952 (Holland 1972). The banks of the Cedar Bayou inlet also have remains of 19<sup>th</sup> century brickyards. At this site, large complexes of brick kilns, huge open cisterns, and associated brick foundations are present to account for relics of the industrial age (Fox 1983).

## **2.2 Reserve Uses**

There are several allowable uses that occur within the Reserve. The primary uses within the Reserve include oil and gas activities, recreational and commercial fishing, water uses, and transportation activities. Detailed information the activities on lands adjacent to the Reserve can be found in Appendix 2.

### Oil and Gas

Estuaries along the Gulf of Mexico, including Texas, are rich in oil and gas deposits. Every estuary in the Western Gulf of Mexico Biogeographic Sub-region has oil and gas wells and pipelines. Much of the past production in the Mission-Aransas Estuary has been depleted. However, recent testing indicates that there is interest in deeper exploration and drilling in the Reserve. As drilling technology continues to improve, deeper and deeper depths become prospective. Exactly where deeper drilling would be focused is impossible to tell before additional seismic data is obtained. In addition, the Texas coast has seen "waves" of seismic exploration. It is likely that there will be additional activity (seismic surveying, drilling, and production) in the future. Seismic operations are conducted in an area, and at a later date, when technology has improved the area is investigated with the new technology. There is no reason to believe that the future of seismic exploration will be any different from the past in terms of repeated "waves" of investigation. If so, the Reserve will most likely be investigated again. Activities for exploration and development of oil and gas are under regulatory authority of the General Land Office, a partner in the reserve.

### Recreational and Commercial Fishing

The habitats in the Reserve support both commercial and recreational fisheries, including shrimp, crabs, oysters, and fin fish resources. The life history strategies of these organisms are dependent upon estuarine-based life cycles. The estuary systems are nursery grounds for many of the commercially viable species, such as penaeid shrimp, in the Mission-Aransas Estuary. It has been estimated that up to 97.5% of the commercial fisheries in the Gulf of Mexico rely on estuaries for a portion of their life histories (Gunter 1967).

### Water Uses and Freshwater Inflow

There are several small watersheds in the Reserve (Figure 4). The Mission River watershed is Hydrologic Unit Codes (HUC) 1210046 and the Aransas River watershed is HUC 12100407. Most of these watersheds drain into Copano Bay, but one drains into Port Bay and one drains into St. Charles Bay (Figure 5). The Mission and Aransas Rivers are small and primarily coastal compared to other rivers in Texas. Texas law (first passed in 1957) ensures that sufficient flows are maintained for "receiving bay and estuary system that is necessary for the maintenance of productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent" (Texas Water Code, § 11.147).

The Mission-Aransas Estuary is one of the few estuaries on the Texas coast that still has enough surface fresh water inflow to maintain a healthy estuary. The National Wildlife Federation recently published a report that described the health of Texas estuaries based on full use of existing freshwater permits (Johns 2004). Existing water-use permits for the Mission and Aransas Rivers authorize 1,900 acre-feet of surface water diversions. Although surface waters in the Mission and Aransas Rivers are not currently at risk, the future growth of south Texas cities pose a significant threat to these valuable surface waters.

Figure 4. Watersheds of the Reserve.

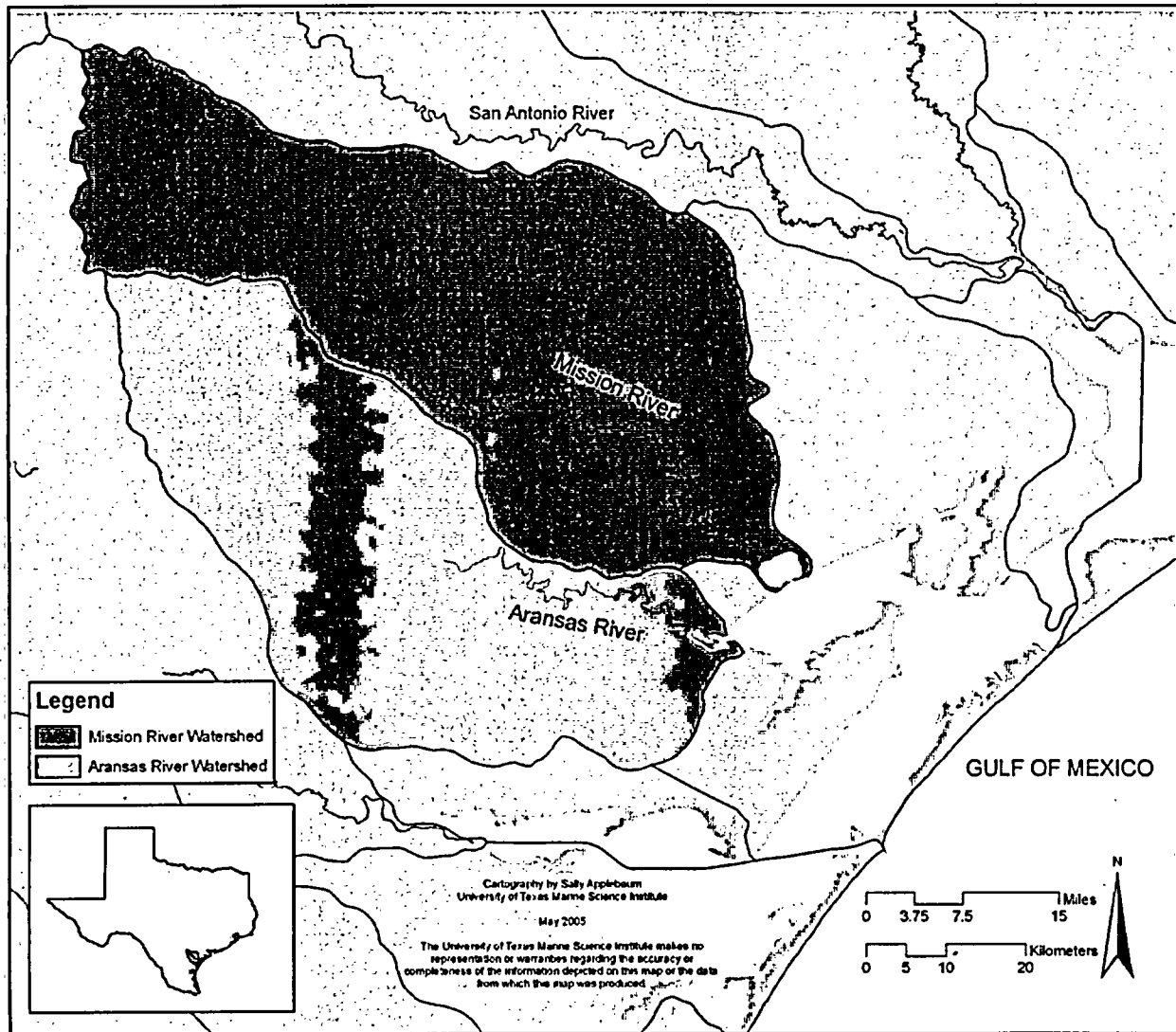
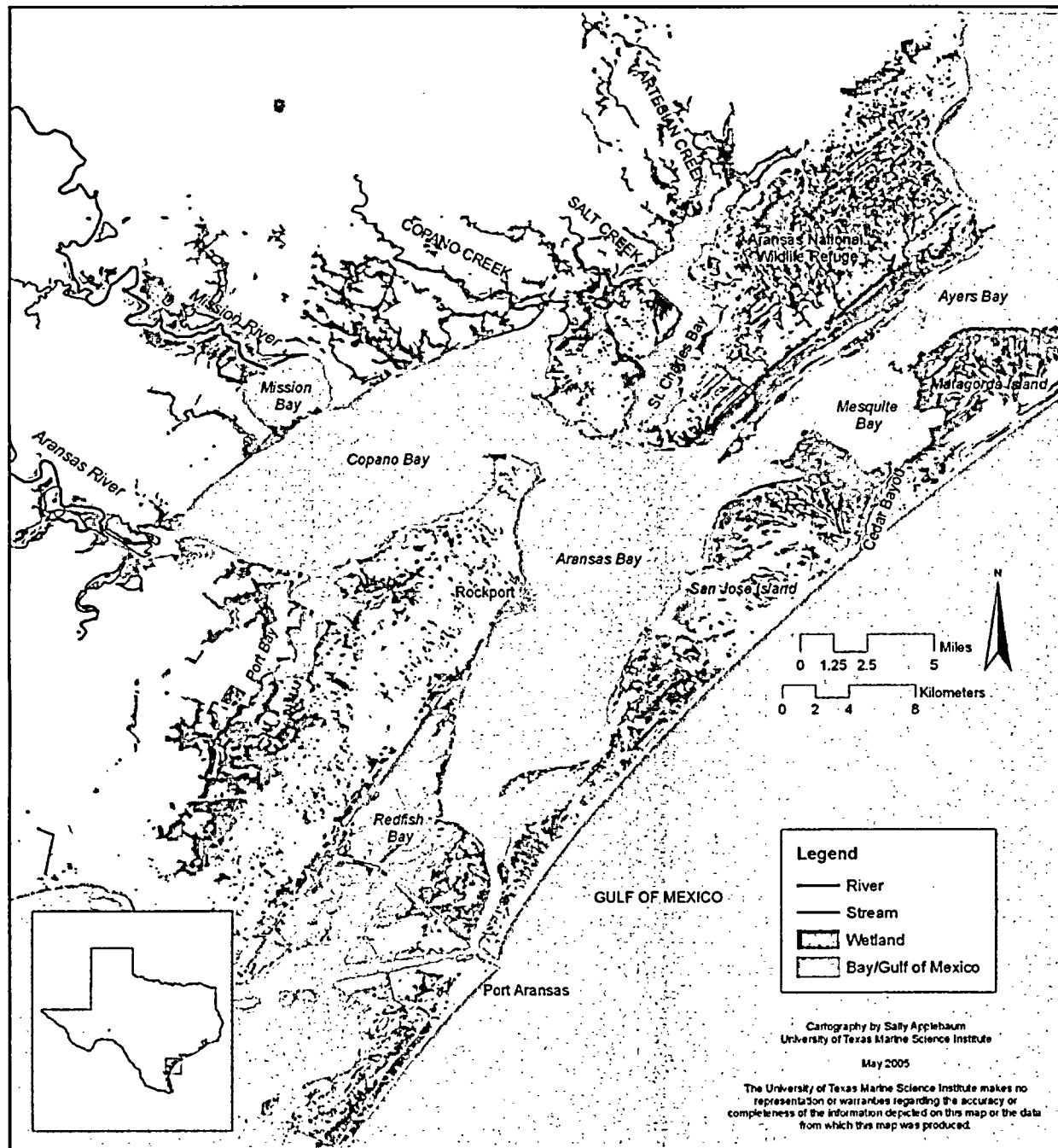


Figure 5. Hydrological features of the Reserve.



### Transportation

The Gulf Intracoastal Waterway is a major industrial water transportation canal that bisects Aransas Bay within the Reserve. The waterway was first dredged in 1905 and is approximately 125 feet wide by 12 feet deep and links seaports along the Northern Gulf of Mexico. The easement for the waterway is 300 feet and there is additionally 2000 feet of easement within the Reserve for dredge material disposal (Texas Governmental Code, Sec. 2204.601). The waterway serves many uses, such as a commercial trade link, national defense, and protective passage for recreational and working

vessels (TxDOT 1996). It is economically imperative to the Texas Coast because it facilitates transporting petrochemicals and agricultural as well as industrial products that would otherwise be too costly or impossible to transport by road. In 1994, over 78 million short tons were moved on the Texas waterway, which values up to twenty-two billion in revenue (TxDOT 1996). The US Army Corps of Engineers must annually dredge 8 million cubic yards of shoaled material to maintain the waterway (TxDOT 1996).

The Copano Bay Causeway bisects the Reserve between Aransas and Copano Bay. There are also numerous state roadways adjacent to the Reserve boundary. These roadways include state highways, farm to market roads, and park roads. Periodic maintenance of these facilities will be occurring (Table 3). In addition, a parcel of land (~ 2500'x1750') west of the Rockport/Fulton Airport that extends out into Copano Bay is designated as a runway protection zone. A map of the airport and protection zones are provided in the site nomination document (<http://www.utmsi.utexas.edu/nerr/>).

**Table 3. Future maintenance on state roadways within Reserve.**

State Roadways	Future projects
State Highway 35 Copano Bay Causeway	Scheduled for replacement, some dredging may be required during construction
State Highway 35 parallel to the ANWR	Bridge replacement scheduled at Copano and Salt Creek Bridges
Farm Road 136 Bridge at Copano Bay	No projects scheduled
Farm Road 2678 Mission River Bridge	No projects scheduled
State Highway 188 Copano Bay Bridge	Long term plans call for the bridge to be widened

### **2.3 Management Authority**

Existing resource protection, surveillance, and enforcement within the Reserve is maintained by the regulatory programs and policies of the applicable authorities and appropriate government enforcement agencies for the allowable uses (oil and gas, recreational and commercial fishing, water uses and freshwater inflow, transportation). Existing resource protection for the Reserve can be found in Appendix 2.

### **3.0 ADMINISTRATION PLAN**

#### **3.1 Introduction**

##### **Relationship to Federal Government**

A state commonwealth or territory and the federal government cooperate in operation of each National Estuarine Research Reserve (NERR). The federal interest is represented primarily by the Office of Ocean and Coastal Resource Management (OCRM), National Ocean Service (NOS), National Oceanic and Atmospheric Administration (NOAA). NOAA's mission includes management of the nation's coastal resources and promotion of global stewardship of the world's oceans and atmosphere through science and service. OCRM coordinates the National Estuarine Research Reserve System (NERRS) nationally and administers financial awards to individual reserves.

The NERRS operates as a federal/state partnership. Although the management of a reserve, including development of site-specific policies and programs, is a state's responsibility, NOAA provides overall system policies and guidelines, cooperates with and assists the states in selecting, designating, and operating reserves, and reviews state programs regularly. The purpose of the NOAA review is to ensure that a state is complying with federal NERRS goals, approved work plans and reserve management plans. The primary mechanisms used by NOAA to assist the state, as well as NOAA responsibilities pertaining to reviews are discussed below.

The final environmental impact statement and the reserve management plan must be approved by NOAA before the final version of each document is published. Upon designation, NOAA staff, in particular the program specialist for the Reserve, communicates directly and regularly with the state reserve staff. Communication builds a level of trust between federal and state staff and familiarizes both the Estuarine Reserve Division (ERD) and state personnel with reserve management procedures and policies. This cooperative approach is needed for a reserve to be successful. Both oral and written communication is necessary and site visits are advisable.

Another component of NOAA oversight is its reserve funding program. NOAA provides different categories of grant funding to a reserve and works with reserve staff to ensure that funds are spent on projects and in areas where the most benefit can be achieved. Semi-annual grant progress reports and a final grant report are required. NOAA personnel carefully review the grant reports and associated communications to ensure compliance with program policies and specific grant conditions.

Pursuant to the Coastal Zone Management Act (CZMA) enabling legislation (Sections 312 and 315), OCRM must conduct performance evaluations of the operation and management of each reserve every three years while federal financial assistance continues. These reviews are a mechanism for identifying, discussing, and resolving concerns with reserve operation.

The state interest is usually represented through one or more state agencies, typically agencies charged with education, environmental, research, wildlife, or coastal management responsibilities. The state agency administers reserve personnel and day-to-day reserve management. The management for the Reserve will be through the University of Texas at Austin, Marine Science Institute as outlined in the administrative plan below.

##### **Administrative Plan for the Reserve**

The Reserve will be administered by the University of Texas at Austin, Marine Science Institute (UTMSI), the State of Texas-designated lead agency for the Reserve. The memorandum of understanding (MOU) between the UTMSI and NOAA establishes the roles and responsibilities of these agencies (Appendix 3). Other key state, federal and private partners of the Reserve include the Texas General Land Office (GLO), United State Fish and Wildlife Service (USFWS), Texas Parks and Wildlife Department (TPWD), Coastal Bend Land Trust (CBLT), The Nature Conservancy (TNC), Fennessey Ranch, Texas Department of Transportation (TxDOT), Coastal Bend Bays and Estuary Program (CBBEP), and a local governmental representative mutually agreed upon by Aransas County and the City of Rockport. These partnerships have been established based on mutual interest in the project and to provide a means by which key aspects of the program will function (i.e., research, education, monitoring, administration, resource protection, facility



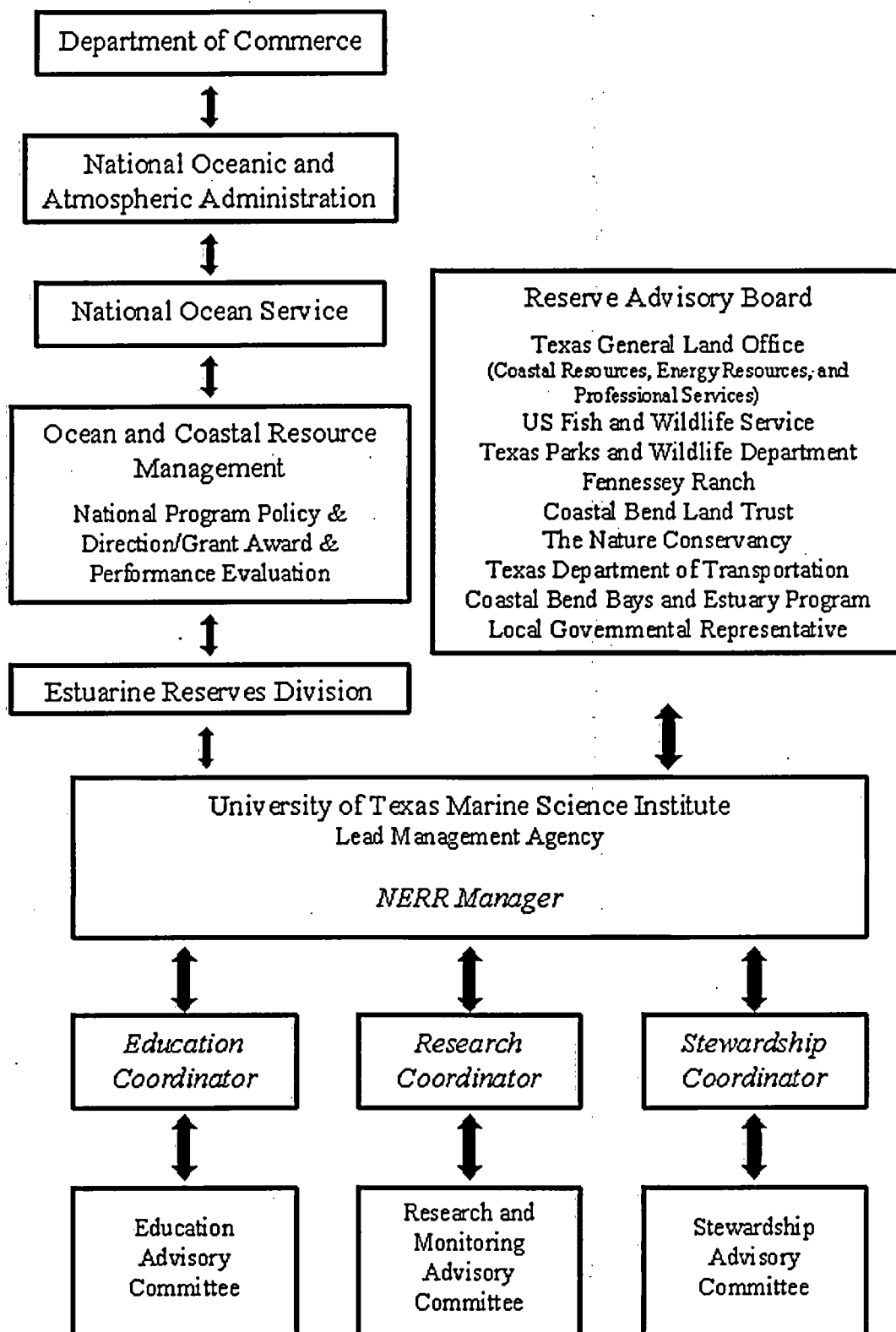
development and operation, and site security). Agreements that describe the relationships between these partners are provided in appendices and listed below:

- MOU between the UTMSI and the six partners: GLO, USFWS, TPWD, TNC, CBLT, Fennessey Ranch, TxDOT, CBBEP, and a local governmental representative mutually agreed upon by Aransas County and the City of Rockport (Appendix 4)
- Coastal Lease for Scientific Purposes from GLO to UTMSI (Appendix 5)

#### Administrative Framework

The administrative framework of the Reserve, including key partners, advisory committees and NOAA are shown in Figure 6. The roles and responsibilities of the primary partners are detailed below. Details about how these groups interact to manage the Reserve are provided below. Advisory groups will also be established to allow other interested parties input into the operation and implementation of the research, monitoring, education and stewardship programs of the Reserve. Three subcommittees will provide advice on the operations and management of the Reserve and the research, monitoring and education programs.

Figure 6. Organizational framework for the Reserve. Principal reserve staff are shown in *italics*. Other coordinator positions may be created, and other committees may be developed or changed as appropriate.



### **3.2 Program Goals and Objectives**

The administrative plan is unique in that the same objectives are required to meet all three goals of the Reserve. This is because administrative objectives are basically the same for any goal that the Reserve might adopt. Administration typically plans, oversees, and supports all Reserve goals.

#### **Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function**

##### ***Objective 1-1: Provide oversight and support for research and monitoring activities***

Oversight of research and monitoring activities will be provided by the Reserve manager and the research coordinator. Support of research and monitoring activities, such as travel and overhead, will be provided for by Reserve funds.

##### **Action 1: Develop, execute, and revise a Reserve management plan**

The UTMSI will develop and execute the Reserve management plan. The UTMSI will revise the management plan every five years with advice from the Reserve Advisory Board. Revision of the management plan will update and create new objectives for the research and monitoring plan.

##### **Action 2: Obtain advice on the program from the broader community**

Advice on the program from the broader community will be obtained through the Reserve Advisory Board and the Research and Monitoring Advisory Committee. The first task of the advisory committee will be the development of a needs assessments for target audiences. Needs assessments are a systematic investigation of an audience to identify aspects of individual skills, knowledge, interests, attitudes, or abilities relevant to a particular issue, organizational goal or objective. Needs assessments are designed to collect sufficient information about a particular target group to design an effective program that addresses the group's needs and desires.

##### **Reserve Advisory Board**

The Reserve Advisory Board (RAB) will provide advice to reserve staff for management, research/monitoring activities, stewardship objectives, and educational programs based on the approved reserve management plan. The state, federal, and private organizations listed above are principal partners and have had principal roles throughout the site selection and designation process of the Reserve and have agreed to continue their involvement as described above and detailed in the agreements among these partners (Appendix 4). The Board shall be comprised of members from the principal partners. The General Land Office, shall have one representative from each of three divisions that have direct interest in the Reserve: Coastal Resources, Energy Resources, and Professional Services. Texas Parks and Wildlife Department, U.S. Fish and Wildlife Service, The Nature Conservancy, Coastal Bend Land Trust, Fennessey Ranch, Texas Department of Transportation, and Coastal Bend Bays and Estuary Program shall each have one representative on the Board. To provide an appropriate linkage to the broader community so the Reserve reflects the concerns and ideas of this regional constituency, a local governmental representative mutually agreed upon by Aransas County and the City of Rockport shall be a member of the Board. Further information on the key Reserve partners in the RAB is in Appendix 6. The RAB will elect a chairman annually from among the principal partners. The RAB will establish by-laws or other appropriate procedures to govern itself.

The RAB shall act on behalf of the agencies/entities having jurisdiction over sites comprising the Reserve. Members of the RAB will serve without compensation from the Reserve. The purpose of the RAB is to advise the University of Texas at Austin regarding implementation of the management plan. The RAB shall review the management plan every five (5) years and shall advise the University of Texas regarding modification of the management plan. The RAB may create committees or subcommittees to provide technical information or linkage to the broader community pertaining to the three main missions of Reserve: research, education, and stewardship. Members of committees or subcommittees will serve without compensation from the Reserve.

### **Reserve Advisory Committees**

Advisory committees will be established after designation of the Reserve to provide effective coordination and cooperation among key interests involved with the Reserve. At least three committees will be established: 1) research and monitoring advisory committee, 2) stewardship advisory committee, and 3) education advisory committee. These advisory committees will advise the respective coordinators on local issues related to research, monitoring, stewardship, and education. Advisory groups will include significant representation from all stakeholders and constituencies within the region.

Each committee will include representation from the research and education community, agencies, user groups, adjacent landowners, industry, and other groups as appropriate. Some cross-membership on committees is anticipated. The three committees will also meet together as appropriate, to ensure the most efficient use of available resources and to integrate the research, stewardship, and education goals.

### **Action 3: Recruit and maintain staff**

The UTMSI will implement the Reserve program by hiring, directing, and maintaining Reserve staff.

### **Staff Requirements**

Implementation of the goals and objectives for the Reserve is dependent upon adequate staffing levels. Although staffing levels may change through time and with availability of resources, a minimum staff is needed to manage and coordinate reserve activities. Initially, the Reserve staff will consist of a reserve manager, research coordinator, stewardship coordinator, education coordinator, and necessary technical and administrative support staff. The functions and responsibilities of the key positions are described below. Additional staff positions (Figure 11) will be incorporated in the program as adequate funding becomes available.

### **Reserve Manager**

The reserve manager directs, coordinates and supervises all aspects of reserve operations and management including administrative, research, stewardship, and education activities. The reserve manager is directly responsible for the implementation of the reserve management plan, supervision of reserve staff, and acts as a liaison with federal, state, local, private entities, and advisory committees to achieve the goals of the Reserve. The reserve manager will be a university-funded UTMSI position. The reserve manager's duties and responsibilities will likely include:

- managing the Reserve operation on a day-to-day basis, prepare grant applications, proposal, budgets, reports and maintain necessary records;
- facilitating meetings of the RAB, research/monitoring, stewardship and education committees;
- representing the Reserve and its policies at public meetings and hearings;
- overseeing the research/monitoring, stewardship, and education programs of the Reserve;
- coordinating with other program managers on activities that might affect the Reserve;
- monitoring day-to-day operation of the Reserve and progress of research/monitoring, stewardship, and education plans;
- supervising reserve staff members;
- overseeing facilities development, site selection and changes in reserve boundaries with advice from RAB and other advisory committees;
- preparing required semi-annual, and annual reports and work plans for NOAA and other possible sources of funding
- directing and coordinating with NOAA on any changes in the reserve management plan;
- working with NOAA in the development of national policy for the NERRS; and
- performing additional duties as required.

### **Support Staff**

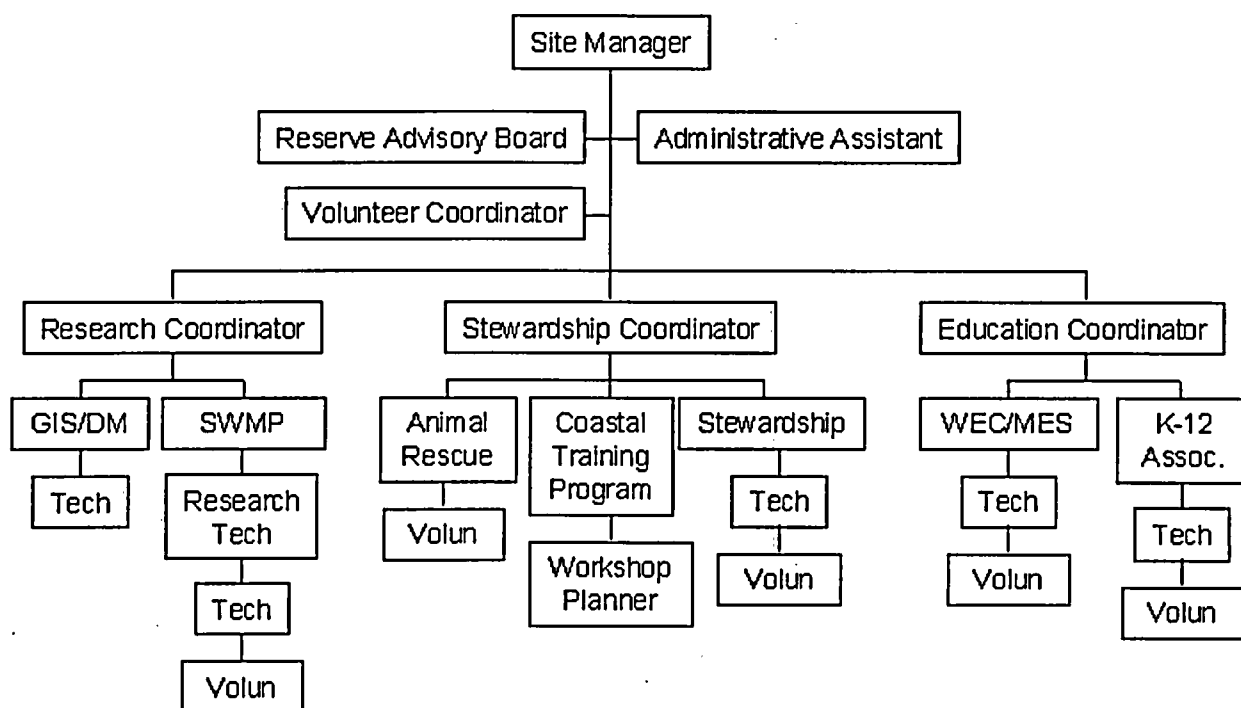
Additional staff may become necessary to accomplish the goals and objectives set forth in this reserve management plan

(Figure 11). Clerical and other technical support staff are key to efficient operation of the Reserve's programs. Clerical duties may include scheduling, public communications, office organization, web design and maintenance, minor accounting, and assistance in project production. Technical duties may include research assistance in sample and data collection and analysis, data interpretation and presentation, geographic information systems, data management, and training volunteers.

### Staff Qualifications

Reserve staff will be highly qualified individuals. The level of education and experience will vary with different levels of administrative responsibilities. The reserve manager and coordinators will hold at least an M.S. in an appropriate field for their position, however, a Ph.D. is preferred for these positions. More highly trained and experienced technical staff are called research associates, and entry-level staff are called research assistant. Student training is accomplished by incorporating graduate research assistants and undergraduate assistants in the program. Volunteers will consist of the general public and are not required to have specific qualifications.

Figure 7. Reserve staff structure. Abbreviations: Volun = volunteer, DM = data management, WEC = wetland education center, MES = marine education services, and Tech = technical staff.



### Research Coordinator

The research coordinator oversees the operation and implementation of the Reserve research and monitoring programs, interacts with the Research and Monitoring Advisory Committee and other research institutions and individuals to fulfill the research objectives of the Reserve. The research coordinator reports to the reserve manager and also coordinates with the reserve education and stewardship coordinators to present scientific data in a user-friendly manner. In addition, the research coordinator will maintain close contact with and inform the OCRM of the progress of NOAA-funded research and monitoring activities. The research coordinator will be a university funded UTMSI position. The research coordinator's duties and responsibilities will likely include:

- assisting the reserve manager and other participating agencies and entities in preparing and updating an annual list of priorities for research and monitoring projects and conducting a peer review process for proposals when

- needed;
- evaluating the results of the peer review process for proposals and making recommendations to the reserve manager and RAB;
- implementing the research program for the Reserve;
- serving as a liaison with the scientific community, promoting data utilization and acting as the primary contact for scientists performing research in the Reserve;
- providing staff support for the Research/Monitoring Advisory Committee
- coordinating all special studies and research activities within or related to the Reserve;
- coordination, interpretation, and application of research results;
- coordinating training of volunteers, research assistants and interns, and monitoring/evaluating their performance;
- recommending locations for research and monitoring stations within the Reserve and providing technical advice and assistance to scientists conducting research and monitoring as available;
- ensure that field journal and photographic records of on-going research activities are maintained;
- representing the Reserve at public meetings;
- working with the stewardship and education coordinator to develop suitable methods to disseminate reserve-related information;
- working with NOAA on system related projects (i.e. SWMP);
- developing additional research guidelines and policy statements as new issues arise;
- coordinating with the reserve manager in the performance of these responsibilities; and
- participating in the development of research and monitoring facilities and the purchase of research and monitoring equipment.

#### **Action 4: Solicit funds via grants**

The Reserve staff will solicit additional funding through grants by actively seeking grant opportunities, preparing applications, and working with partners to leverage resources.

Many federal agencies periodically announce funding availability for projects that target the protection, preservation and management of coastal resources and estuarine areas. The Reserve will continually seek opportunities from these agencies. Examples of federal agencies that may fund/support research in the NERR include: the NOAA Office of Ocean and Coastal Resource Management, NOAA Sea Grant, NOAA Coastal Services Center, the Environmental Protection Agency, U.S. Geological Survey, the Department of the Interior and the Gulf of Mexico Program.

State agencies charged with protecting and regulating Texas's coastal resources occasionally provide funding opportunities to support research efforts. Examples of some of these agencies include: Texas General Land Office (GLO), Texas Parks and Wildlife Department (TPWD), Texas Commission of Environmental Quality (TCEQ), Texas Coastal Coordination Council and the Texas Coastal Management Plan, and the Coastal Bend Bays and Estuaries Program. Several private commercial and industrial businesses as well as non-profit organizations in South Texas support environmental research within the community through grants and contracts. Support for the Reserve by these businesses is strong. It is anticipated that sources of funding will exist through these businesses.

#### **Action 5: Develop and operate a program for gifts to enhance Reserve activities**

The UTMSI and Reserve manager will develop and operate a program to encourage gifts to the Reserve. A gift program can be accomplished by creating a Friends group, soliciting donations from organizations, and working with partners to identify potential donors and solicit gifts. A gift program will allow the Reserve to perform activities that enhance Reserve programs. Activities may include hosting notable researchers, recruiting staff, and funding graduate student fellowships.

#### **Action 6: Foster partnerships for research**

The Reserve offers a permanent place where research institutions may coordinate their projects and compare results. This benefit was recognized immediately and interest in forming partnerships to develop the Reserve began at this

project's inception. Numerous opportunities exist to develop additional partnerships and cooperative working agreements with agencies and institutions. Existing positive relationships between universities already exist and will be strengthened through the development of mutually beneficial studies. A strong scientific interest in the Reserve exists and will facilitate the development of cooperative agreements between the NERR and other agencies/institutions.

**Goal 2: Increase understanding of coastal ecosystems by diverse audiences**

***Objective 2-1: Support K-12 and stakeholder education and outreach programs***

Oversight of education and outreach activities will be provided by the Reserve manager and the education coordinator. Support of the following activities will be provided for by Reserve funds:

- Travel to relevant conferences and public seminars
- Obtain and maintain computer capabilities to support electronic linkage between on-site research and monitoring efforts and interested schools and other groups using the world-wide web (coordinated with research program).
- Identify and seek financial (funding), material (e.g., literature), and cooperative (e.g., personnel) resources that can support the educational programs of the Reserve
- Establish and maintain a listing of available coastal, estuarine, and anthropogenic related educational materials, resources and facilities (coordinated program evaluation process).

**Action 1: Develop, execute, and revise a Reserve management plan**

The UTMSI will develop and execute the Reserve management plan. The UTMSI will revise the management plan every five years with advice from the Reserve Advisory Board. Revision of the management plan will update and create new objectives for the education and outreach plan.

**Action 2: Obtain advice on the program from the broader community**

Advice on the program from the broader community will be obtained through the RAB and the Education Advisory Committee. The first task of the advisory committee will be the development of a needs assessments for target audiences. Needs assessments are a systematic investigation of an audience to identify aspects of individual skills, knowledge, interests, attitudes, or abilities relevant to a particular issue, organizational goal or objective. Needs assessments are designed to collect sufficient information about a particular target group to design an effective program that addresses the group's needs and desires. Education programs will be designed with evaluation components. Evaluation of programs allows for determination of effectiveness, achievement of stated goals, and an iterative process for improvement over time. Further information on the RAB and advisory committees can be found under objective 1-1, action 2.

**Action 3: Recruit and maintain staff**

The UTMSI will implement the Reserve program by hiring, directing, and maintaining Reserve staff. Further information on staff requirements, support staff, staff qualifications, and reserve manager responsibilities is listed in objective 1-1, action 3.

**Education Coordinator**

The education coordinator oversees the operation and implementation of the Reserve education and volunteer programs including on-site and outreach activities. The education coordinator also interacts with the Education Advisory Committee and other environmental education institutions and individuals to fulfill the education objectives of the Reserve. The education coordinator reports to the reserve manager and also coordinates with the reserve education and stewardship coordinators to present scientific data in a user-friendly manner. The education coordinator will a university funded UTMSI position. The education coordinator will work with reserve staff and an education advisory committee to determine the specific priorities of the reserve. Reserve goals will form the core of the Action Plan for the Reserve's Education, Interpretation and Outreach Program. They will be tied into national goals and objectives as they will be

pursued by the Reserve education program and draw upon the possibilities provided to the future NERR by a combination of: 1) the physical and biological characteristics of the Reserve (e.g., habitat diversity), 2) the potential users of the Reserve (e.g., schools, general public) and 3) the groups of people that will assist with the implementation of these programs including the state, federal and private partners and volunteer groups that will contribute to the operation the Reserve. The education coordinator's duties and responsibilities will likely include:

- assisting the participating agencies in preparing and updating an annual list of priorities for education, interpretation and visitor use programs to be developed for the Reserve;
- coordinating development of proposals for Reserve education, interpretation and visitor use programs and projects, and conduct a peer review process for the proposal received;
- coordinating approved education, interpretation and visitor use activities within the Reserve and communicating with other reserves, especially relating to education and volunteer programs;
- providing staff support for the Education Advisory Committee
- upon request, advising and coordinating government agencies on particular issues, questions or projects and their impacts on or relationship to the Reserve;
- assisting in training and supervising volunteers in education programs, and monitoring/evaluating their performance;
- keeping a photographic record of on-going education, interpretation and visitor use activities for use in slide presentations and exhibits;
- representing the Reserve at public meetings, civic groups, professional societies and other environmental organizations upon request, as available;
- working with the stewardship and education coordinator to develop suitable methods to disseminate reserve-related information;
- working with NOAA to develop national education policy for the NERRS;
- coordinating with the reserve manager in the performance of these responsibilities; and
- participating in the development of educational facilities, including trails and exhibits and the purchase of education and monitoring equipment.

**Action 4: Solicit funds via grants**

The Reserve staff will solicit additional funding through grants by actively seeking grant opportunities, preparing applications, and working with partners to leverage resources. Further detail on grant funding is listed in objective 1-1, action 4.

**Action 5: Develop and operate a program for gifts to enhance Reserve activities**

The UTMSI and Reserve manager will develop and operate a program to encourage gifts to the Reserve. A gift program can be accomplished by creating a Friends group, soliciting donations from organizations, and working with partners to identify potential donors and solicit gifts. A gift program will allow the Reserve to perform activities that enhance Reserve programs. Activities may include travel and housing scholarships for under served K-12 schools.

**Action 6: Foster partnerships for education**

The Reserve offers a permanent place where research institutions may coordinate projects and compare results. This benefit was recognized immediately and interest in forming partnerships to develop the Reserve began at this project's inception. Numerous opportunities exist to develop additional partnerships and cooperative working agreements local K-12 schools, local and regional colleges and universities. Existing positive relationships between traditional education entities already exist and will be strengthened through the development of mutually beneficial studies. A strong scientific interest in the Reserve exists and will facilitate the development of cooperative agreements between the NERR and other agencies/institutions.



**Goal 3: Promote public appreciation and support for stewardship of coastal resources**

***Objective 3-1: Provide oversight and support for stewardship activities***

Oversight of stewardship activities will be provided by the Reserve manager and stewardship coordinator. Support of these activities, such as travel and overhead, will be provided for by Reserve funds.

**Action 1: Develop, execute, and revise a Reserve management plan**

The UTMSI will develop and execute the Reserve management plan. The UTMSI will revise the management plan every five years with advice from the Reserve Advisory Board. Revision of the management plan will update and create new objectives for the stewardship plan.

**Action 2: Obtain advice on the program from the broader community**

Advice on the program from the broader community will be obtained through the RAB and the Stewardship Advisory Committee. The first task of the advisory committee will be the development of a needs assessments for target audiences. Needs assessments are a systematic investigation of an audience to identify aspects of individual skills, knowledge, interests, attitudes, or abilities relevant to a particular issue, organizational goal or objective. Needs assessments are designed to collect sufficient information about a particular target group to design an effective program that addresses the group's needs and desires. Some stewardship programs will be designed with evaluation components. Evaluation of programs allows for determination of effectiveness, achievement of stated goals, and an iterative process for improvement over time. Further information on the RAB and advisory committees can be found under objective 1-1, action 2.

**Action 3: Recruit and maintain staff**

The UTMSI will implement the Reserve program by hiring, directing, and maintaining Reserve staff. Further information on staff requirements, support staff, staff qualifications, and reserve manager responsibilities is listed in objective 1-1, action 3.

**Stewardship Coordinator**

The stewardship coordinator oversees the operation and implementation of the Reserve stewardship programs, interacts with the Stewardship Advisory Committee and other institutions and individuals to fulfill the stewardship goals of the Reserve. The stewardship coordinator reports to the reserve manager and also coordinates with the reserve education and research coordinators to present scientific data in a user-friendly manner. In addition, the stewardship coordinator will maintain close contact with and inform the OCRM of the progress of NOAA-funded stewardship activities. The stewardship coordinator will be a university funded UTMSI position. The stewardship coordinator's duties and responsibilities will likely include:

- assisting the reserve manager and other participating agencies and entities in preparing and updating and annual list of priorities for stewardship projects and conducting a peer review process for proposals when needed;
- implementing the stewardship program for the Reserve;
- serving as a liaison with the resource management community, promoting data utilization and acting as the primary contact for resource managers performing stewardship in the Reserve;
- providing staff support for the Stewardship Advisory Committee;
- overseeing the development of a site profile and ecological characterization of the Reserve;
- provide a forum for information exchange with local and state decision makers;
- coordinating all special studies and stewardship activities within or related to the Reserve;
- coordinating and overseeing habitat restoration activities within the Reserve;
- coordinating and overseeing animal rescue activities within the Reserve;
- developing the Coastal Training Program;
- assisting in the training of stewardship assistants and interns, and monitoring/evaluating their performance;
- providing technical advice and assistance to resource managers;

- keeping a field journal and photographic records of on-going stewardship activities;
- representing the Reserve at public meetings;
- working with the research and education coordinator to develop suitable methods to disseminate reserve-related information;
- working with NOAA on NERRS-related projects;
- developing additional stewardship guidelines and policy statements as new issues arise;
- coordinating with the reserve manager in the performance of these responsibilities; and
- participating in the development of stewardship facilities and the purchase of stewardship equipment.

**Action 4: Solicit funds via grants**

The Reserve staff will solicit additional funding through grants by actively seeking grant opportunities, preparing applications, and working with partners to leverage resources. Further detail on grant funding is listed in objective 1-1, action 4.

**Action 5: Develop and operate a program for gifts to enhance Reserve activities**

The UTMSI and Reserve manager will develop and operate a program to encourage gifts to the Reserve. A gift program can be accomplished by creating a Friends group, soliciting donations from organizations, and working with partners to identify potential donors and solicit gifts. A gift program will allow the Reserve to perform activities that enhance Reserve programs. Activities may include purchasing land for conservation from willing sellers.

**Action 6: Foster partnerships for stewardship**

The Reserve offers a permanent place where research institutions may coordinate their projects and compare results. This benefit was recognized immediately and interest in forming partnerships to develop the Reserve began at this project's inception. Numerous opportunities exist to develop additional partnerships and cooperative working agreements with neighboring industries, businesses, agencies and institutions. Support from adjacent industries during the review and nomination process of the Reserve has been extensive. Existing positive relationships between environmental and regulatory groups and private-sector industries already exist and will be strengthened through the development of mutually beneficial studies. A strong interest in the Reserve exists and will facilitate the development of cooperative agreements between the NERR and other agencies/institutions.

## 4.0 BOUNDARIES/ACQUISITION PLAN

### 4.1 Introduction

#### Boundary Criteria

National Oceanic and Atmospheric Administration (NOAA) boundary requirements are outlined in the federal register (915 C.F.R 921.11). These requirements are summarized below:

- *Key Land and Water Areas that Approximate an Ecological Unit:* Reserve boundaries must “encompass and adequate portion of key land and water areas of the natural system to approximate an ecological unit...” and should encompass resources representative of the total biogeographic habitat.
- *Encompass Areas with Adequate controls:* NOAA regulations require that there be a level of control over uses and activities to ensure that the ecological integrity of the Reserve is maintained for sustained research and education. Specifically, the regulations state that reserve boundaries must encompass the area within which adequate control has or will be established by the managing entity over human activities occurring within the Reserve.
- *Management Considerations:* The administrative burden and responsibility for operating a reserve and associated research, stewardship, and educational programs were a significant consideration in the site selection process and in the delineation of the Reserve boundaries. Given the limited funds available to support reserve programs, it is also important to develop a reasonable boundary that will establish a creditable reserve without creating an overwhelming administrative burden.
- *Research/Monitoring and Education Needs and Goals:* The research/monitoring and education needs and goals of the Reserve are an important consideration in developing a boundary. These needs and goals define the purpose of establishing a reserve, and should play a primary role in defining boundaries.

#### Boundary Description and Rationale

This plan must include an identification of ownership within the Reserve boundaries including land already in public domain (15 C.F.R. Part 921.13(a7i)). Ownership of public land within the Reserve boundary includes Aransas National Wildlife Refuge (USFWS), open water/bays (Texas General Land Office, GLO), and Goose Island State Park (TPWD). As authorized by the Texas Coastal Management Plan (4a, p.630) the University of Texas will hold a Coastal Lease for Scientific Purposes from GLO for state-submerged land within the Reserve boundary (Appendix 5). Ownership of private land within the Reserve includes Buccaneer Cove Preserve (Coastal Bend Land Trust), and the Fennessey Ranch. The northeastern and southeastern boundaries are defined by the Mission-Aransas estuary system.

The boundary of the Reserve is set back 1000 feet from the shoreline (easement) along more densely populated areas and adjacent to private lands (Figure 8). The area affected by the setback consists of submerged state owned land that is dedicated to the permanent school fund, some of which is already leased to private landholders, or property owned by local government entities. Some of this property is leased from GLO to private landholders to accommodate structures such as docks, piers, etc. Several private property owners have requested that the 1000-foot setback be removed along their property lines (Figure 11-13). This has occurred primarily along the shorelines of Redfish Point, southeastern Copano Bay and Port Bay. Letters from these property owners are included in Appendix 7.

In the public scoping meeting there were several requests to exclude the Gulf Intracoastal Waterway (GIWW), United States Army Corps of Engineers (USACOE) dredge spoil sites, and Texas Department of Transportation in holdings from the boundary Appendix 8. The GIWW and USACOE dredge spoil sites were excluded from the boundary (Figure 9). The Copano Bay causeway that bisects Aransas and Copano Bay was also excluded from the boundary with a 500' setback on either side of the bridge. The GIWW, dredge spoil sites, and Copano causeway are long standing active areas that will require continued maintenance.

Figure 8. Ownership designations of lands within the Reserve.

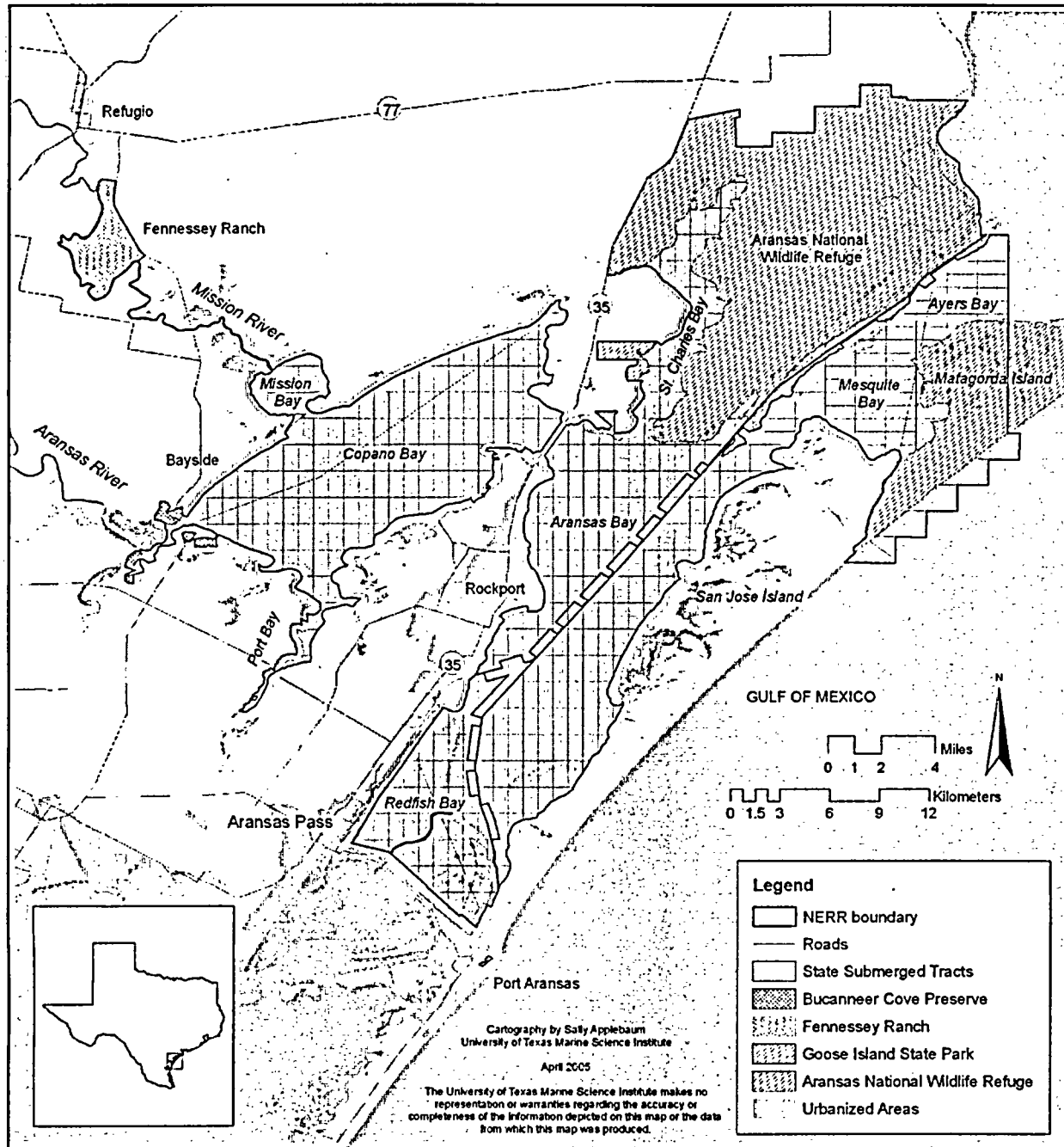
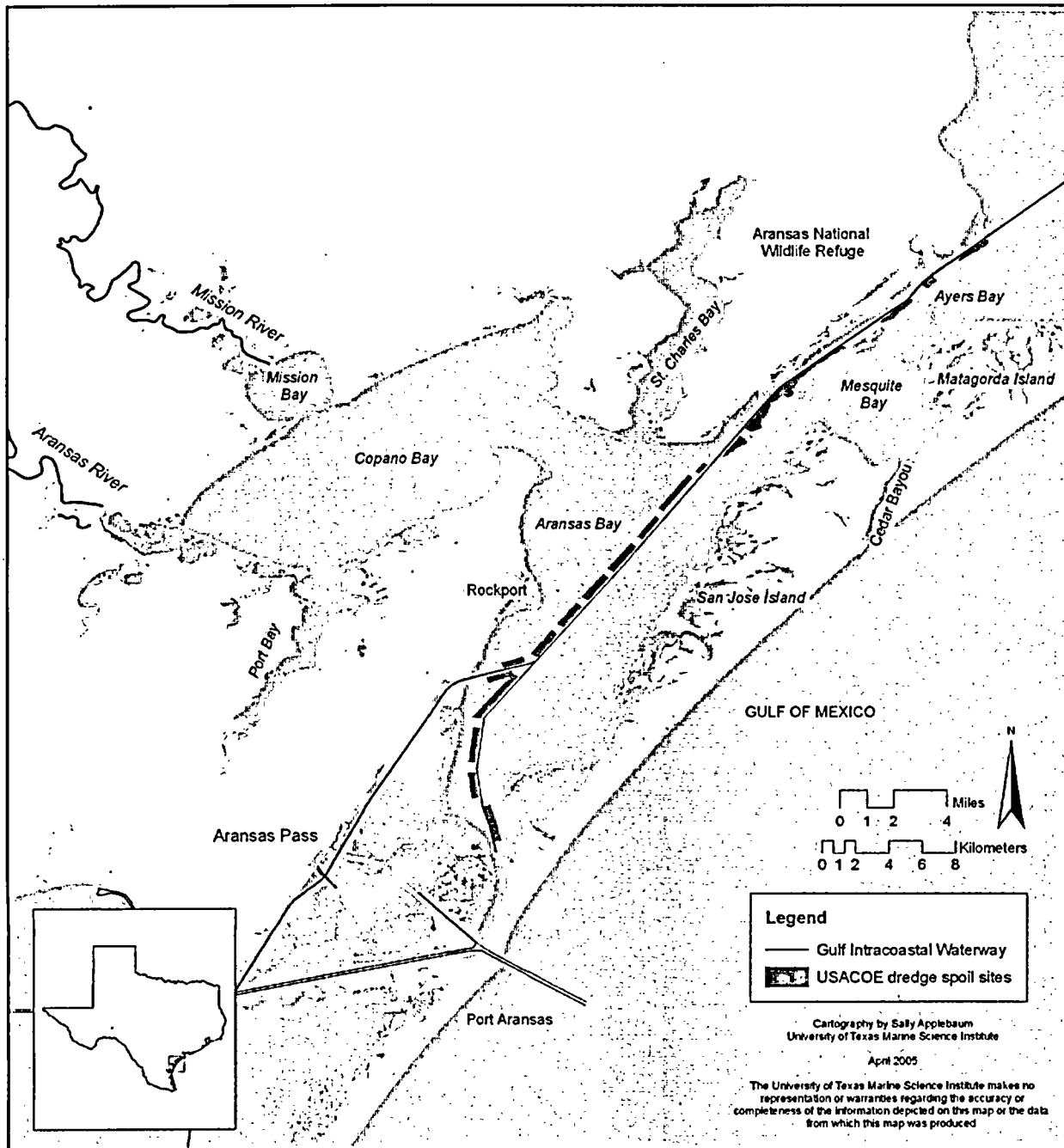


Figure 9. Gulf Intracoastal Waterway (GIWW) and USACOE dredge spoil sites excluded from Reserve boundary.



## **4.2 Program Goals and Objectives**

### **Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function**

#### ***Objective 1-2: Protect the integrity of core areas for long-term research***

##### **Action 1: Delineate core and buffer boundaries and identify existing protection**

Knowledge of the Texas coastal zone ecosystems structure and function will improve through long-term research in core areas. Land and water core areas are determined based on specific scientific knowledge of the area, and their representative of the total ecosystem, and which if compromised could endanger the research objectives of the Reserve.

As described at 15 CFR 921.11 (C)(3), NOAA research reserve boundaries generally include two subcategories: key land and water areas (called "core areas") and a buffer. NOAA defines core areas as ecological units of a natural estuarine system which preserve, for research purposes, a full range of significant physical, chemical and biological factors contributing to the diversity of fauna, flora and natural processes occurring within the estuary.

The term buffer refers to an area adjacent to or surrounding core land and water areas and essential to their integrity. Buffer zones protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. When determined appropriate by the state and approved by NOAA, the buffer zone may also include an area necessary for facilities required for research and interpretation. Additionally, buffer zones should be established sufficient to accommodate a shift of the core area as a result of biological, ecological or geomorphological change which reasonably could be expected to occur.

##### **Water Core**

The water core areas in the Reserve were chosen based on level of state control, habitats present, presence of active oil and gas wells, existing long-term records of research, and location for freshwater inflow analysis (Figure 10). Level of state control and habitats were identified by resource management code definitions within state tracts.

The locations of the water core areas ensure adequate long-term state control. State control provides sufficient protection to ensure a stable environment for research. Resource management codes (RMCs) were created to assist potential users of the state-owned submerged lands during the permitting process by the U.S. Army Corps of Engineers and are used to represent development guidelines (Table 4). The codes enhance protection of sensitive natural resources by providing recommendations for minimizing adverse impacts to sensitive natural resources from mineral exploration and development activities. The RMCs are based on recommendations from the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Texas Parks and Wildlife Department (TPWD), Texas Historical Commission, and the USACOE. The management codes indicate that only some of the area within the state tract contains those resources. Before beginning work on state submerged land, lessees may be required to conduct a survey for sensitive habitats and resources by the USACOE. In most cases, tract development may proceed when an applicant demonstrates that the development plan is not inconsistent with the concerns listed in the codes. When impacts to sensitive habitats or resources are unavoidable, development may be allowed, subject to negotiation for mitigation.

RMCs were used to delineate core boundaries because not only do they enhance protection of natural resources, but they also indicate presence of essential habitats and ecological units of a natural estuarine system. In particular, state tracts with the RMCs that indicated presence of marsh, submerged aquatic vegetation, archeological resources, oyster or serpulid reef, and additional oil and gas drilling restrictions were used to help delineate core boundaries (Figure 14). Locations of important bird rookeries, such as Harbor Island and Ayers Bay, were also taken into consideration in delineation of core boundaries (Figure 15). The isolated state tract in Aransas Bay represents a long-term station and an ideal location for placement of a System-wide Monitoring Program (SWMP) station because of its distance from San Antonio Bay and the Aransas Pass inlet to the Gulf of Mexico.

Buccaneer Cove Preserve is privately managed by the Coastal Bend Land Trust (CBLT), which ensures that long-term protection will occur. The primary goal of the CBLT is the preservation and enhancement of native wildlife habitat in

the Coastal Bend. In addition, the Buccaneer Cove Preserve and Harbor Island/Redfish Bay are identified as a high priority coastal habitat area to be protected during oil or hazardous material spills (Figure 16). Mission Bay and part of the Ayers and St. Charles Bay core sites are identified as a medium priority coastal habitat area. Priority areas were identified and prioritized by TPWD and GLO personnel in cooperation with other entities and are prioritized by utilization of fish and birds, as well as amount of wetland habitat.

Figure 10. Reserve core and buffer areas.

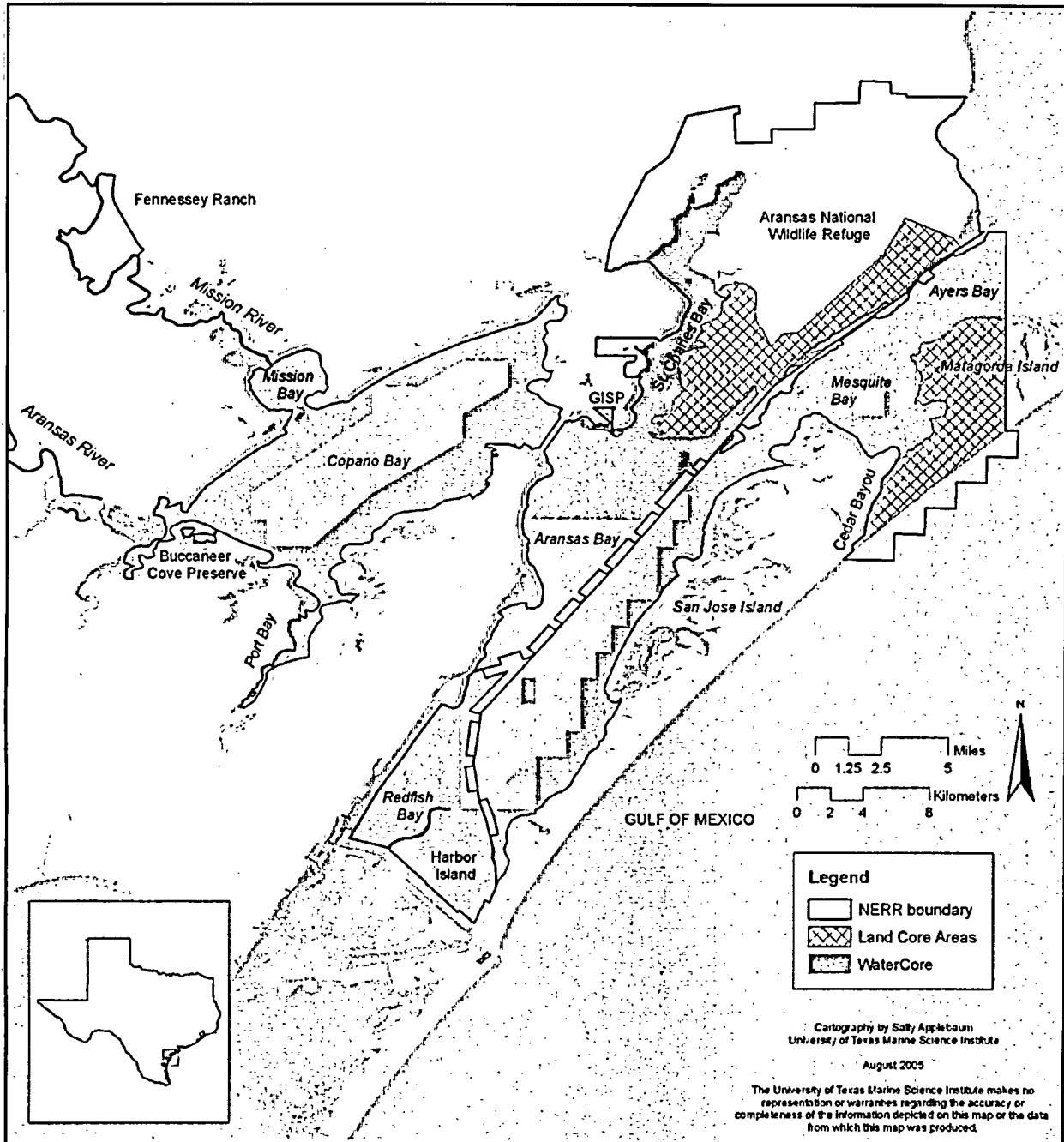


Figure 11. Closeup map of ANWR shoreline.

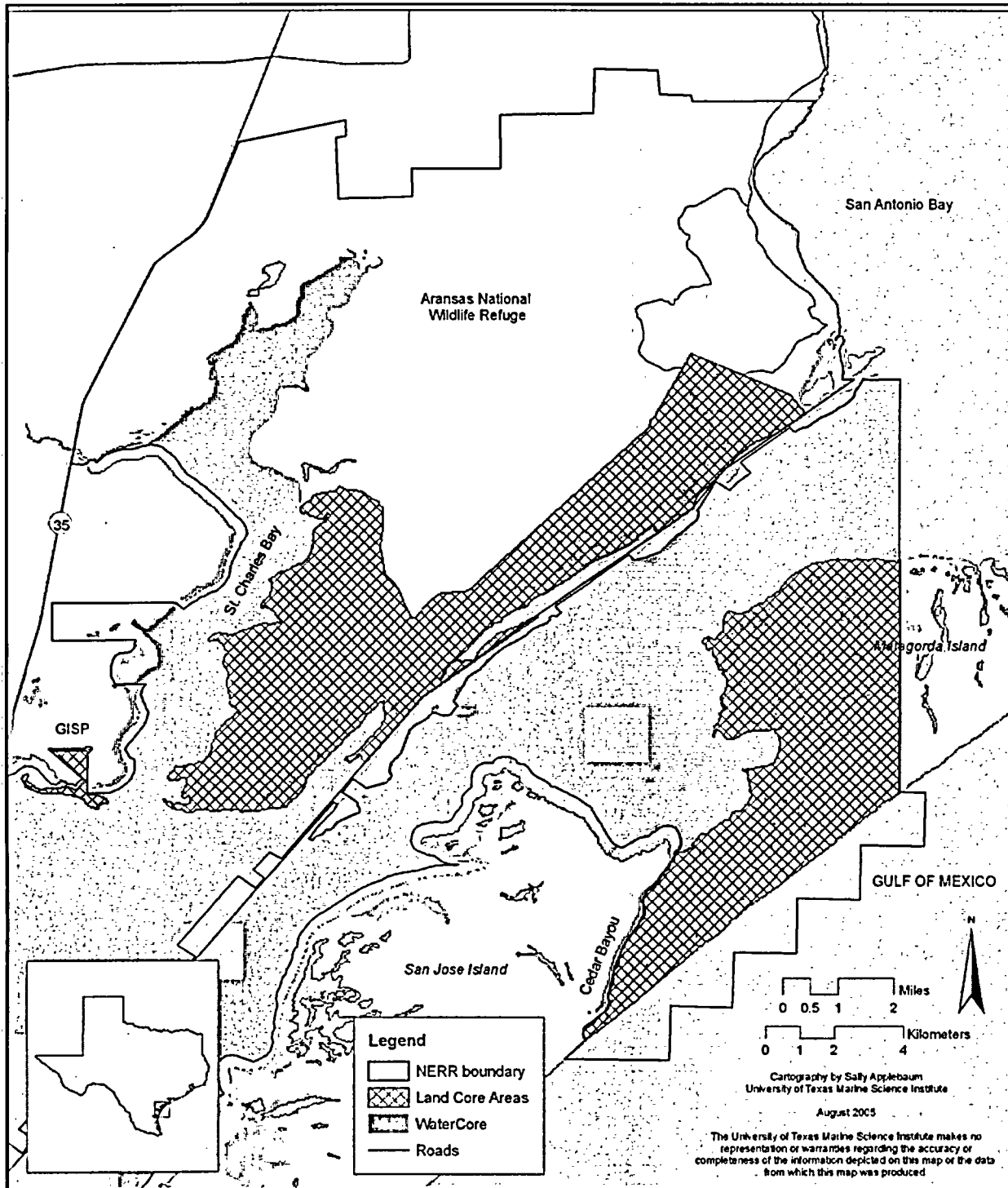




Figure 12. Closeup map of Live Oak Peninsula shoreline.

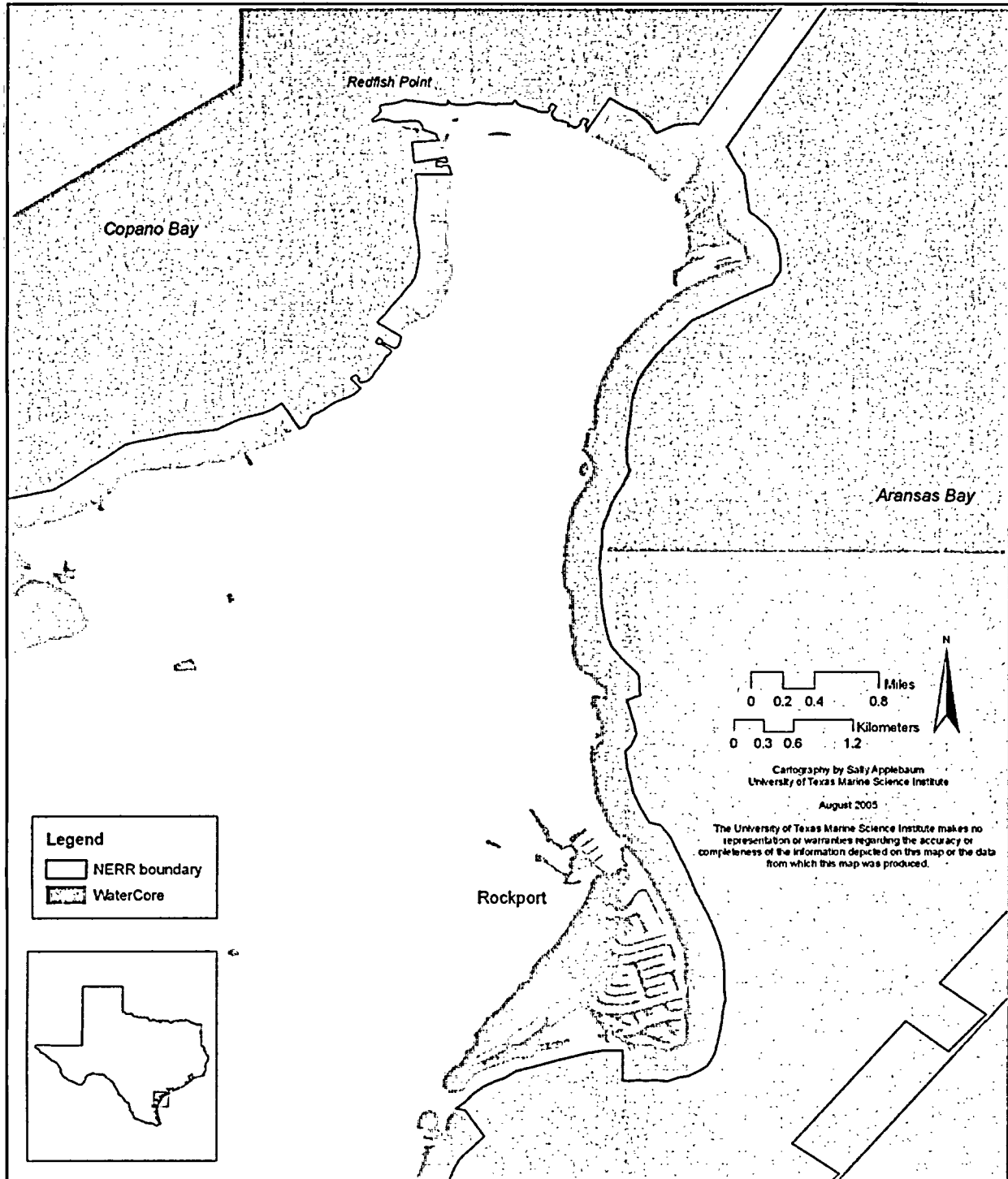


Figure 13. Closeup map of Southern Copano Bay and Port Bay.

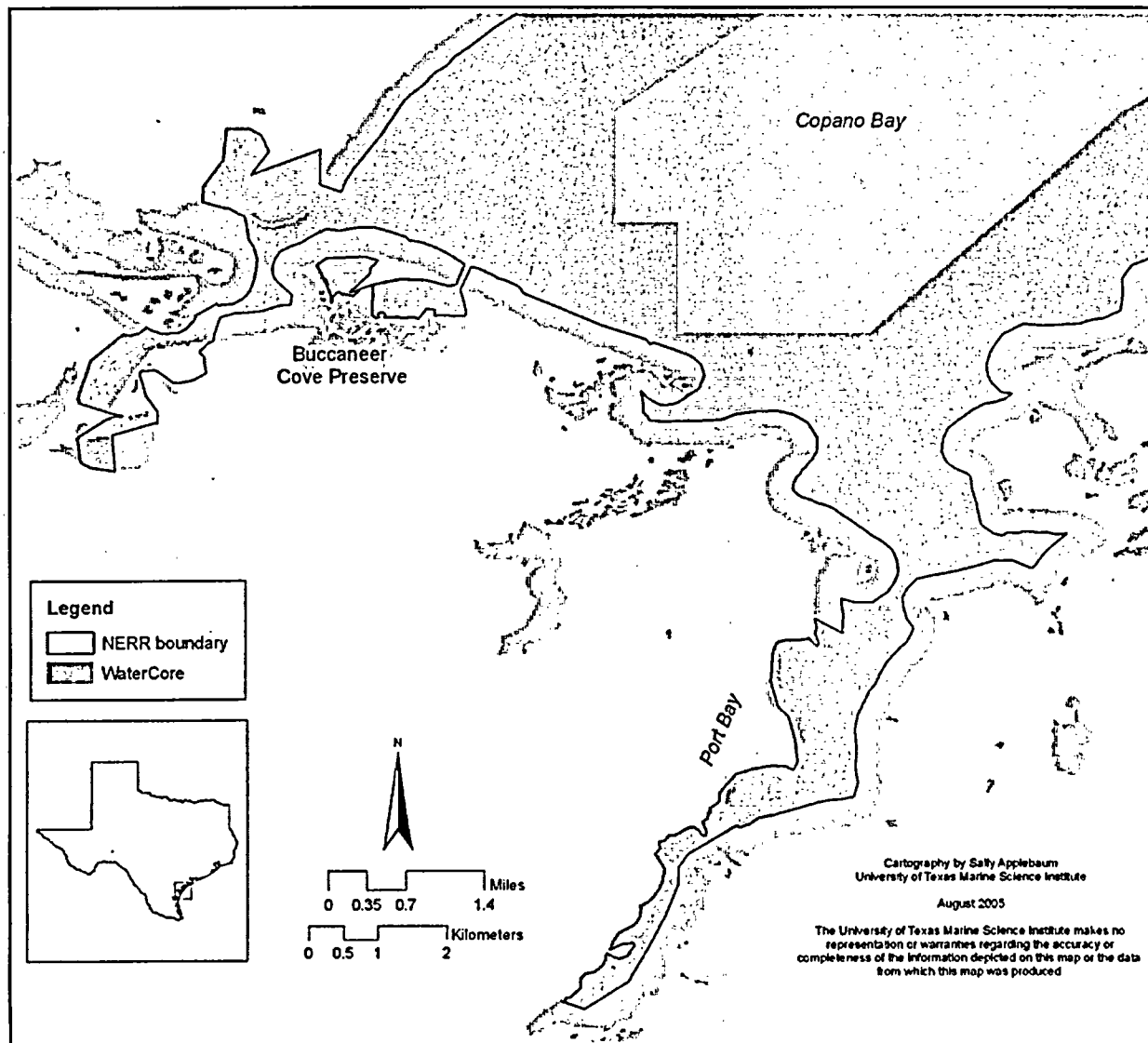


Figure 14. RMCs used to delineate water core boundaries.

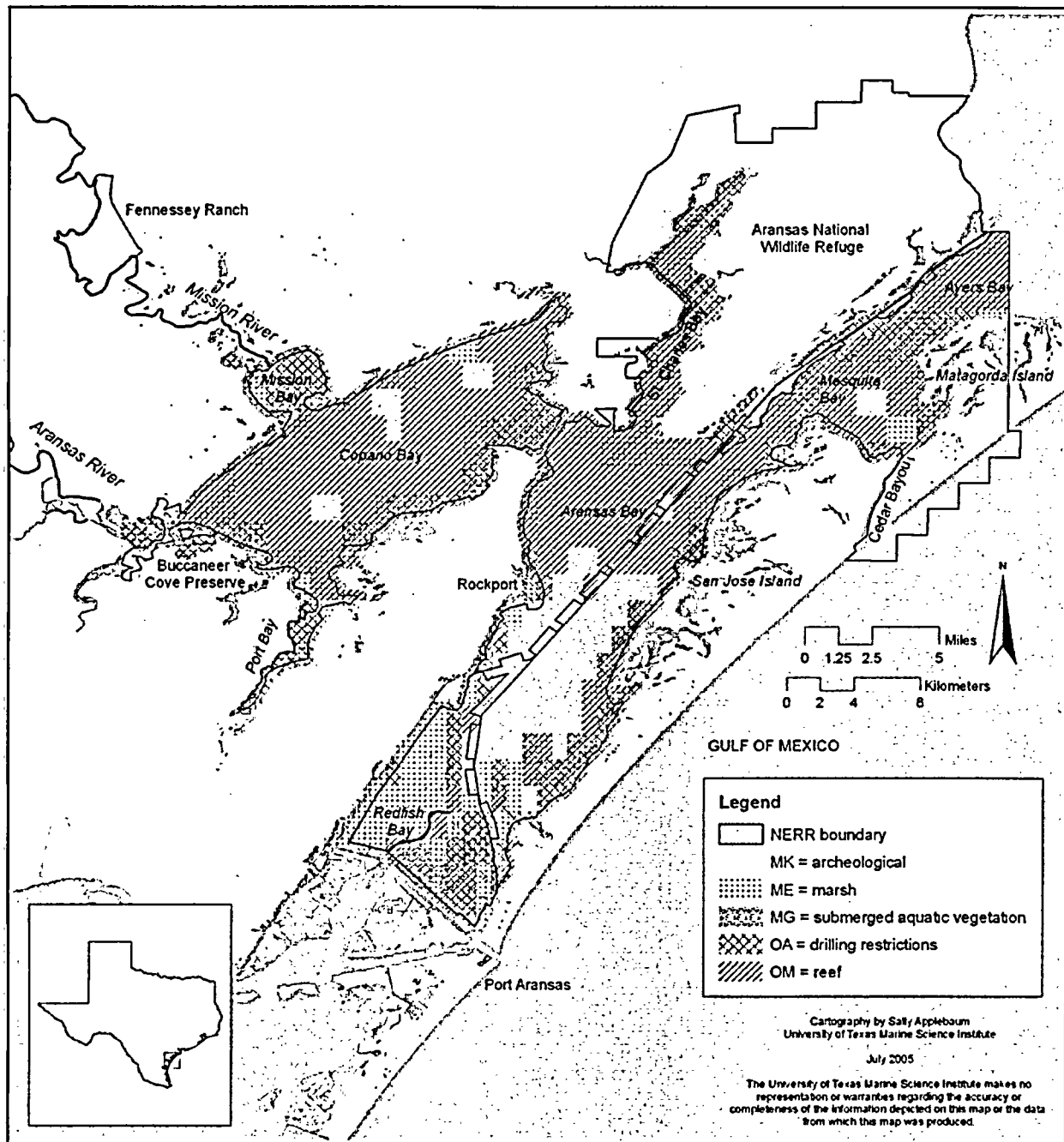


Figure 15. Bird rookeries within Reserve.

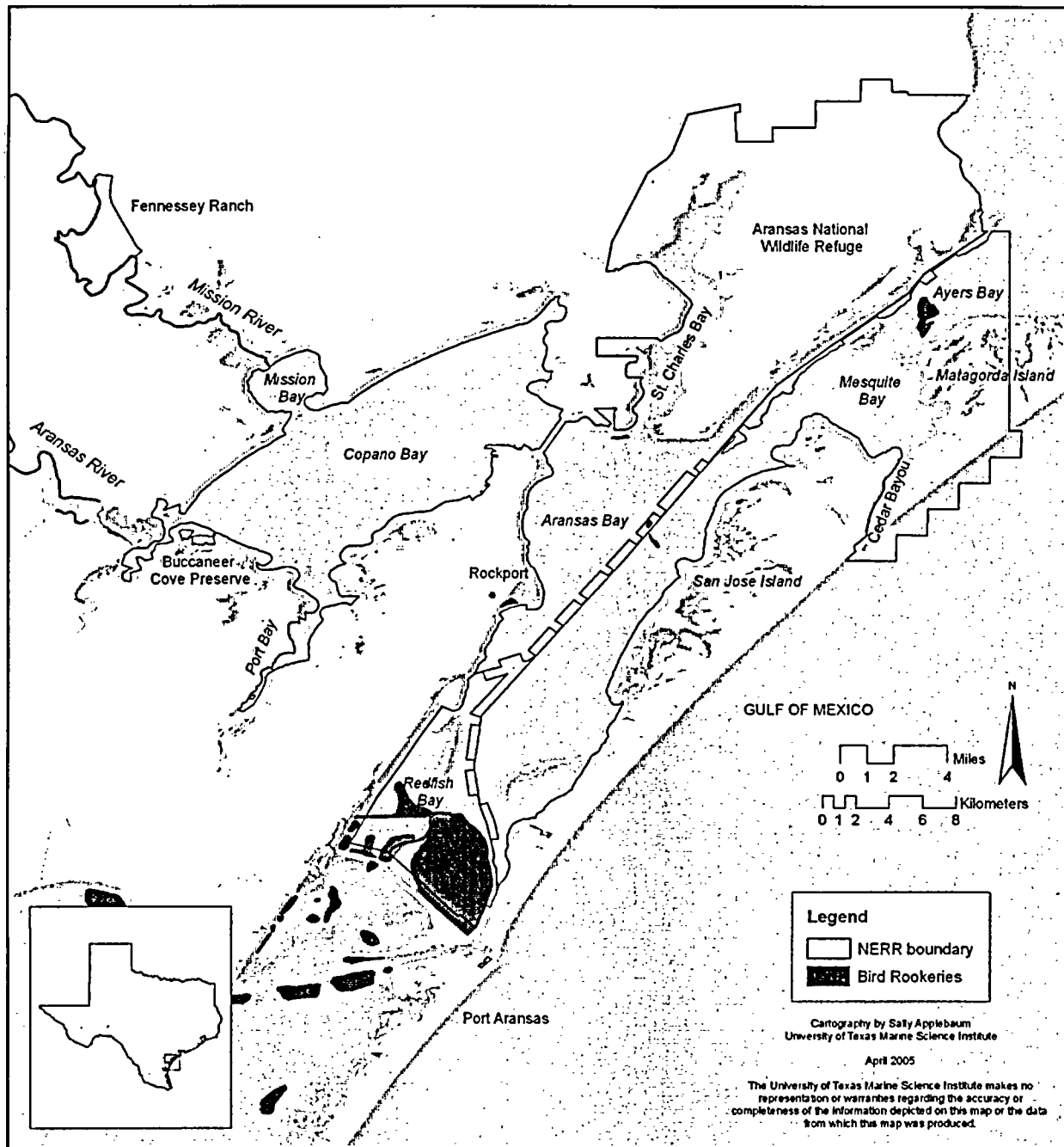
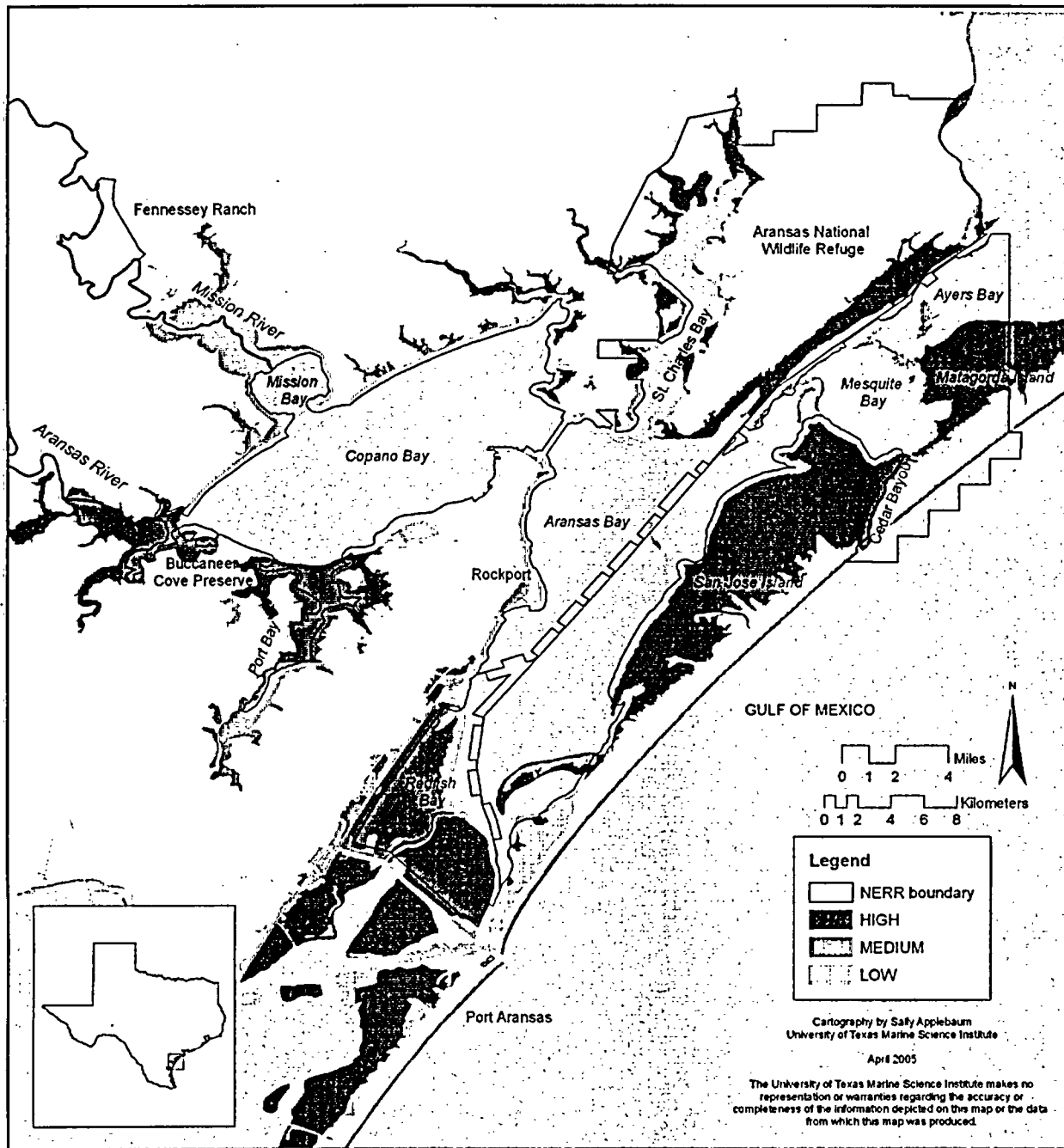


Table 4. Resource management code definitions. Codes in bold indicate essential habitats or restrictions that were used to delineate core boundaries. For more information on the Resource Management Codes, please contact the General Land Office. Last updated on 21 August 2001.

Code	Definition	Protection
CF	Channel Use	Vehicular access methods must be designed to avoid or minimize impacts on areas containing emergent marsh, submerged grassbeds or sand, mud, or algal flats.
DA	Dredging	Water depths on this tract may be sufficient for access without dredging. Dredging may destroy or degrade sensitive estuarine habitats and reduce the productivity of the bay.
DB	Dredging	No dredging in water less than 4 feet deep as measured from mean low water to protect shallow water areas which contain sensitive habitat.
ME	Marsh Habitat	Sensitive marine habitats exist within this tract, but oil and gas exploration and production activities, construction and operation activities, access routes, rights-of-way, and other activities may be permissible if sensitive areas are left undisturbed.
MG	Submerged Aquatic Vegetation	Seagrass has been documented on this tract, but oil and gas exploration and production activities, construction and operation activities, access routes, rights-of-way, and other activities may be permissible if sensitive areas are left undisturbed.
MK	Archeological Landmark	State archeological landmarks and/or other cultural resources protected by state law are known to be or may be located on this tract and should not be disturbed.
MR	Sedimentation	Reduce impacts of sedimentation on seagrass, marshes, oyster reefs, or other sensitive estuarine habitats in this tract.
OA or OS	Directional Drilling	Important marine habitat exists within this tract, and drilling activity and dredging of access channels may significantly damage the marine ecosystem. Directional drilling from off-tract locations may be required for mineral development of this tract.
OH	Depth Restriction	This tract has both deep (greater than 6 feet) and shallow water areas and/or adjacent uplands. To protect sensitive habitats in the shallow water, confine drilling activities to the deep-water areas or adjacent uplands.
OM	Oyster and Serpulid Reef	Avoid dredging, dredged material disposal, geophysical surveying, drilling, and pipeline and platform construction on the top or slopes of reefs, banks, hard bottoms, artificial reefs, historic reefs, serpulid reefs, or constructed reefs on this tract.
RW	Navigation	Navigational concerns such as navigational channels, dredged material placement areas, safety fairways, and anchorage areas exist within this tract.
TB	Time restriction	Tract contains whooping crane critical habitat. No construction, dredging, or drilling between October 15 and April 15. No permanent structures higher than 15 feet above mean water.
TC	Time restriction	Bird rookeries are located on or near this tract. No drilling, dredging, seismic exploration, construction activity, or watercraft landing within 1000 feet of a rookery during nesting season between February 15 and September 1.

Figure 16. Priority coastal habitat areas to be protected during oil or hazardous material spills as identified and prioritized by TPWD and GLO personnel in cooperation with other entities.



## Land Core

The land core areas provide essential key upland habitats and are divided into two different units: Goose Island State Park (GISP), and portions of the Aransas National Wildlife Refuge (ANWR) (Figure 10). GISP is located adjacent to the water core area of St. Charles Bay. The land core areas of GISP contains a wide variety of habitats including, live oak thickets or mottes, tidal salt marshes, and mud flats, that attract many migratory bird species. Goose Island State Park is managed by the Texas Parks and Wildlife Department (TPWD). The portion of the ANWR chosen as core area includes essential habitat (coastal prairie and marsh) for the endangered whooping crane. ANWR is managed by the United States Fish and Wildlife Service (USFWS).

Core land areas are under ownership and management of the TPWD, and USFWS. Existing regulations from TPWD and USFWS will ensure adequate long-term control and sufficient protection to ensure a stable environment for research. Regulations for mineral operations on TPWD and USFWS managed lands are bound to the goals and policies of the Coastal Management Plan (CMP) and Texas Railroad Commission (RRC) regulations. The Coastal Management Plan (CMP) has several pertinent policies for construction, operation, and maintenance of oil and gas exploration and production facilities in the Coastal Natural Resource Areas (CNRAs). Seagrasses, coastal wetlands, and tidal flats are identified and included in the CNRAs. If CNRAs are found in the area of proposed oil and gas exploration, applicants must take steps to avoid, minimize, restore, enhance, protect, or mitigate for any impacts. TPWD leases the land from GLO. The Texas Coastal Preserve System was created from the Coastal Public Lands Act, Section 33.001 which charges GLO with the responsibility to preserve the natural resources of the surface estate in coastal public land.

Upon acquiring a conservation easement, parts of the Fennessey Ranch may be considered as a core area. Fennessey Ranch is a privately owned wildlife habitat and is designed to be environmentally sound as well as an economically viable business. Environmental research is conducted on this land by the Environmental Protection Agency, Texas Commission on Environmental Quality, The University of Houston, and other organizations. Ranch programs are dedicated to wetland enhancement and wildlife management. The University of Texas at Austin will hold the conservation easement. The conservation easement will ensure that Fennessey Ranch will be retained forever predominantly in its natural and scenic condition. The easement will protect native plants, animals, or plant communities on Fennessey Ranch and prevent any use that will significantly impair or interfere with the conservation values and assure that traditional uses are compatible with the conservation values of Fennessey Ranch.

### Goal 3: Promote public appreciation and support for stewardship of coastal resources

The objectives of 3-2, 3-3, and 3-4 describe future acquisition and boundary expansion opportunities that will promote public appreciation and support for stewardship of coastal resources by including properties necessary to protect the integrity of the Reserve for research purposes, and for those parcels required for research and interpretive support facilities or buffer purposes. Currently, Fennessey Ranch is the Reserve's primary acquisition priority, Appendix 9. A conservation easement is anticipated for Fennessey Ranch to ensure long-term protection. Future acquisitions and boundary expansions will occur under current law, with willing sellers, and at fair market value. Future acquisitions and boundary expansion opportunities will be identified through a conference hosted by the stewardship coordinator. The conference will employ The Nature Conservancy's strategic, science-based planning process, called Conservation by Design, to identify the highest-priority properties for acquisition or boundary expansion. This method uses conservation area planning to develop a strategy. Conservation area planning consists of the "5-S Framework":

- **Systems** - Identifying the species, native communities and ecosystems that will be the focus of observation in an area.
- **Stresses** - Determining how our conservation targets are threatened, such as by habitat reduction or fragmentation, changes in natural flow patterns of waterways, or changes in the number of species in a forest, grassland or coral reef.
- **Sources** - Identifying and ranking the causes of the stresses.
- **Strategies** - Finding practical ways to reduce or eliminate threats through acquisition of interests in land and water, adaptive management or restoration of lands and waters, public policies based upon sound science, and promotion of compatible human uses.
- **Success** - Assessing our progress in reducing threats and improving the biodiversity and ecological health of a conservation area.

After high priority areas are identified, an acquisition plan will be designed for each property. The acquisition plan will:

- Identify the methods of acquisition to establish long-term control (likely including the less-than-fee simple option (e.g., conservation easement), management agreement, fee simple property acquisition, or a combination of these approaches;
- Determine, with appropriate justification, the minimum level of control(s) required;
- Identify the level of existing state control(s);
- Identify the level of additional state control(s), if any, necessary;
- Examine all reasonable alternatives for attaining the level of control identified, perform a cost analysis of each;
- Rank, in order of cost, the methods (including acquisition);
- Include an estimate of the fair market value of any property interest which is proposed for acquisition;
- Include a schedule estimating the time required to complete the process of establishing adequate state control of the Reserve;
- Involve only willing sellers;
- Include a discussion of any anticipated problems; and
- Identify possible funding sources, such as the NERRS facility and acquisition fund, and the Coastal and Estuarine Land Conservation Program (CELCP).

In addition, an assessment of the relative cost-effectiveness of control alternatives will include a reasonable estimate of both short-term costs (e.g., acquisition of property interests, regulatory program development including associated enforcement costs, negotiation, adjudication, etc.) and long-term costs (e.g., monitoring, enforcement, adjudication, management and coordination). In selecting a preferred method for establishing adequate state control over each parcel examined under the process described above, priority consideration will be given to the least costly method of attaining the minimum level of long-term control required. Generally, with the possible exception of buffer areas required for support facilities, the level of control required for buffer areas will be considerably less than that required for key land and water areas. This acquisition plan, after receiving the approval of NOAA, shall serve as a guide for negotiations with landowners.

*Objective 3-2: Expand boundary to shorelines where adjacent property owners are agreeable*

**Action 1: Contact adjacent property owners**

The boundary of the Reserve is set back 1000 feet from the shoreline (easement) along more densely populated areas and adjacent to private lands (Figure 8). The area affected by the setback consists of submerged state owned land that is dedicated to the permanent school fund, some of which is already leased to private landholders, or property owned by local government entities. Some of this property is leased from GLO to private landholders to accommodate structures such as docks, piers, etc. Several private property owners have requested that the 1000-foot setback be removed along their property lines. Letters from these property owners are included in Appendix 7. There is still a large amount of shoreline with critical mangrove, fringing marsh, and seagrass habitats. Using the Texas shoreline dataset generated by GLO staff (based on USGS 1:24000 scale hydro data, modified and updated by using DOQs (1995-96)) the total length of shorelines within the Reserve boundary is 290 miles or 1,529,188 feet. Expansion of the boundary to shorelines where adjacent property owners are agreeable will continue by contacting adjacent property owners who own large tracts of shoreline with valuable habitats.

**Action 2: Expand boundary onto shoreline**

The Reserve boundary will be expanded to the shoreline when adjacent property owner are agreeable and inform the Reserve by written notification.

*Objective 3-3: Expand boundary to include key wetland habitats*

**Action 1: Identify key wetland habitats**

Key wetland habitats will be identified by The Nature Conservancy's strategic, science-based planning process. Wetland habitats that are likely to be identified as key include shorelines along St. Charles Bay and Port Bay (Figure 17).



**Objective 3-4: Expand boundary to protect key watershed areas**

**Action 1: Identify key watershed areas**

Key watershed areas will be identified by The Nature Conservancy's strategic, science-based planning process. Watershed areas that are likely to be identified as key include the Aransas River Delta and property along the Mission River (Figure 18).

Figure 17. General wetland habitats that are likely to be identified as key areas for future acquisition.

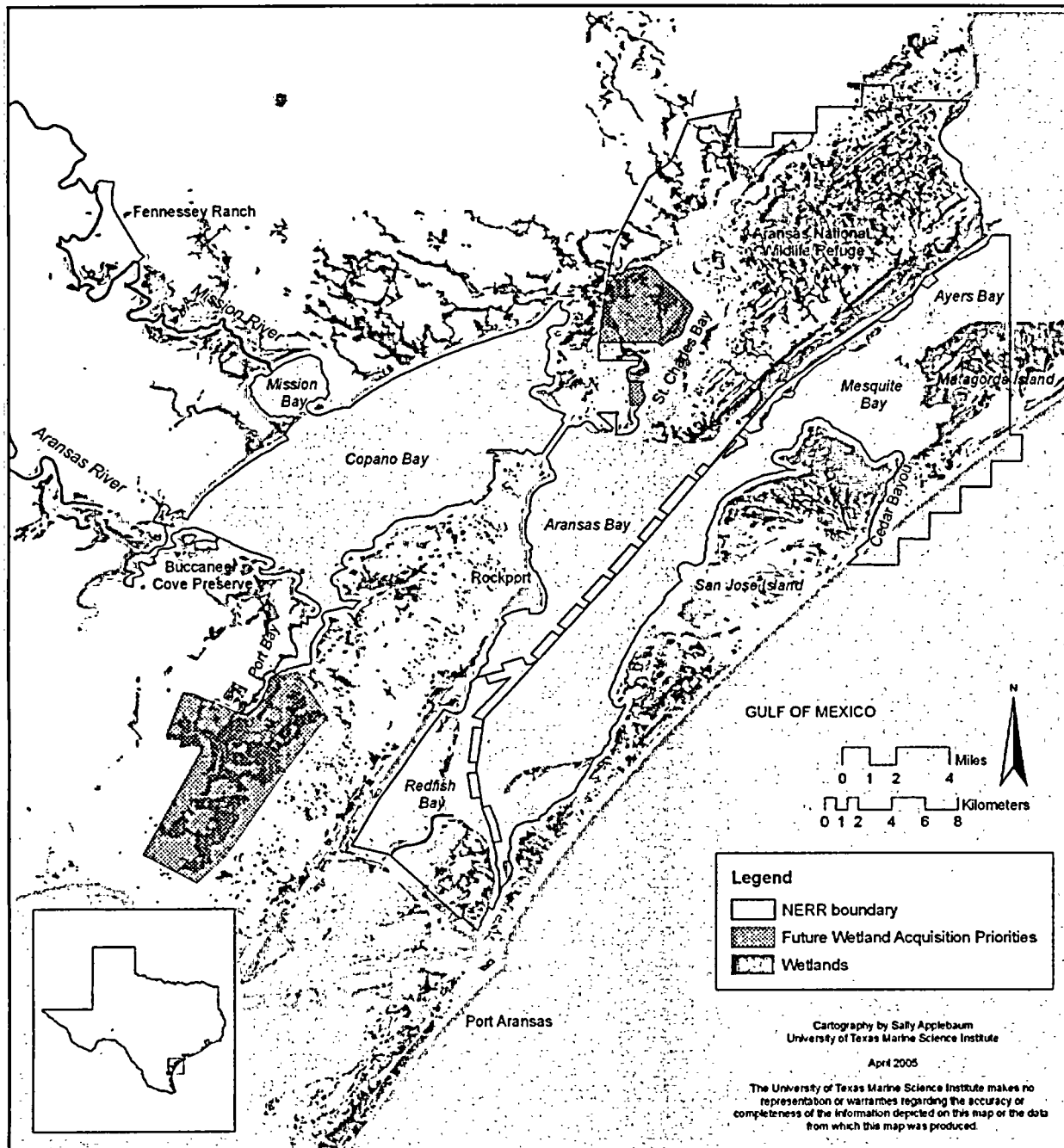
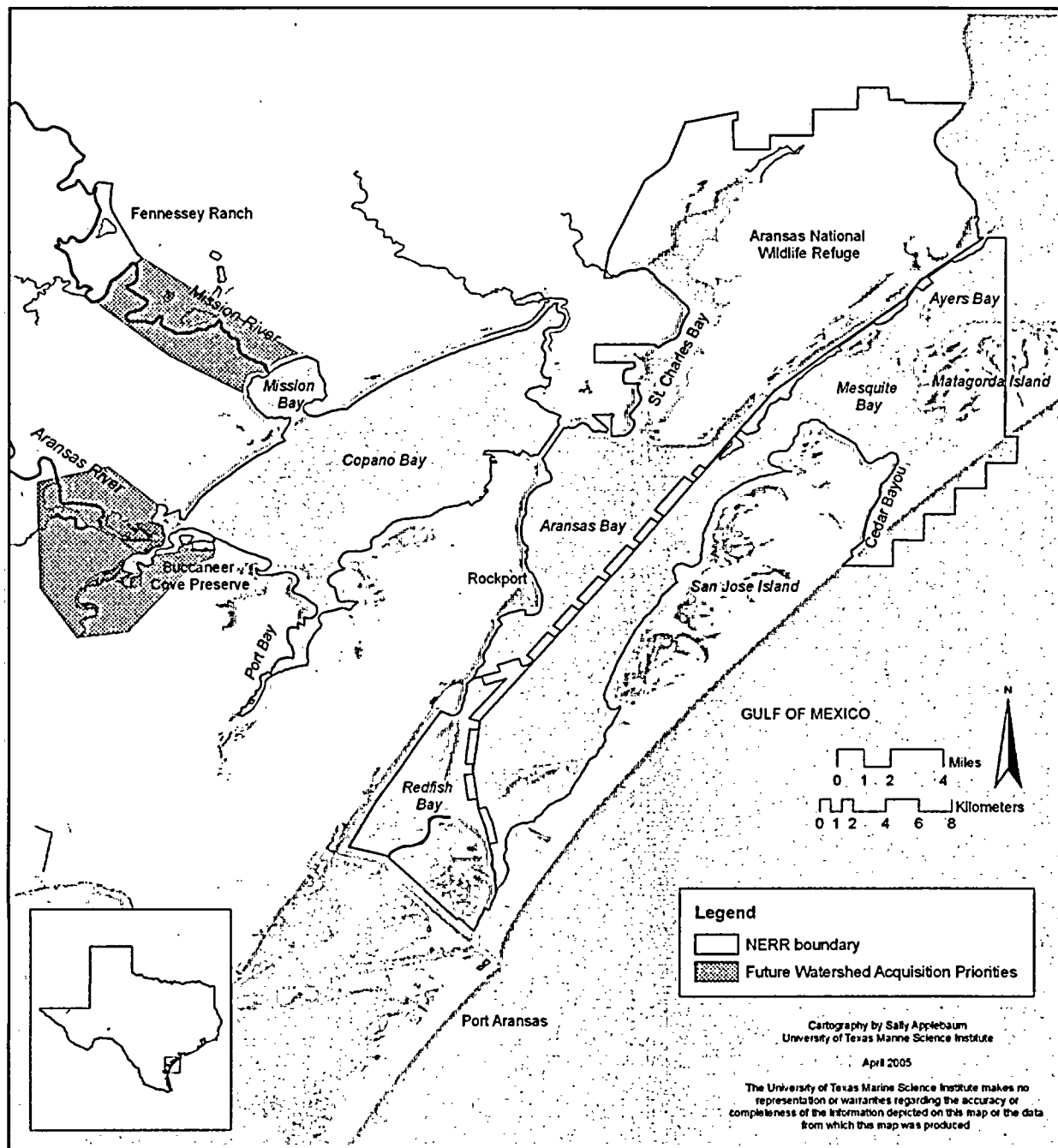


Figure 18. General watershed areas that are likely to be identified as key areas for future acquisition.



## 5.0 STEWARDSHIP PLAN

### 5.1 Introduction

The stewardship plan outlines specific projects that the stewardship staff of the Reserve will develop and conduct. A site profile and ecological characterization of the Reserve will be created in three different parts that include a demographic characterization, environmental characterization, and a site profile development. Initial analyses and development for the Coastal Training Program will be conducted under the demographic characterization of the site profile. Land management coordination will be a key responsibility because land management will not be conducted by the University of Texas Marine Science Institute (UTMSI). The restoration and mitigation initiative of the Reserve will be conducted in three steps: literature review, restoration science and mitigation plan, and initiation of restoration or mitigation projects. Partnership with local animal rescue programs will also be responsibilities of the stewardship staff. In addition, other specific types of programs that the stewardship staff may conduct are listed in this stewardship plan. A key component of the stewardship plan is creation of a stewardship advisory committee to provide reserve staff with community based input.

### 5.2 Program Goals and Objectives

#### Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function

##### *Objective 1-3: Update site profile and ecological characterization via ground-truthing of the GIS data base*

The goal of developing a site profile is to enhance research efforts by developing habitat inventory information and assimilating baseline data concerning the estuarine resources and habitats within a Reserve. It accomplishes this by compiling and synthesizing all the existing information (both contemporary and historical) available for the Reserve. It captures into a single, comprehensive document all that is known and what is not known about a reserve's natural and cultural resources at a particular point in time. The site profile improves the usefulness of the National Estuarine Research Reserve System (NERRS) as a whole from both the local and national perspectives. The site profile for the Reserve will be completed in three stages: 1) Demographic Characterization, 2) Environmental Characterization, and 3) Site Profile Development.

#### **Action 1: Demographic Characterization**

Demographic characterization involves the initial analyses for the Coastal Training Program, which includes a market analysis, needs assessment, market plan, and strategic plan. The demographic characterization will also involve a land development pressure analysis to be used in prioritization of land acquisition, as well as an economic valuation of habitats within the Reserve. The economic valuation will help affix a dollar amount to our estuarine system, and in turn will be useful in several aspects of marine policy, such as mitigation. The characterization will be aided by regional social science workshops. Characterization will also include implementation of the NERRS social science strategy. Geo-referenced census data will also be collected and made available to National Oceanic and Atmospheric Administration (NOAA) partners and staff.

#### **Action 2: Environmental Characterization**

Environmental characterization involves a literature search and a review of all existing research/field data. All available information that describes the geology, biology, chemistry, geomorphology, hydrology, etc. of the Reserve and with surrounding areas will be compiled. Information on research projects in the Reserve will also be cataloged and made available for an internal reserve research database. Aerial mapping of habitats will also be completed to provide a current footprint of the Reserve. This habitat mapping will use geographic information software (ArcView) to document change, and will strive to use the same classification system as other National Estuarine Research Reserve (NERR) sites.

#### **Action 3: Site Profile Development**

Site profile development involves a synthesis of information gathered during the demographic and environmental

characterization stage. The resultant document provides a picture of the Reserve in terms of its resources, management issues and constraints, and research needs.

The site profile will provide researchers, students, coastal zone managers, teachers, resource agency representatives and the public with a detailed summary of what is known about the Reserve, along with a discussion of issues of particular concern to the Reserve. Information contained in the Texas Site Profile will be particularly valuable to resource managers dealing with an issue affecting a reserve but who may not have or need the individual research papers completed within the Reserve.

*Objective 1-4: Protect core areas for long-term research*

**Action 1: Partner with Reserve partners to follow existing rules and regulations**

Protection of core areas for long-term research will be achieved by the partner participation in the Reserve Advisory Board (RAB). The RAB will work toward the following objectives, to the maximum extent practicable, as governed by their individual missions, bylaws or other operating instruments:

- to ensure a conducive setting for research and monitoring through long-term protection of the Reserve,
- to enhance public awareness and understanding of the Reserve and provide public education opportunities,
- to provide an opportunity by which research and monitoring activities at the Reserve will be communicated to coastal decision makers,
- to protect the integrity of the Reserve through implementation of the reserve management plan, and
- to assist with revision and updating of the management plan at least every five years.

**Goal 2: Increase understanding of coastal ecosystems by diverse audiences**

*Objective 2-2: Better inform decision-makers*

**Action 1: Develop a Coastal Training Program**

The coastal training program provides up-to-date scientific information and skill-building opportunities to individuals who are responsible for making decisions that affect coastal resources. Through this program, reserves can ensure that coastal decision-makers have the knowledge and tools they need to address critical resource management issues of concern to local communities. This program is a strategic progression from very successful coastal decision-maker workshops sponsored by NERRS.

The goal of the Reserve coastal training program is to have better-informed decision-making regarding coastal resource issues, and improved coastal stewardship at local and regional levels. The coastal training program at the Reserve will provide professional training and focus on issues such as coastal habitat conservation and restoration, mitigation, biodiversity, water quality and quantity, energy resource development, and sustainable resource management. The program will target a range of audiences, including land-use planners, elected officials, regulators, land developers, engineers, community groups, environmental non-profits and coastal businesses. This training program will provide a range of opportunities for professionals to network across disciplines, and develop new collaborative relationships to solve complex environmental problems.

The coastal training program will provide information and skill-building opportunities through a variety of formats ranging from seminars, hands-on skill training, participatory workshops, lectures and technology demonstrations. Participants will benefit from opportunities to share experiences and network in a multidisciplinary setting, often with a reserve-based field activity.

The stewardship advisory committee will play a key part in determining coastal resource issues to address, as well as the identification of target audiences. This advisory committee will be critical in the exchange and sharing of expertise and resources to deliver relevant and accessible training programs that meet the needs of specific groups.

Initial analyses for the coastal training program will be conducted under the demographic characterization of the site

profile. Prior to launching a coastal training program, initial analysis will include: a market analysis to identify other training providers and partnership opportunities, target audience selection and assessment of their training needs, establishment of an advisory committee, and development of an implementation strategy and a marketing plan for the training program. Several NERR sites have completed these steps and are providing information and training based on audience needs. Audiences identified by other NERR sites include municipal and county officials, regulatory agency staff, realtors and developers, tourism and development community, community and civic groups (garden clubs, chambers of commerce), senior citizen groups, and recreational and commercial resource users. A coastal training program will provide information exchange and skill building and hopefully showcase successfully implemented applications of new scientific information and technologies.

In the public scoping meetings there was interest for a program investigating the socioeconomic impacts of marine transportation in our area. Education of decision-makers on the socioeconomic impacts of marine transportation could be an ideal training opportunity for the Coastal Training Program.

The Texas Cooperative Extension Service and Natural Resources Conservation Service (NRCS) currently offer a watershed program to help educate the agricultural community on effective rangeland management to help minimize erosion, sedimentation, and runoff. Other programs offered by Extension and NRCS that will mesh well with the coastal training program and NERR include:

- Brush management conference
- Controlled burn seminar
- Nature booths at county fair
- Ranch heritage day

Collaboration with programs such as these will be valuable when developing the coastal training program.

#### **Action 2: Recruit and maintain staff to implement the Coastal Training Program**

The Reserve will recruit and maintain staff as needed to implement the Coastal Training Program after program initiation.

#### ***Objective 2-3: Improve the capacity to engage in ecotourism activities***

##### **Action 1: Develop an ecotourism docent training program**

Understanding of coastal ecosystems by diverse audiences will be promoted by the development of an ecotourism docent training program. This program would promote ecotourism by hosting an workshop for local fishing guides. Benefit to the public will be an increase in environmental awareness of tourist, and of the Reserve's user groups, such as fishing, kayaking, and birding guides. Motivation for the workshop will be a NERR ecotourism certification, that will increase business. A follow-up survey will be conducted to gauge the effectiveness of the workshop.

#### ***Objective 2-4: Provide outdoor educational experiences to scouting and other organizations***

**Action 1: Partner with organizations, such as the Aransas National Wildlife Refuge (ANWR), to provide educational experiences**

The Stewardship Training program for Boy Scouts and Girl Scouts will be operated through the stewardship program. The ANWR currently operates scout trips through their Youth and Environmental Training Area (YETA). These scout trips focus on service and stewardship. This program can be expanded through NERR by incorporating estuarine based activities such as Oceanography Day. Oceanography Day was a one-day scouting event offered by UTMSI every three years to provide scouts the opportunity to earn an oceanography merit badge. The Oceanography Day schedule included a series of displays, films, lectures and laboratory work that took place at the UTMSI facilities and a trip aboard a research vessel. Scouts would prepared for the trip by submitting a report, covering the first six requirements of the oceanography merit badge, to the Marine Science Institute prior to the trip. During this process, the scouts had to demonstrate their knowledge of the various branches of oceanography and the characteristics of different types of ocean waves. They had to understand and draw a cross-section of underwater topography and be familiar with various descriptive terms related to the ocean floor. They compared the depths of oceans to the heights of mountains on land.

The scouts learned about the properties of seawater and studied plants and animals that live in the sea. Perhaps the most interesting part of the adventure in Port Aransas was a trip in Corpus Christi Bay aboard the research vessels *Katy* and *Longhorn*. During the one-hour adventure scouts learned about the role of research vessels and observed some of research equipment in operation. The scouts were also able to observe plankton and nekton that had been previously captured by the crew of the vessels. Integration of Oceanography Day and the YETA programs would be exciting for scouts and a means of educating young people about the value of estuarine systems and why it is important to become good stewards of the land/sea interface.

**Goal 3: Promote public appreciation and support for stewardship of coastal resources**

***Objective 3-5: Monitor land management practices among Reserve partners***

**Action 1: Annual assessment of landowner management policies and practices**

Coordination of management activities will involve all the responsible land owners within the Reserve. An annual assessment of landowner management policies and practices will be performed by reserve staff and will emphasize coordinated projects, access, and information on key issues identified from the site profile analyses. Land management coordination will be accomplished by performing an analysis of this assessment to ensure that management policies and practices are consistent with the mission and goals of the Reserve.

**Action 2: Monitor habitats and management practices on Fennessey Ranch**

The Fennessey Ranch conservation easement requires regular monitoring of habitats and management practices. The monitoring program will be used to ensure responsible management of Fennessey Ranch. Changes to the Fennessey Ranch management plan will be based on sound science.

***Objective 3-6: Develop partnerships with locally-based animal rescue programs***

**Action 1: Partner with local organizations to enhance rescue programs**

The majority of animal rescue at the Reserve will be handled through cooperation and coordination with the Edith McAlister Animal Rehabilitation Keep (ARK) housed on the UTMSI campus. The ARK provides rehabilitation to injured animals endemic to the Mission-Aransas Estuary and its surrounding environs. The ARK got its start over 25 years ago and is currently the largest rehabilitation facility on the Texas coast. Facilities include a turtle laboratory, avian laboratory, raptor cages, all purpose cages, walk-in freezer, and several large turtle holding tanks. The ARK also participates in monitoring stranded animals along the Texas coast and cooperates with the Texas Marine Mammal Stranding Network and the Sea Turtle Stranding and Salvage Network. The ARK will also participate with volunteer coordination.

***Objective 3-7: Support existing clean-up and recycling programs***

**Action 1: Partner with local organizations to enhance clean-up and recycling programs**

The stewardship staff will look to expand the Monofilament Recovery & Recycling Program (MRRP). The MRRP is a statewide effort to educate the public on the problems caused by monofilament line left in the environment, to encourage recycling through a network of line recycling bins and drop-off locations, and to conduct volunteer monofilament line cleanup events. The MRRP is sponsored by the Texas Sea Grant Program. A stewardship goal of the Reserve is the expansion of this program to all the boat ramps, marinas, and other public access points within the Reserve.

A clean-up campaign will also be initiated to remove sunken boats and derelict structures from the bays. This campaign will partner with the Coastal Conservation Association (CCA) and Saltwater-fisheries Enhancement Association (SEA) for funding and organization. Both of these local organizations are already currently funding projects to remove derelict structures in and around the NERR boundary. The clean-up campaign could also include a beach debris quantification

survey. The Texas Commission of Environmental Quality (TCEQ) currently does an annual barrel cleanup on Matagorda Island. Collaboration with TCEQ would be valuable in expansion of the barrel cleanup on Matagorda Island.

*Objective 3-8: Promote Reserve initiatives at public events, fairs and expositions*

**Action 1: Create and participate in public events, fairs and expositions**

Creation of and participation in public events, fairs and expositions will promote public appreciation and support for stewardship of coastal resources. A likely public event that will be operated through stewardship is an annual "Bio-Blitz." A bio-blitz will be a day long survey of habitats that will be conducted by the public and willing researchers. Coordination with the research coordinator and staff will help determine the agenda. This program will incorporate both public outreach and research. Findings will be incorporated into the environmental characterization of the site profile. The bio-blitz will allow reserve staff to amass a large amount of knowledge on biodiversity in a relatively short amount of time.

Collaborations with other resource agencies and organizations for public events, fairs and expositions will also be a key responsibility of the stewardship staff. Such collaborations will include among others the General Land Office (GLO) beach cleanup, GLO Coastal Issues Conference, Coastal Bend Bays and Estuaries Habitat & Living Resources Implementation Team, Texas Cooperative Extension Service, and the GLO Coastal Texas 2020 program.

**Action 2: Create and disseminate interpretative materials or signs at public access sites**

Interpretive materials and signs promoting public appreciation and support for stewardship of coastal resources will be created and placed at public access sites.

*Objective 3-9: Initiate restoration and mitigation projects with appropriate partners*

The restoration and manipulation initiative of the Reserve will be completed in three stages: 1) Literature review, 2) Restoration Science and Mitigation Plan, and 3) Initiation of Restoration or Mitigation Projects.

**Action 1: Literature review**

Literature review involves a detailed literature review of restoration and mitigation projects of habitats found within the Reserve. The literature review also includes a review of the locations and results of all local mitigation and restoration projects within the Reserve.

**Action 2: Restoration and mitigation plan**

The restoration and mitigation plan involves identification of the areas within the Reserve in need of restoration or mitigation and the methods of which to achieve restoration in the identified areas. The restoration and mitigation plan will also highlight gaps in the knowledge of restoration and mitigation science, and will work with the research coordinator on proposal to fill these gaps.

**Action 3: Initiate restoration and mitigation projects**

Restoration and mitigation projects identified in the restoration and mitigation plan will be initiated. All habitat restoration and manipulation activities at the NERR will be reviewed and accepted by the RAB and NOAA prior to initiation. A likely restoration project that will be initiated includes partnering with existing seagrass conservation science programs. A collaboration with existing seagrass conservation science programs will be likely initiated to look at the effect of propeller scars, and other factors that may influence seagrass production.

## **6.0 PUBLIC ACCESS PLAN**

### **6.1 Introduction**

#### **National NERRS Priorities for Public Access**

Section 921.13(a) of the National Estuarine Research Reserve System (NERRS) regulations requires a plan for public access as part of the reserve management plan. Public access can be defined as the ability of all member of the community to pass physically and visually to, from, and along the ocean shore, other waterfronts, and over public lands. The ability to enjoy the oceans, bays and rivers is directly related to the ability to reach them from the uplands. A public access plan must try to allow for the long-term public use and enjoyment of the water and shoreline while minimizing damage to the resources themselves.

#### **Reserve Public Access Policy**

The Reserve public access policy will recognize the traditional uses and access to the Mission-Aransas Estuary as much as possible in an effort to maintain biological integrity of the area for these uses as well as for education, research, and monitoring. As outlined below traditional recreational and commercial activities that require access to the Reserve will continue to be allowed. This policy will be made compatible with the public access policy of each of the appropriate agencies having title to the lands in question (i.e., GLO, USFWS, TPWD, CBLT, and Fennessey Ranch). Specific policies for access for the purposes of education, stewardship, research and monitoring will be determined through coordination with each of these National Estuarine Research Reserve (NERR) programs. Acquisition of a conservation easement will likely increase public access to Fennessey Ranch. However, access may be limited or controlled in a equitable manner for resource protection, public safety, or for other reasonable causes.

### **6.2 Program Goals and Objectives**

#### **Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function**

##### ***Objective 1-5: Access to Reserve partner land and water areas for research activities***

##### **Action 1: Enhance access to land and water areas consistent with NERR purposes**

Present public access to the Reserve is adequate (Table 5). Current boat access includes 20 boat ramps within or near the Reserve (Figure 19). Boat access for NERR activities will also include boat access from the University of Texas Marine Science Institute (UTMSI) boat ramp and dock. In addition to boating access, there are access points for fishing, picnicking, camping, and wind surfing. Improvements to access points may be needed in the future to ensure research access.



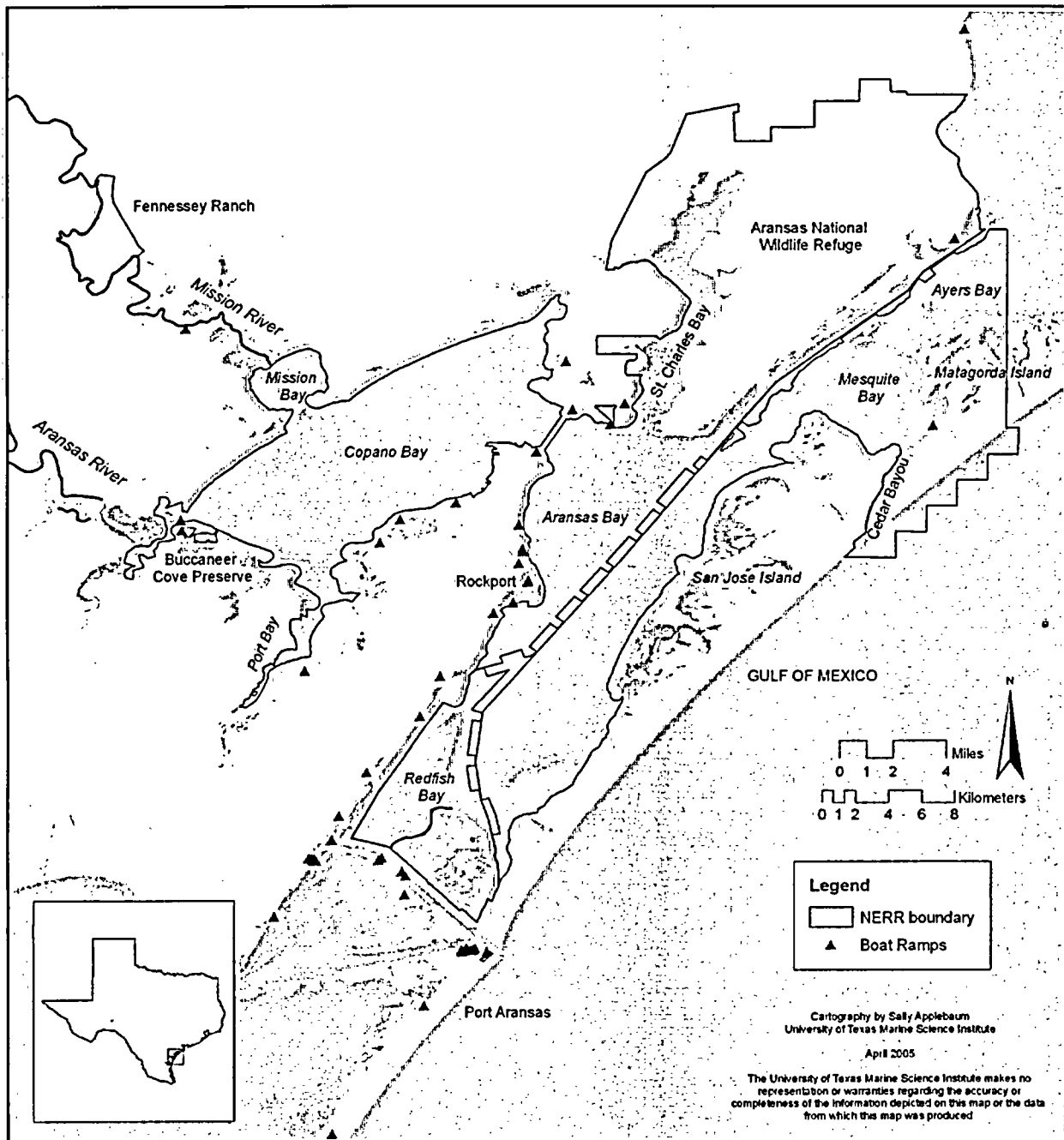
Table 5. Current public access sites within and near the Reserve with activities and facilities available.

Site/Area	Location	Fishing	Wildlife Viewing	Picnicking	Camping	Wind Surfing	Boat ramp	Boat Dock	Pier	Restroom	Electricity/ Lighting	Fresh Water	Conces- sion	Entrance/ Parking Fee	Access for the Mobility Impaired	Bay/River /Lake Access
12th Street	End of 12th Street, Lamar	•														•
Bob's Place	Rattlesnake Point Road, Rockport						•				•			•		•
Beacon Bait Stand	302 South Fulton Beach Road, Rockport	•					•	•	•		•		•	•		•
Copano Bay Bridge – South End	Highway 136, Bayside	•	•													•
Copano Bay State Fishing Pier	State Highway 35, Rockport	•	•				•		•	•	•		•	•	•	•
Copano Causeway North	North Highway 35, Rockport	•	•													•
Copano Causeway South	South Highway 35, Rockport	•	•													•
Cove Harbor Marina	161 North Cove Harbor Drive,	•	•				•	•	•	•	•		•		•	•
Fulton Fishing Pier	250 Deforest Loop, Rockport	•							•	•	•		•	•	•	•
Goose Island State Park	202 Palmetto Avenue, Rockport	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Highway 188	At Port Bay, Rockport	•	•													•
Little Bay	Near Rockport Beach Park, Rockport	•	•			•										•
Palm Harbor Marina	151 Port Avenue, Rockport				•		•	•		•	•		•	•		•

Site/Area	Location	Fishing	Wildlife Viewing	Picnicking	Camping	Wind Surfing	Boat ramp	Boat Dock	Pier	Restroom	Electricity/ Lighting	Fresh Water	Conces- sion	Entrance/ Parking Fee	Access for the Mobility Impaired	Bay/River /Lake Access
Palmetto Road	East end of Palmetto Road, south of Fulton						•									•
Redfish Camp	5220 FM 881, Rockport		•		•		•	•		•			•	•		•
Rockport Beach Park	210 Seabreeze Drive, Rockport	•	•	•		•	•	•	•	•	•		•	•	•	•
Sand Dollar Bait House	918 North Fulton Beach Road, Rockport		•				•	•		•	•				•	•
Sea Gun Marina	5810 Highway 35 North, Rockport	•	•				•	•								•
St. Charles Bay Boat Launch	175 Lamar Beach Road, Rockport	•					•	•	•	•	•			•	•	•
Aransas River Boat Ramp	South of Bonnie View	•		•			•									•
Copano Bay Bridge	FM 136, Bayside	•	•													•
FM 2678 Bridge	North of Mission River, Refugio	•	•													•
Hopper's Landing	FM 2040 & Hopper Road, Austwell	•			•		•	•			•			•		•
Mission River Bridge	FM 2678, Refugio	•	•													•
Refugio County Park	Bayside	•	•													•
Texas Parks & Wildlife	Off of FM 136, Bayside	•	•				•	•							•	•
Roberts Point Park	J.C. Barr Boulevard and Cotter, Port	•	•	•			•	•	•	•	•				•	•

Site/Area	Location	Fishing	Wildlife Viewing	Picnicking	Camping	Wind Surfing	Boat ramp	Boat Dock	Pier	Restroom	Electricity/ Lighting	Fresh Water	Conces- sion	Entrance/ Parking Fee	Access for the Mobility Impaired	Bay/River /Lake Access
South Bay Bait and Charters	1950 Highway 361, Port Aransas	•			•		•	•	•	•	•		•	•		•
Woody's Sport Center	136 West Cotter, Port Aransas						•	•		•	•		•		•	•
P.J.'s Marina	Port Aransas Causeway	•		•	•		•	•	•	•	•		•	•		•
Lonyo's Cajun Marina	Highway 361, Port Aransas Causeway,	•			•		•	•		•	•		•			•
Aransas National Wildlife Refuge	Aransas National Wildlife Refuge	•	•	•		•				•				•	•	•

Figure 19. Boat ramp locations within the Reserve.



**Goal 3: Promote public appreciation and support for stewardship of coastal resources**

***Objective 3-10: Ensure public and group access to Reserve partner education facilities and environments***

**Action 1: Enhance access to land and water areas**

Apart from possible improvements to the existing access facilities, there is little need for development of additional boat access points. Minor access needs are limited to construction of interpretive trails, and board walks (i.e., at Matagorda Island, UTMSI wetland education center, and the Public Research and Education Center). Major access needs include construction of a boat ramp in east Copano Bay adjacent to the Aransas County Airport, as well as renovation of bulkheads at the proposed Public Research and Education Facility, and Matagorda Island Education center. As currently envisioned, these facilities will be located on lands within the buffer zone of the Reserve and would provide public access and multiple uses associated with education, research, and monitoring. Reserve programs will also have access to Reserve partner boat ramps of UTMSI, Aransas National Wildlife Refuge (ANWR), and the Copano Bay research and education center that are not open to the public.

**Action 2: Seek funding for access vehicles for Reserve programs**

**Marine Education Vessel** - A vessel is required to transport classes to the Reserve. The requirement is for a 45-foot (plus motor-mounts and motors) vessel with a capacity for 40 guests, that has a shallow draft and can obtain high speed. It will be powered by two 225 hp, 4-stroke outboards to demonstrate the best available poll control. The deck will be 45' x 14'. Hull draft is 10" and with motors running 24". It will have a 140 gal. fuel capacity, a head with 60 gal. holding tank, and 60 gal. freshwater tank. It will list as 10 tons displacement and Coast Guard approved for 49 passengers. The total cost is \$270,000.

**Matagorda Island Marine Education Vessel** - A vessel is required to transport people to and from Matagorda Island. The requirement is for a 50-foot aluminum pontoon vessel with a capacity for 45 guests, that has a shallow draft and can obtain high speed. It will be powered by two 250 hp, 4-stroke outboards to demonstrate the best available poll control. Vessel will be maintained by ANWR personnel. An approximate price for boat and engines is \$80,000.

## **7.0 FACILITIES/CONSTRUCTION PLAN**

### **7.1 Introduction**

Facilities will enhance access to the Reserve and provide support for research and education programs. The Reserve is responsible for providing those facilities that are necessary to fulfill each reserve's mission as established by federal and state laws, administrative rules, interagency agreements and the reserve's management plan. Providing suitable facilities will promote achieving the educational and research goals of the Reserve and of the National Estuarine Research Reserve System (NERRS) as a whole. Facility development will proceed as funds become available, as prioritized in the reserve's management plan. All facilities will be designed to comply with the Americans with Disabilities Act, create minimum visual or environmental impacts, comply with building and wastewater codes, comply with appropriate environmental requirements, satisfy local, regional and national priorities by soliciting input from user groups and allowing for future expansion to meet long range goals.

#### Existing Facilities and Potential Facility Sites

Facilities currently existing at the Reserve consist of facilities at the University of Texas at Austin, Marine Science Institute (UTMSI), Aransas National Wildlife Refuge (ANWR), Goose Island State Park, and Fennessey Ranch.

##### *University of Texas at Austin, Marine Science Institute Facilities*

The Institute's 83,000 sq. ft. central complex is located on 72 acres of beach-front land and consists of a series of interconnected buildings containing laboratories, classrooms, televideo instruction room, offices, a library, museum, exhibit halls, visitor's center, auditorium, seminar rooms, and workshops (Figure 20).

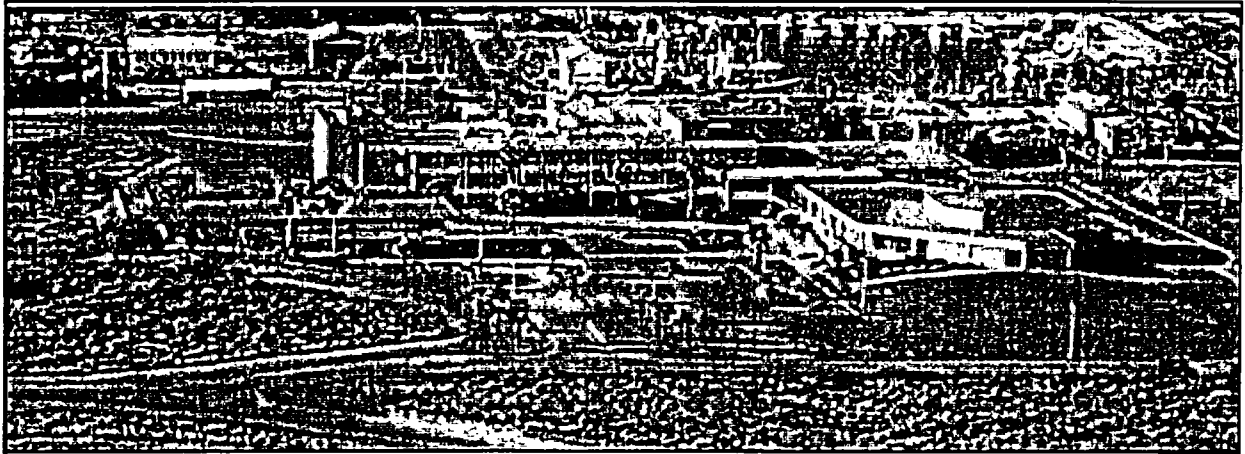
A 10,000 sq. ft. wet-laboratory is supplied with filtered running seawater. Other structures on the grounds of the Institute include 9,500 sq. ft. of dormitories, a cafeteria, physical plant complex, garages, greenhouses, walk-in freezers, and several outdoor pool/habitat tanks. The five-acre boat basin provides quick access for our research vessels to both the bay systems and the Gulf of Mexico.

A research pier allows direct access for research projects in the Aransas Pass tidal inlet connecting the Gulf with the bays. This 300 foot pier has a 1200 sq. ft. lab at its base and a 150 sq. ft. instrument room on the end. The terminus of the pier and instrument room house a weather station, tide gauge, current meter, and sensors for water temperature and salinity, all of which are transmitted to real time data displays in the Visitor's Center and main laboratory. The pier also has an electric winch for deploying sampling equipment such as plankton nets and large-mesh tide traps to study fluxes of biota through the inlet.

A mile west of the main building complex, the Fisheries and Mariculture Laboratory (FAML) occupies 26,000 sq. ft. of buildings on 10 acres adjacent to the ship channel. This facility includes four large laboratories which provide for temperature and photoperiod control. The FAML complex provides facilities for research on spawning and rearing of marine finfish and crustaceans and affords unique opportunities for research utilizing captive animals. Both the main laboratories and the FAML facility have office and laboratory space available for visiting scientists.

The Marine Science Institute's fleet of research vessels is led by its flagship, the R/V Longhorn, which is part of the University-National Oceanographic Laboratory System (UNOLS) fleet. The workhorse of UTMSI's bay operations is the R/V Katy, a 57-foot long trawler. The UTMSI research fleet is rounded out by several smaller boats, each with special capabilities for working in different habitats and performing different operations.

Figure 20. Overview of University of Texas Marine Science Institute.



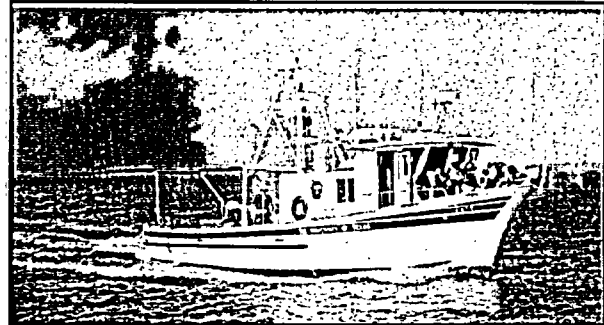
#### Research Vessel Specifications

##### The R/V Longhorn



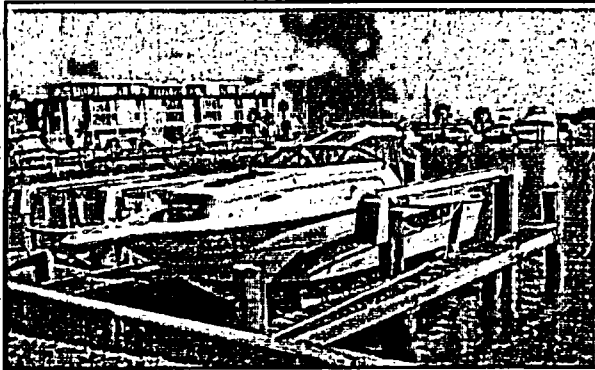
A 103 ft general-purpose coastal oceanographic research vessel, is capable of a 3,000 nautical mile range, complete with: dry laboratory (400 ft<sup>2</sup>), wet laboratory (400 ft<sup>2</sup>), main winch, crane, davit, deck space is available for vans, and two or three smaller workboats (16' carolina skiff and 16' zodiac inflatable boat are available), laboratory saltwater supply, seawater tanks, freshwater supply, compressed air supply, ctd, niskin bottles, reversing thermometers, 35' and 40' shrimp (otter) trawls, 1-meter plankton nets, smith-mcintyre sediment samplers, box-corer, piston corers, rock dredge, and safety equipment.

##### The R/V KATY



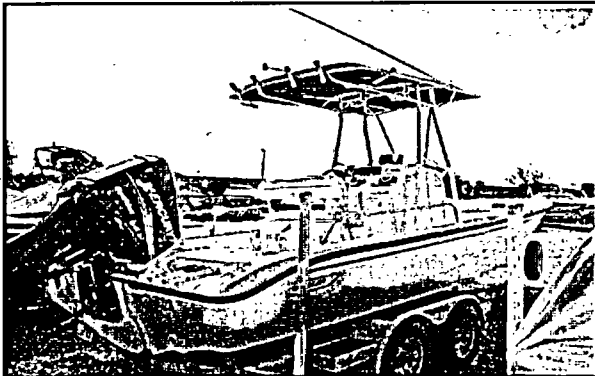
The Katy is 57 feet long and has a top speed of 10 knots. Below decks living quarters include bunk space for six. There is a complete galley with refrigerator and electric range. All the quarters are air conditioned. In addition to the normal controls on the bridge, there is a stern steering station. A wet laboratory space is semi-enclosed off the work deck. A compartment immediately forward of the wet laboratory space can be used as a day room for personnel, or can be rigged as an instrument room for research projects. This vessel's primary utilization is as a stern trawler for class trips sponsored by the MES. The Katy will be used by the NERR educational and outreach program.

#### VIP - R/V In Lieu of Diamonds



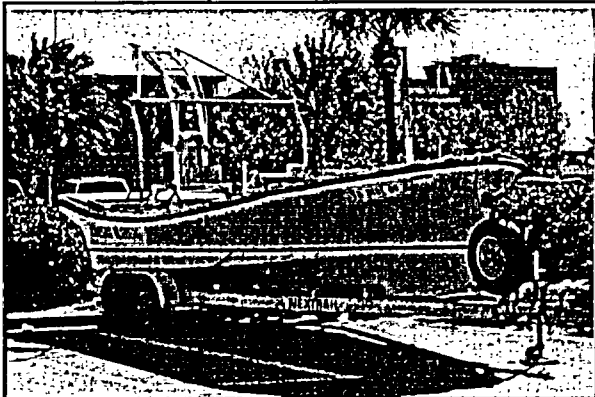
A 27-ft "walkaround" VIP Cruiser powered by a 260 hp inboard/outdrive, capable of bay work and offshore work in good weather. It has a v-berth, galley, head and canvas enclosures. Maximum capacity: 8 people or 1,200 lbs.

#### Dr. Cleo



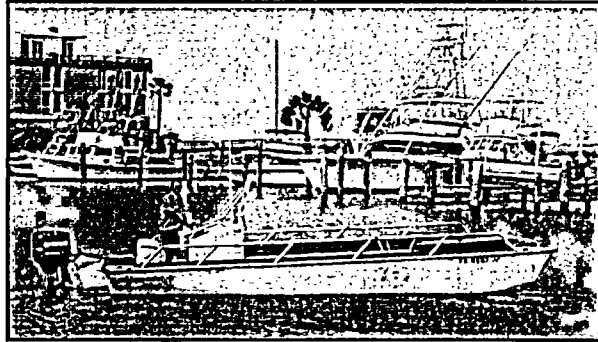
A 22-ft Boston Whaler center console with a 200 hp Mercury Optimax outboard engine. It is fully equipped with electronics and has a T-top. Suitable for bay and offshore (in calm weather) work, it has a capacity of 9 people or 1,650 lbs.

#### R/V Caesar Kleberg



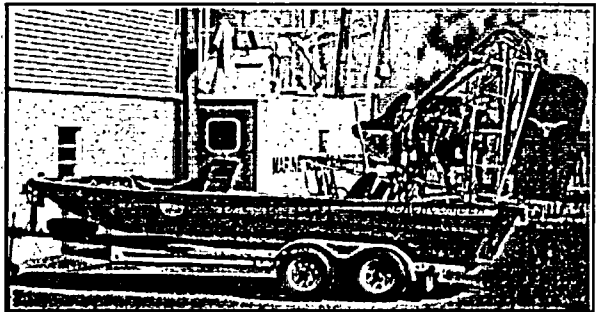
A 24-ft Jefferson skiff powered by a 260 hp OMC Cobra Inboard/Outdrive. Maximum capacity: 8 people or 1,480 lbs.

#### R/V Shearwater



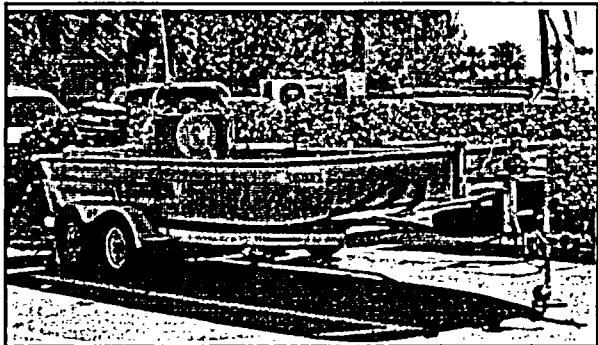
A 26-ft "landing craft" with a 150 hp outboard engine. It can carry an All Terrain Vehicle and gear or up to 14 people. Maximum carrying capacity: 2,600 lbs.

#### R/V Beachcomber



An 18-ft custom "air-boat" powered by a high performance 454 cu. in. Chevy engine. It is used for ultra shallow research and delta/marsh work. Maximum capacity: 6 people or 1,110 lbs.

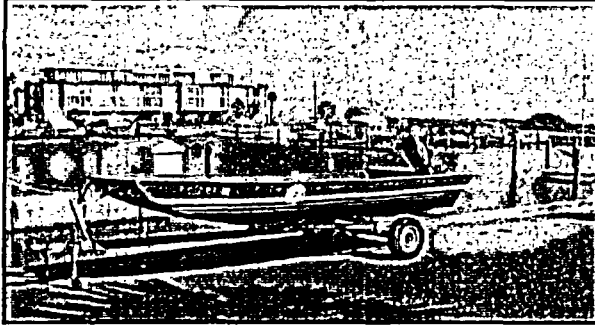
#### Jet-Air



An 18-ft center console flat bottom skiff with an 80 hp outboard with a "water-jet" drive for shallow water operation. It has a large fuel capacity and can carry up to 5 people or 925 lbs.

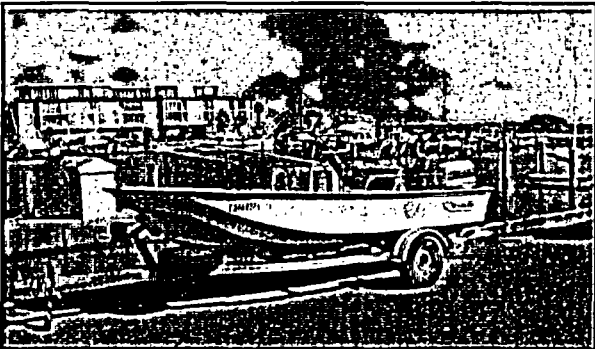


**Lowe**



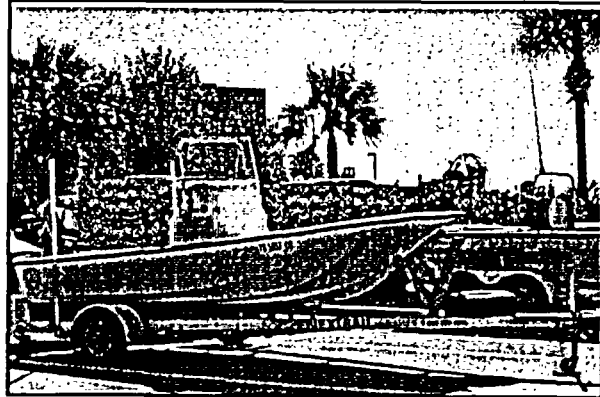
An 18-ft aluminum "John boat" powered by a 45 hp outboard. Its large deck is suitable for working various gill nets, etc. Maximum capacity: 8 people or 1,085 lbs.

**Montauk**



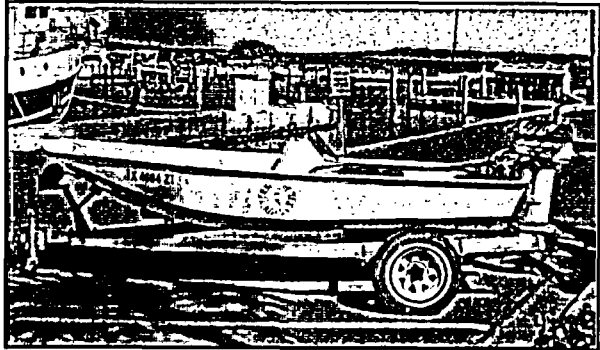
A 17-ft center console Boston Whaler with a 110 hp outboard motor. Maximum capacity: 5 people or 925 lbs.

**Big Whaler**



A 16-ft center console Boston Whaler with a 70 hp outboard. Maximum capacity: 5 people or 925 lbs.

**Little Whaler**



A 13-ft Boston Whaler with console, powered by a small outboard engine. Maximum capacity: 4 people or 600 lbs.

*Aransas National Wildlife Refuge Facilities*

Facilities at the Aransas National Wildlife Refuge include a wildlife interpretive center that offers refuge information, exhibits, environmental education, wildlife programs, and a nature bookstore. A 16-mile, paved auto tour loops through brushlands, grasslands, oak mottes, and brackish and freshwater marshes; complete with trailhead signs and exhibit panels. The 40-foot observation tower offers a panoramic view of San Antonio Bay and Mustang Lake. A boardwalk made of environmental friendly recycled "plastic lumber" meanders through a salt marsh to the shore. The refuge also offers several miles of walking trails that include observation platforms, telescopes, and a photo blind. Two picnic grounds with restrooms are also available. The refuge also has a headquarters complex, with offices, residences, and service area. A Youth Environmental Training Center (YETA) is used by youth groups and other organizations to promote environmental education. The YETA is composed of an assembly area, picnic shelter, restroom facilities, amphitheater and four primitive campgrounds for up to 250-300 people (Figure 21). A layout of the YETA facilities is in Appendix 10.

The Aransas National Wildlife Refuge also encompasses the southern end of Matagorda Island, which includes the old Wynne Ranch (Figure 22). USFWS is in the process of rehabilitating some buildings of the Wynne Ranch and converting them into environmental education facilities. Currently in use is the Enron Matagorda Island Environmental Education and Research Center. The center contains a 22 person capacity group barracks, kitchen, restroom, heat, laundry room, and laboratory. All facilities use solar power as well as a diesel gas generator. The USFWS is renovating the McAlister House to compliment the current research center. The McAlister house will have an 8 person capacity, A/C, heat, and contain a kitchen, and restroom. Matagorda Island also a covered wagon for short-distance transportation,

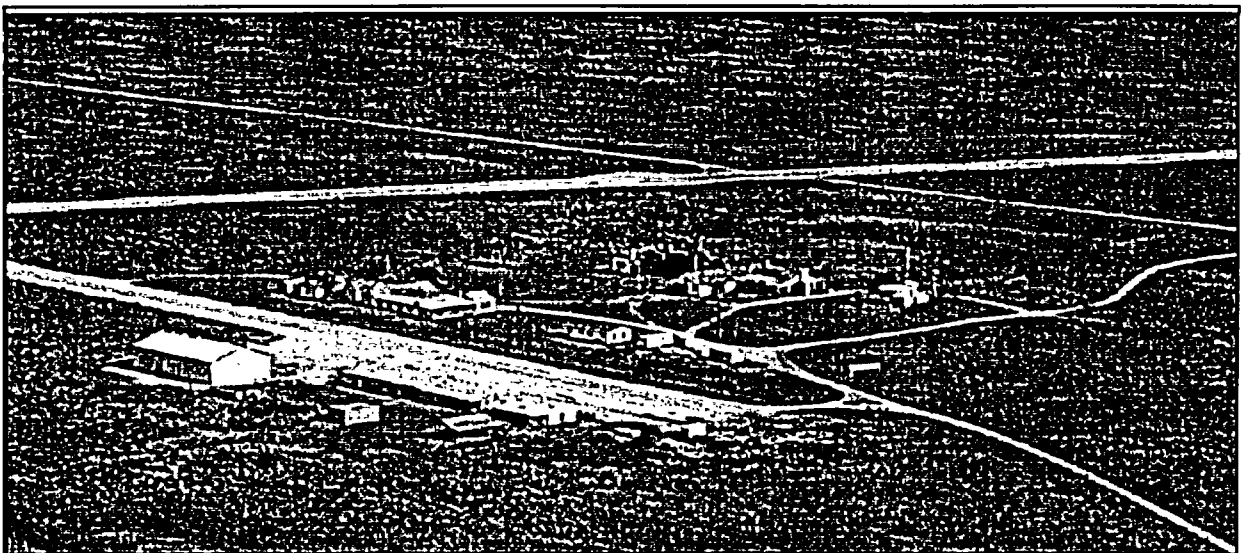
and several warehouses.

The refuge also has two boat dock and houses at Mustang Lake (9' dredged channel) and Matagorda Island. In addition there are two cabin cruiser boats, cathedral and "v" hulled, approximately 24 feet long. Each cruiser can hold 9-12 people.

Figure 21. Covered picnic shelter at the ANWR Youth Environmental Training Center.



Figure 22. Wynne Ranch complex on Matagorda Island.



### *Goose Island State Park Facilities*

Facilities at Goose Island State Park include shade shelter campsites ("open cabanas") with water and electricity, located on the island near the bay; campsites with water and electricity in a heavily, tree-shaded area; campsites with water in the shady area; a group area; picnic sites (some with shade shelters); restrooms with and without showers; a snack bar within two miles; a fish-cleaning shade shelter; a double-lane boat ramp; a 1620-foot, lighted fishing pier with 2 fish-cleaning tables; a group recreation hall with tables and chairs (no kitchen - capacity 50); playground areas; and a Texas State Park Store (Figure 23).

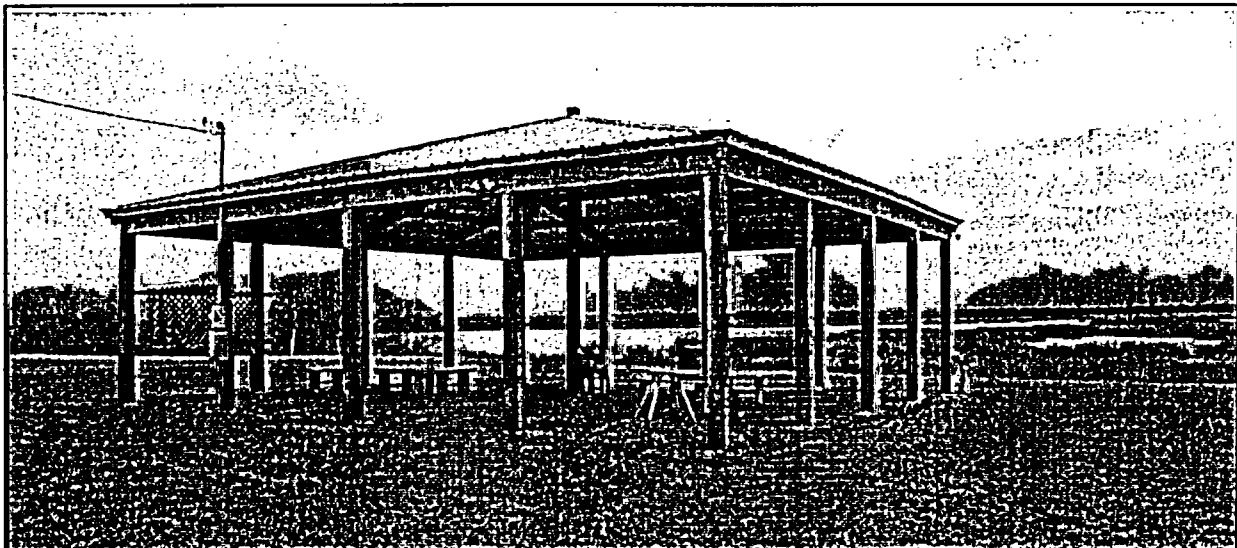
Figure 23. Aerial view of Goose Island State Park pier and island.



### *Fennessey Ranch Facilities*

Facilities at Fennessey Ranch include an open air pavilion at McGuill Lake with electricity (Figure 24) and picnic tables, trailer that accommodates 35 people for tours, 4 photo blinds, boat launch, 14 artesian wells, and several outhouses located around the property (painted dark green to blend in with scenery).

Figure 24. Open air pavilion at McGuill Lake.



## 7.2 Program Goals and Objectives

### Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function

#### *Objective 1-6: Provide facilities for the research and monitoring community*

##### **Action 1: Coordinate facility use for the research and monitoring community**

As a means of supporting the objectives of the research plan for the Reserve, the following types of facilities and equipment are ideally envisioned. The research and monitoring program will be run out of the existing facilities of the University of Texas Marine Science Institute. There will be access to the following UTMSI facilities:

- Wet and Dry Laboratories
- Conference Room/Resource Room
- Auditorium
- Boat and Vehicle Support Facility

##### **Action 2: Create a visiting scientist facility at UTMSI**

The Reserve is far from many Texas cities and there is a need for affordable housing for visiting scientists and classes. Scientist needs are for medium-term visits from one week to three months. The plan is for an apartment complex of 10 units medium-term and a barrack style dormitory for short-term stays of 1-2 nights. The residence will be 14,000 square feet, and the "standard" rate for residence hall construction is \$140 per square foot. \$1,960,000 for basic construction is anticipated; however the building must be raised due to specifications for coastal regions, which will multiply the standard rate by 1.3 resulting in an adjusted estimate for local conditions of \$2,550,000. The total construction estimate is \$3,500,000 and is devised by multiplying by 1.35 for contingencies, engineering studies, and unknowns of. The value of the land (5.83 acres) is \$1,750,000 at \$300,000/acre.

### Goal 2: Increase understanding of coastal ecosystems by diverse audiences

#### *Objective 2-4: Provide access to UTMSI facilities for Reserve education programs*

##### **Action 1: Coordinate facility use for education programs**

As a means of supporting the objectives of the Education/Outreach Plan of the Reserve, the education programs will have access to the following UTMSI facilities:

- Wet and Dry Laboratories
- Conference Room/Resource Room
- Auditorium
- Boat and Vehicle Support Facility
- Wetland Education Center
- Marine Science Library

#### *Objective 2-5: Create a Copano Bay research and education center*

The Copano Bay public research and education facility will focus on active, hands on education of research from the Reserve. The target audience for this facility will be organized K-12 classes. This facility will be located on NERR property adjacent to Copano Bay on Redfish Point (Figure 25). The facility will be in an ideal location to accommodate the general public, and local school groups. The property currently has a bulkhead with channel that needs to be repaired. Repairing this bulkhead will allow for the marine education vessel to dock and utilize not only the UTMSI but also the research and education facility. The Mission-Aransas Estuary is shallow (1-4m) and a bulkhead with existing channel is essential in utilizing Copano Bay in research and education programs. An additional docking location will also make field trips more accessible and allow for a much broader audience. The facility will focus on current research within the Reserve and give the public a chance to interact with real data and researchers. The majority of displays will be constructed for active participation. The facility will contain a parking lot, bulkhead, wetland pond with boardwalk,

and a building. The building will be elevated on stilts with a concrete pad underneath that will house an open air web laboratory. The facility will be staffed by an in house researcher, naturalist and volunteers. Construction will incorporate handicap accessible features.

Figure 25. Proposed site to be included in the boundary for the Copano Bay public research and education facility.



**Action 1: Coordinate facility use for the education and stewardship community**

The education and stewardship community will have full access to the Copano Bay public research and education facility. Reserve staff at the facility will help coordinate and schedule education and stewardship programs.

**Action 2: Create and disseminate interpretive materials and signs**

Interpretive materials and signs promoting public appreciation and support for stewardship of coastal resources will be created to and placed at the Copano Bay public research and education facility.

**Action 3: Use green building techniques in construction of facilities**

As new facilities are built, the Reserve will strive to build in the most sustainable manner possible. Building sustainable or "green" buildings is the practice of creating healthier and more resource-efficient models of construction, renovation, operation, maintenance, and demolition. Building green will benefit the environment by reducing the impacts of natural resource consumption. Building green will also benefit the Reserve's operational budget by improving the bottom line and minimizing energy and water consumption. The sustainability program will work to gain the Leadership in Energy and Environmental Design (LEED) certification as a green building. Elements of green building include:

- Energy - Designing and operating buildings to use energy efficiently and to use renewable sources of energy, including solar, wind, and biomass.
- Water- Designing and operating buildings to use water efficiently.
- Materials- Using building materials that, in comparison to competing brands, have a reduced effect on the environment throughout their life cycle (e.g. recycled content, low toxicity, energy efficiency, biodegradability,

and/or durability).

- Waste - Reducing the waste from construction, remodeling, and demolition.
- Indoor Environment - Designing and operating buildings that are healthy for their occupants

**Action 4: Develop a construction plan**

A construction plan, including a proposed construction schedule, general descriptions of proposed developments and general cost estimates will be developed for the Copano Bay research and education center. Information will be generated to begin in the initial phase of construction and development.

*Objective 2-6: Partner with USFWS to enhance visitor experience at the Aransas Wildlife Refuge*

**Action 1: Help create an environmental education building**

The YETA currently has a building that is approximately 1000 square feet and is used for environmental education purposes but is very primitive. The refuge would like to replace this building with a 2000 square foot education center with electricity, air conditioning, running water, and restrooms to better accommodate school groups. The building would contain mostly classroom space to be used for a variety of environmental education programs. Because this area is located on the mainland, we would be able to accommodate a wide variety of groups interested in learning about the refuge and the coastal environment. Restrooms in this building would replace facilities that are over 20 years old and are constantly being repaired. The approximate cost is \$250,000.

**Action 2: Help build a board walk on Matagorda Island**

A board walk is required to facilitate Matagorda Island educational programs. The requirement is for materials for a boardwalk with the dimensions of 900 feet long by 5 foot wide. Construction of the boardwalk will be done by ANWR personnel and volunteers. Total cost for materials is \$100,000.

*Objective 2-7: Complete the Wetland Education Center at UTMSI*

**Action 1: Construct the infrastructure of the Wetland Education Center**

The Wetlands Education Center is a 2.6 acre facility with tidal channels, submerged seagrasses, and fringed with Black Mangrove and Smooth Marsh Cordgrass, and will be completed by December 2005. Once the marsh is built, there will be a need for interpretive facilities. The NERR contribution is to construct the Education/Public Outreach Infrastructure, which includes a public boardwalk around the periphery of the marsh, an amphitheater, educational signage, and several overlook platforms. Cost estimate for the infrastructure is \$1,800,000.

*Objective 2-8: Link Education and Outreach NERR facilities*

**Action 1: Create a Mission-Aransas NERR education trail**

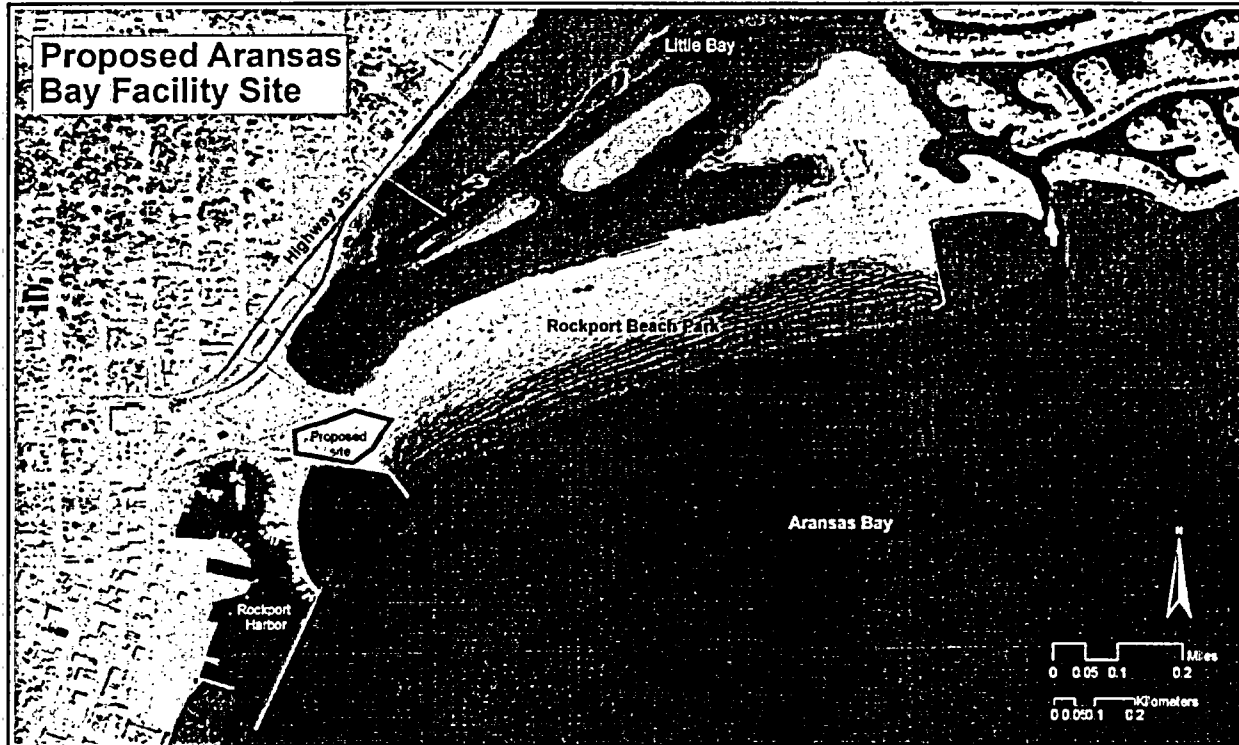
The Reserve and its educational facilities are spread over a large area. There is a need to link and inform educational audiences of all Reserve facilities available. There are currently three proposals for education facilities that will be sited at ideal locations to serve the large area of the Reserve. The Wetland Education Center will be on the southern boundary of the Reserve in Port Aransas. The Copano Bay research and education center will be centrally located in the Reserve on Copano Bay. The ANWR environmental education building will be the northern link the Reserve on the shores of San Antonio Bay. The Mission-Aransas NERR education trail will be created to inform targeted audiences of the location and details of available facilities. A trail map with locations and descriptions will be created to link facilities and increase use and attendance.

**Goal 3: Promote public appreciation and support for stewardship of coastal resources**

***Objective 3-11: Create an Aransas Bay public outreach facility in partnership with the City of Rockport and others***

The Aransas Bay multi-purpose public outreach facility will be a joint effort between the City of Rockport, Aransas County Navigation District (ACND), Reserve, and the Rockport Chamber of Commerce. The target audience for this facility will be the general public and tourists. The building will be a single story containing the auditorium, public outreach NERR visitor center, an information kiosk, public restrooms, and offices for the ACND and City of Rockport. The Rockport Chamber of Commerce will help staff the visitor center with docents and volunteers. NERR funds will be used to construct the public outreach NERR center, public restrooms, and the auditorium. State match funds are also proposed for use on these components of the facility. The public outreach NERR center will contain passive and interpretive displays with the purpose to educate the public about the local estuarine ecosystem and the Reserve program. Displays will be created for the target audience, the general public and tourists. No staffing will be required to maintain displays. The auditorium will have room for 200 people with breakouts for 50 and 20. The auditorium will be used for meetings, public seminars, and workshops. The facility is currently proposed for location on Aransas County Navigation District owned property at the site of the current Aransas County Navigation District Office downtown at the Rockport Harbor (Figure 26). A location such as this in downtown Rockport is key for targeting all sectors of the general public. This location is already a significant tourist destination because it is adjacent to the Texas Maritime Museum, Rockport Center for the Arts, Rockport Beach Park, Rockport Fulton-Area Chamber of Commerce, Fishing Pier, and Cabanas. The TPWD building is within walking distance, and aquarium maintenance not be a problem. The facility, through its location, will have a high level of exposure and visibility and would thereby be easily found by those wishing to visit in addition to attracting visitors that may not have even been aware that the facility existed. The preliminary size estimate for the facility is 15,000 to 20,000 square feet. Conceptually, the ACND would occupy 5,000 square feet, the City of Rockport would occupy 5,000 square feet, and the NERR program would occupy 5,000 square feet. The remaining square footage is anticipated to be public or common area. Initial cost estimate are approximated at \$250 per square foot with a total project cost of 3 to 4 million dollars. With the considerations of location and multi-user design requirements it is anticipated that the construction timeline would include 6 months for design and up to 18 months for construction. The NERR facility will be composed of approximately 5,000 square fee totaling \$1,250,000.

Figure 26. Proposed site to be included in the boundary for the Aransas Bay public outreach facility.



**Action 1: Create and disseminate interpretive materials and signs**

Interpretive materials and signs promoting public appreciation and support for stewardship of coastal resources will be created to and placed at the Aransas Bay public outreach facility.

**Action 3: Use green building techniques in construction of facilities**

As new facilities are built, the Reserve will strive to build in the most sustainable manner possible. More information on sustainable building for Reserve facilities is described under objective 2-5, action 3.

**Action 4: Develop a construction plan**

A construction plan, including a proposed construction schedule, general descriptions of proposed developments and general cost estimates will be developed for the Aransas Bay public outreach facility. Information will be generated to begin in the initial phase of construction and development.



## **8.0 RESEARCH AND MONITORING PLAN**

### **8.1 Introduction**

The National Estuarine Research Reserve System (NERRS) was created to increase our ability to responsibly manage estuarine ecosystems through research and education. The NERRS provides a mechanism for addressing scientific and technical aspects of coastal management problems through a comprehensive, interdisciplinary and coordinated approach. Research and monitoring programs include the development of baseline information, which is the basis of this approach. Research and monitoring activities of the Reserve will be guided in part by national plans that identify goals, priorities and implementation actions for these programs. This approach, when effectively integrated with the education and outreach programs, will help ensure the availability of scientific information that has long-term, system-wide consistency and utility for managers and members of the public to use in conserving natural processes in their estuaries.

The Research and Monitoring Plan will result in greater scientific understanding of the estuarine system and its resources, and provide information for resource managers and policy decision makers to facilitate sound coastal management decisions. The Research Plan strives to promote individual as well as interdisciplinary research efforts not only within the National Estuarine Research Reserve (NERR) boundary but also throughout its watershed. This is accomplished by encouraging efforts in a variety of disciplines including inter habitat comparative studies, watershed studies, anthropogenic impact studies etc. Another goal of the Research Plan is the promotion of understanding of coastal ecosystems by diverse audiences.

#### **Research Goals of the NERRS**

The primary research objective for the NERRS is to determine the causes and effects of natural and anthropogenically-induced change in the ecology of estuarine and estuarine-like ecosystems. Research policy at the Reserve is designed in part to fulfill the NERRS goals as defined in the NERR program regulations. The research and monitoring goals of the NERRS include:

- addressing information needs of coastal management issues identified as significant through coordinated estuarine research within the system;
- promoting federal, state, public, and private use of one or more reserves within the system when such entities conduct estuarine research; and
- conducting and coordinating estuarine research within the system, gathering and making available information necessary for improved understanding, use and management of estuarine areas.

#### **NERRS Policies and Priorities**

The national research policy of the NERRS is to promote the use of individual NERR sites for short and long term studies and to develop a scientific information database to improve the management of estuarine resources. The long-term studies include the systematic monitoring of important estuarine variables throughout the NERR sites. An example of a short-term study may include a project that determines the composition or flow rates of groundwater to rivers and bays.

The research policy of the Reserve is to provide data and information needed by resource managers and policy makers to assist and guide them when making coastal management decisions. The priorities are to preserve and protect ecosystems in their natural state, and manage the Reserve in a manner that keeps it compatible with the traditional uses of the area. The following policies serve to support research objectives of the Reserve:

- All research conducted within the Reserve will be coordinated through the Research Coordinator and the Reserve Manager, with advice from the Reserve Advisory Board (RAB).
- All field work will be preformed in the least destructive way with minimal or no impact on the environment.
- When a destructive impact of significant size ( $>10\text{m}^2$ ) to the environment is unavoidable, restoration of the impact and notification to the Estuarine Reserves Division (ERD) is required.
- All research activities and/or collection of specimens must be approved in writing by the NERR research coordinator prior to commencing any work.
- All outside approvals/permits (federal and state) must be secured prior to obtaining written approval from the

- research coordinator to conduct work within the Reserve.
- Results of research conducted within the Reserve by scientists other than NERR staff does not necessarily have the endorsement of the Reserve. All such NOAA funded research reports will contain an approved statement of disclaimer.
- Abstracts and copies of final reports of all research projects within the Reserve will be provided by the Research Coordinator and ERD for inclusion in the Reserve database and/or library.
- Site specific research data located with global positioning system coordinates are to be input into the Reserve geographic information system after appropriate reports and publications have been completed.
- Any proprietary data restrictions will be respected.
- Construction and operation of the System-wide Monitoring Program (SWMP) within the Reserve will be coordinated with ERD and other NERR sites.
- Researchers working within the Reserve must acknowledge the reserve's role and support of the project in any written or oral papers or presentations.
- Researchers working within the Reserve should promote the use of the Reserve to the scientific community.

#### NOAA Research and Monitoring Funding Priorities

National Oceanic and Atmospheric Administration (NOAA) is a significant source of research funding for both independent and NERR staff researchers. Regulations of the NERRS (15 C.F.R. Part 921.50(a)) specify the purposes for which research funds are being used, which include:

- support research that will both enhance scientific understanding of the Reserve ecosystem and help meet the information needs of managers;
- provide information needed by reserve managers and coastal ecosystem policy makers; and
- improve public awareness and understanding of estuarine ecosystems and management issues.

NOAA encourages coordinated research among reserves and other scientists and, when appropriate, preferentially funds research proposals on specific estuarine topics that it has identified as national priorities. This unified approach promotes the exchange of research findings among reserves, state and federal agencies, and members of the academic research community.

Research funding priorities for the NERRS were first established in 1984 when a group of leading scientists convened to evaluate the status of estuarine knowledge. The group identified a diverse set of estuarine issues that were to receive top priority for research funding. These included: (a) sediment management, (b) nutrients and chemical inputs, (c) coupling primary and secondary productivity, and (d) fishery habitat requirements. The NERRS research program was refined in 1991, 1994, and in 1996.

The primary research objective for the NERRS is the study of causes and effects of natural and human-induced change in the ecology of estuarine and estuarine-like ecosystems. NERRS research funded through NOAA should be designed to provide information of significant value to the development and implementation of resource management policy governing the U.S. coastal waters.

#### Users and Audience

The University of Texas Marine Science Institute (UTMSI) and Reserve will provide excellent opportunities for researchers. The Reserve is also within easy driving distance of all coastal towns in South Texas and the cities of Corpus Christi, Rockport, Refugio, Victoria, Houston, San Antonio, Austin, and its surrounding municipalities. It is anticipated that the majority of users will include non-profit institutions, and other users, such as, students of all ages, teachers, local residents and visitors. Another major user will be fellows from the Graduate student fellowship program.

This Reserve has traditionally been an important area for commercial and recreational fishing, and hydrocarbon production, and will continue to be used by these interests. Designation of the Mission-Aransas NERR will not alter traditional uses of the area. It is also anticipated that the Reserve will be used by various environmental interest groups, civic organizations, and private and professional societies for field trips and educational seminars.

## Evaluation and Coordination Procedures

Research projects initiated by the Reserve must be submitted for evaluation and written approval before the project can be initiated. Project proposals, plans, etc. submitted to the Reserve by researchers and scientists outside the NERR program will be evaluated and coordinated by the Research and Education Coordinators and the Reserve Manager prior to project initiation. All projects will be evaluated for consistency with the Reserve's research and education programs' goals, policies and priorities, and to ensure that the research will not unduly interfere with other research or activities at the reserve. Projects must demonstrate sound scientific inquiry and a sensitivity to protecting and preserving the environment during data collection efforts. Abstracts and copies of final reports of all research projects within the Reserve will be provided by the Research Coordinator and ERD for inclusion in the Reserve database and/or library.

## **8.2 Program Goals and Objectives**

### Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function

#### *Objective 1-7: Improve understanding of short and long-term changes within Texas coastal ecosystems*

##### **Action 1: Build and operate the System-wide Monitoring Program**

NERRS operates a System-wide Monitoring Program (SWMP) as a nationally-coordinated and standardized program. The goal of the SWMP is to develop quantitative measurements of short-term variability and long-term changes in the water quality, biotic diversity, and land-use / land -cover characteristics of estuaries and estuarine ecosystems for the purposes of contributing to effective coastal zone management.

The SWMP provides valuable long-term data on water quality and weather at 15-30 minute time intervals. Coastal managers have used this monitoring data to make informed decisions on local and regional issues, such as "no-discharge" zones for boats and measuring the success of restoration projects. The program currently measures water quality parameters, weather, and a suite of nutrients. As the program expands, plans include adding a biological monitoring component, such as submerged aquatic vegetation, benthos, and invasive species. Remote sensing is a component that will be used to track changes in vegetated or other habitats.

The current expectations of the SWMP are that each of the participating NERR sites own at least four water quality dataloggers and one weather station. Each Reserve should deploy two data loggers in pristine and impacted areas. Furthermore, each Reserve is expected to edit, document, and submit data and metadata from these two dataloggers in a timely manner to the NERR's CDMO. The reserve system's monitoring program currently measures pH, conductivity, temperature, dissolved oxygen, turbidity and water level. In addition, nutrient samples are taken at four of the datalogger stations on a monthly basis and monthly diel samples at one datalogger station. Analyses for ammonium, nitrate, nitrite (or nitrate+nitrite), ortho-phosphate and Chl a are be conducted on-site at Reserve facilities. In addition, a weather station collects data on weather conditions (e.g., air temperature, wind direction and speed, barometric pressure and relative humidity). These variables are not only indicative of habitat quality for numerous estuarine species, but they establish health criteria and determine human uses.

Data management, quality control, and information delivery services are provided by the SWMP Centralized Data Management Office (CDMO) operated by the University of South Carolina. The CDMO manages the basic infrastructure and data protocol to support the assimilation and exchange of data, metadata and information within the framework of NERRS sites, state coastal zone management programs and NOAA/Ocean and Coastal Resource Management (OCRM), as well as other state and federally-funded education, monitoring and research programs.

The NERR-SWMP includes a rigorous Quality Assurance /Quality Control (QA/QC) program undertaken to ensure that the type, amount, and quality of data and ancillary numerical information are adequate to meet the study objectives. Development of supporting metadata is also a critical element of the monitoring program. Initial QA/QC protocols were developed during the NERR-SWMP Phase I program (1995-2000). The NERR-SWMP Quality Control program currently includes standardized protocol for the routine calibration, deployment and recovery of automated dataloggers, and guidelines for the identification and treatment of outliers and spurious datasets.

Analysis of the Reserve SWMP datasets will be undertaken on an annual basis to summarize and simplify the acquired numerical information, conduct statistical tests of inherent variability and significant differences, evaluate alternative hypotheses, determine the consequences of ecological observations, and assess levels of uncertainty associated with the conclusions drawn from the Reserve SWMP datasets. The anticipated analytical and interpretive programs should be developed prior to data collection and should include identification of the statistical tests, power analysis, and modeling technique to ensure that the data analysis is appropriate to the scientific approach and methodology for the Reserve SWMP.

As previously mentioned, the SWMP plan contains some general areas for future monitoring including expansion including:

- Abiotic monitoring
- Eutrophication/nutrient monitoring, chlorophyll fluorescence and photopigment analysis
- Development of an integrated contaminant record (i.e., analysis of surficial sediment )
- Benthic intertidal and subtidal mapping
- Global sea level rise measurements
- Pore water chemistry and analysis

In addition, the SWMP program will coordinate with the stewardship program to integrate the land use and habitat change and the watershed land use mapping analyses.

SWMP station locations were chosen based on their distance from freshwater inflow sources, location in bay systems, and existing locations of Texas Coastal Ocean Observation Network (TCOON) stations and other long-term monitoring sites. SWMP station locations will also be reviewed by the SWMP oversight committee. Anticipated SWMP stations will be located in the following core areas: Copano Bay West, Copano Bay East, Aransas Bay South and Mesquite Bay (Figure 27). The weather station will likely be located at Copano Bay West because the precipitation gradient in Texas is from Northeast (high) to Southwest (low) and there are already weather stations in Port Aransas and San Antonio Bay.

The purpose of the Reserve SWMP stations are to gain information on climactic and hydrological patterns that influence freshwater inflow in the Mission-Aransas Estuary. SWMP station locations were chosen based on their distance from freshwater inflow sources, location in bay systems, and existing locations of TCOON stations and other long-term monitoring sites. The Reserve encompasses a large area and to ensure adequate coverage SWMP station locations are widely spaced apart. Copano Bay West was chosen as a SWMP station because it will provide hydrological data that is influenced by the freshwater inflow source of the Aransas River. Copano Bay East was chosen as a SWMP station because it will provide hydrological data on water flow patterns between Copano and Aransas Bay. Mesquite Bay was chosen as a SWMP station because is a pristine site that can be used as a control. A station at Mesquite Bay will also provide data on water flow patterns that are affected by San Antonio Bay and the hydrological connection with Cedar Bayou and the Gulf of Mexico. Aransas Bay South was chosen as a SWMP station because of its connection with Cedar Bayou and Aransas Pass.

The Reserve SWMP program will have the advantage of integrating the water level and meteorological data collected within the TCOON (<http://lighthouse.tamucc.edu>). TCOON is operated by the Division of Nearshore Research (DNR) at Texas A&M - Corpus Christi (TAMU-CC) and consists of 36 water level monitoring platforms along the Texas coast. TCOON is sponsored by the Texas General Land Office, Texas Water Development Board, U.S. Army Corps of Engineers (USACOE), and NOAA's National Ocean Service. In addition to the TCOON project, DNR operates several monitoring platforms in the Reserve SWMP project area. These include meteorological, water quality, and water velocity projects sponsored by the Texas General Land Office (GLO), NOAA, Texas Water Development Board (TWDB), USACOE-Galveston district, Port of Corpus Christi, and the Guadalupe Blanco River Authority (GBRA). Collaboration with DNR will be advantageous to the Reserve SWMP program because:

- It will provide broader coverage because there are already two stations within the NERR boundary, including one NOAA station in Rockport
- It will provide real-time data to decision-makers and scientists in an already tested and proven web-based format
- Collaboration will benefit Texas and Gulf coast communities by providing coastal decision-makers with data with greater coverage

- Incorporation with TCOON will not hinder the availability or quality of data submitted to the NERR CDMO

In addition to the TCOON, Texas A&M University College Station (TAMU) has a high frequency (HF) radar station located on Matagorda Island. This radar system collects real-time measurements of surface circulation patterns, wave height/direction/period, and wind direction in the Gulf of Mexico, adjacent to the targeted water bodies. A unique feature of an HF Radar system is its ability to provide real-time surface current measurements out to 35km into the Gulf.

There are currently five active TCOON stations within and directly adjacent to the Reserve boundary and one high frequency radar TAMU station (Figure 27). The data collected by each station is compared in Table 6.

Figure 27. Anticipated SWMP stations and active TCOON and TAMU stations within or adjacent to the Reserve boundary.

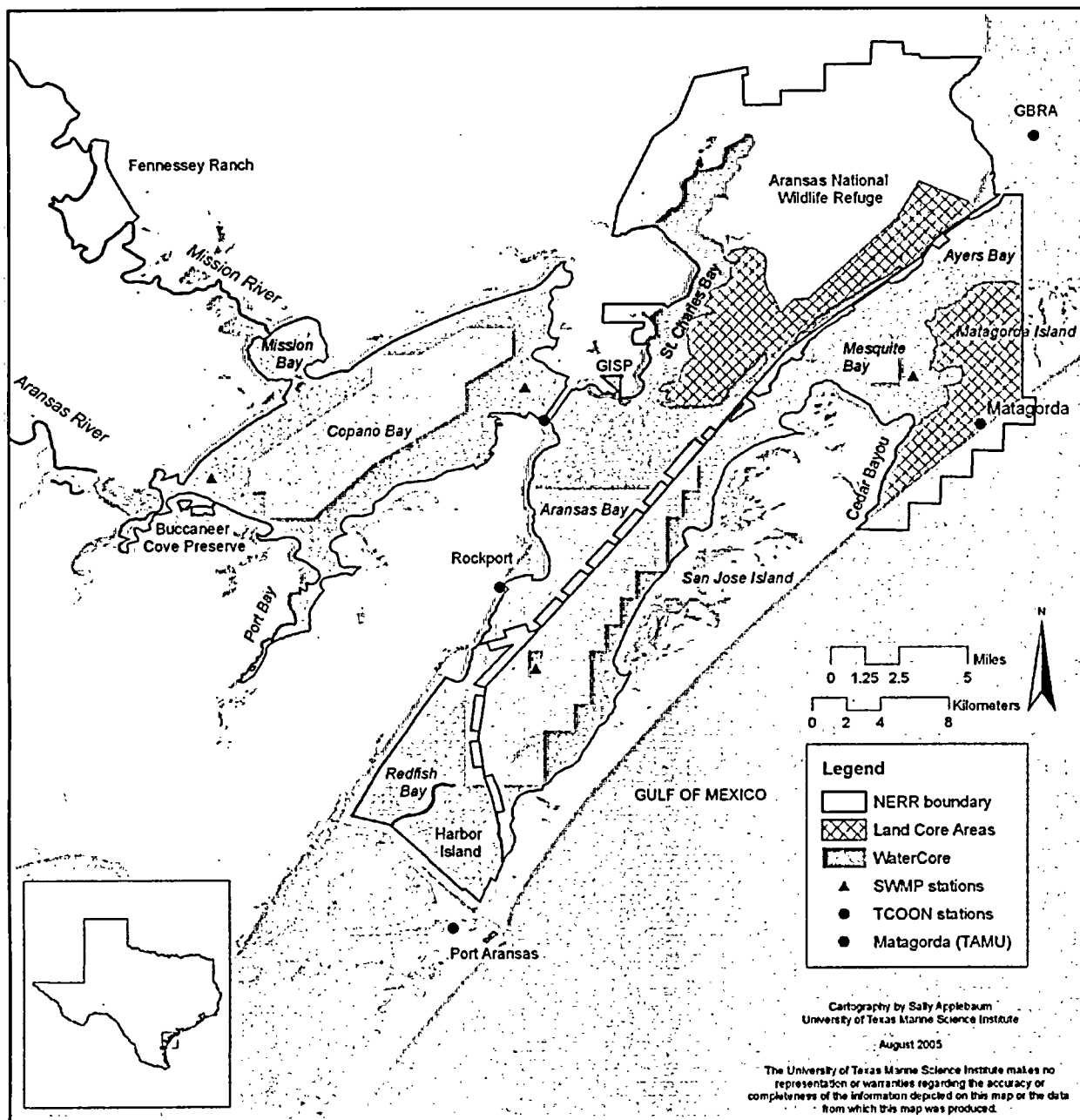


Table 6. Data available by TCOON and TAMU stations within or adjacent to the Reserve boundary.

Station	Location	Data Collected
Rockport (DNR 015)	Aransas Bay	Elevation and water temperature
Copano Bay (DNR 036)	West Copano Bay	Elevation and water temperature
GBRA 1 (DNR 127)	South San Antonio Bay	Meteorological, elevation, water quality
Port Aransas (DNR 009)	Port Aransas, Texas	Meteorological, elevation, air and water temperature
Port Aransas (DNR 109)	Port Aransas, Texas	Water velocity
Matagorda (TAMU MATA)	South Matagorda Island	Surface circulation patterns, (wave height/direction/period, and wind direction)

**Action 2: Initiate a biological monitoring program with partners**

The research program will also collaborate with partners to create a biological monitoring program. Collaboration with DermoWatch is a example of partnership to create and enhance biological monitoring. DermoWatch monitors oyster populations. DermoWatch provides recent and historical data on the occurrence and progression of Dermo disease in Texas and Louisiana through a website ([www.dermowatch.org](http://www.dermowatch.org)) that calculates a time to a critical level of disease. This is an estimate of the time that it would take the parasite (*Perkinsus marinus*) to reach a critical level, assuming no change in temperature and salinity. Collaboration with the NERR program will incorporate Aransas and Copano Bay into the DermoWatch website and allow users within the NERR area to utilize this valuable information source. The coupling of real-time temperature and salinity data from the SWMP will also increase the reliability of determining the time to a critical level of oyster disease. The research program will also collaborate with programs such as Texas Parks and Wildlife Department coastal fisheries monitoring, and the Coastal Bend Bays and Estuaries Program microbiological monitoring in Copano Bay.

**Action 3: Initiate a freshwater inflow and groundwater program with partners**

Water resource development is a critical human activity that alters environmental flows. A freshwater inflow and groundwater program will be initiated with partners to determine the effect on estuaries, including the balance of water, nutrients, and sediment, and effects on Cedar Bayou, which exchanges with the Gulf of Mexico. This program may partner with agencies such as the Texas Water Development Boars, local river authorities, Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, Texas State Soil and Water Conservation Board, Aransas National Wildlife Refuge, and Groundwater Conservation Districts. Studies may include research to determine the effect of freshwater inflow on secondary productivity (i.e., macrofaunal community structure and biomass) in the Reserve. Studies may also include research on the effect of freshwater inflow on blue crab abundance, which is a primary food source for whooping cranes. An important focus would be how climatic gradients and climatic variability affect benthos in coastal ecosystems. Results from these types of studies could provide information for water management decisions. Techniques used in these studies may include: systematics to determine diversity, geographic information systems (GIS) to understand community structure at different spatial scales, and simulation modeling of primary and secondary productivity.

**Action 4: Assist in the development of the site profile**

The site profile will be primarily developed through the stewardship program. The research program will assist primarily with the environmental characterization and site profile development. Development of a site profile will improve the understanding of short and long-term changes within Texas coastal ecosystems by providing a strong starting point of the habitat inventories.

***Objective 1-8: Increase understanding of effects of anthropogenic activities on coastal ecosystems***

**Action 1: Initiate a program on oil and gas activities with partners**

A oil and gas program will be initiated with partners to determine the effect of oil and gas activities on estuaries. This program may partner with agencies such as the Texas General Land Office, and local exploration and production industries. Projects could include the presence or absence of biological responses to contaminant exposure near oil and gas wells within the Reserve. Community structure (focusing on benthic species) would be a model analysis to identify ecological effects from oil and gas activities. Reproduction or population effects could also be used to identify sublethal effects. Toxicity or bioaccumulation of contaminants in estuarine food chains could also be studied.

**Action 2: Initiate a climate change research program with partners**

A climate change research program will be initiated with partners to determine the effect of climate change on the Mission-Aransas estuary. This program may partner with organizations such as the Coastal Bend Bays and Estuaries Program, Bureau of Economic Geology at the University of Texas at Austin, and Texas A&M Corpus Christi. Indicator species such as the black mangrove may be ideal candidates to determine the effect of climate change and relative sea level rise because the northern limit of black mangroves is in the Reserve boundary. Mangroves are also sensitive to changes in elevation and this program will also have a component on relative sea level rise and erosion. Techniques used in these studies will likely incorporate geographic information systems (GIS) and aerial photography to analyze long-term change.

***Objective 1-9: Increase graduate student participation in Reserve research and monitoring programs***

**Action 1: Graduate student fellowships**

The NERR system graduate research fellowship program will be used to promote student participation in research. Beginning in 1997, NOAA began funding a competitive Graduate Research Fellowship program in the NERRS. The fellowship program is intended to produce high quality research conducted within the Reserve, and to be focused on improving coastal zone management while providing graduate students with hands-on experience in conducting coastal monitoring. This fellowship will provide graduate students with funding for 1 - 3 years to conduct their own research project, which are based on the Reserve local needs, the NERRS priorities, and the student's interest. Research projects must be conducted within the Reserve and enhance the scientific understanding of the reserve's ecosystem.

As part of the ecological monitoring education program, students are asked to provide up to 15 hours per week of assistance to the Reserve. This program will be designed with the on-site staff and may include additional monitoring, research assistance, sampling and analyses at the Reserve. This training may take place throughout the school year or be concentrated during a specific season. Students are encouraged, but not required, to incorporate these training activities into their own research projects.

**Goal 2: Increase understanding of coastal ecosystems by diverse audiences**

***Objective 2-9: Disseminate research results to lay public***

**Action 1: Develop a website and other forms of media**

Information gathered during research and monitoring efforts at the Reserve will be disseminated to the public through the Reserve website. Data from the SWMP program will be disseminated through the CDMO, but the Reserve website will serve as a mechanism to disseminate other research related information, such as posting reports. The Reserve website will be created and maintained by UTMSI, with its own domain name, as a vehicle to facilitate communication with the broader community as well as to provide internal cohesion for all participants in the Reserve program. This website will profile each reserve component, the participants in the program, and link to other NERR sites as well as state and national sites. This website will be a coordinated effort with Education Program. Information gathered during research and monitoring efforts at the Reserve will also be disseminated to the lay public by:

- Creating signs and posters
- Participating in public workshops, conferences and meetings arranged by the Reserve
- Articles in journals/newsletters of local organizations
- Local educational and outreach programs (coordinated with the Education Program)
- News releases to local media
- Public lecture series

*Objective 2-10: Transfer research knowledge to K-12 teachers and classrooms*

**Action 1: Partner with the National Science Foundation to enhance the GK-12 program**

Research knowledge will be transferred to K-12 classroom with graduate students in the GK-12 program. The GK-12 Program is sponsored by the National Science Foundation to partner graduate students in the sciences with K-12 teachers to enhance science education through new classroom activities, workshops, and field projects. The project is designed to provide K-12 teachers and students with recent knowledge and innovative learning strategies in the areas of biology, environmental science, aquatic science, geology and oceanography. The current program provides support for graduate Fellows based at the Marine Science Institute (Port Aransas), the Environmental Science Institute (Austin), and the Institute of Geophysics (Austin). The field and classroom theme for the UTMSI component is bay and estuary education (UTMSI). Expansion of the GK-12 UTMSI program to additional local schools is a goal of the Reserve education and outreach plan.

*Objective 2-11: Inform researchers and decision-makers of research results*

**Action 1: Develop an on-site resource center**

Information gathered during research and monitoring efforts at the Reserve and the final reports from such work will be disseminated to decision-makers and available to all interested parties upon request. Copies of reports will also be submitted to ERD. The Reserve encourages the dissemination of research results by researchers, agencies, institutions, etc. An on-site resource center will include an on-site library, as well as botanical and zoological reference collections of local flora and fauna. Copies of reports from research performed within the Reserve will be submitted to the research coordinator for inclusion in the on-site library. This will assure a complete, comprehensive and indexed collection of research activities and results within the Reserve. Additional methods of disseminating information include:

- NOAA's computerized abstract service, keyed to NOAA contract numbers and revised annually (hard copies of the collected abstracts are available upon request to reserve managers, other federal and state agencies, universities and individuals);
- Journal articles in peer-reviewed literature;
- Presentations at professional conferences;
- Special symposia hosted by NOAA or other NERR reserves often in association with other meetings such as the biennial meetings of the Estuarine Research Federation or Coastal Zone Managers;
- Regular contact with representatives of other state and federal agencies, local government agencies and planning boards

**Goal 3: Promote public appreciation and support for stewardship of coastal resources**

*Objective 3-12: Promote public participation in research and monitoring programs*

**Action 1: Develop a keystone species monitoring program**

Public participation in research and monitoring will be promoted with the development and creation of a keystone species monitoring program. This program will utilize volunteers to conduct monitoring of species that will not be monitored by the biological monitoring program. This will focus primarily on non-fish marine vertebrates (e.g., birds dolphins, and turtles), in contrast to the seagrass, oyster, and water quality monitoring projects from the biological monitoring program.

This monitoring program could also be used to enhance existing or create organism inventory programs (e.g., Christmas



bird count, migratory songbird surveys, state heritage program non-indigenous species programs). Monitoring projects will also, if applicable, coordinate with Environmental Protection Agency's Coastal Monitoring Assessment and other National Estuarine Programs, such as the Coastal Bend Bays and Estuaries Program, and Texas Parks and Wildlife Department. A list of on-site and off-site research and monitoring opportunities for interested persons or groups will be maintained. Students and volunteers will also be encouraged to present and publish the findings of their research or monitoring efforts. The stewardship program will also work with the research program to encourage participation in the keystone species monitoring program.

*Objective 3-13: Increase public understanding of ecological values*

**Action 1: Develop a social science program to determine the economic valuation of estuaries and their habitats**

A social science program will be initiated that will work to determine the economic valuation of estuaries and their habitats. Results of this research will be used to provide an understanding of ecological values to the public and therein promote public appreciation and support for stewardship of coastal resources.

## 9.0 EDUCATION/INTERPRETATION/OUTREACH PLAN

National Estuarine Research Reserve System was created in 1972, as a part of the Coastal Zone Management Act (CZMA, 16 U.S.C. 1451 et seq.), to increase our ability to manage estuarine ecosystems responsibly. A critical aspect of this mandate is the education, interpretation, and outreach component. In part, a reserve must "...serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation" (16 U.S.C. 1461 (b)(2)(C)). Although each reserve educational program functions independently, they share common goals and assist each other's programs within the system. Each program tailors itself to the specific organizational and geographic needs of the region.

### 9.1 Introduction

The primary educational objective of the National Estuarine Research Reserve System (NERRS) is to foster coastal and estuarine education among a variety of audiences via formal, informal, and non-formal approaches. Each Reserve is dually challenged to not only meet the specific educational needs of their local and regional user groups, but also to develop and participate in national education initiatives that promote increased literacy of estuarine biology and ecology, human interactions with coastal systems, and citizen stewardship.

A recent formal inventory and assessment of the NERRS K-12 and educator professional development programs provided evidence that the NERRS is a national leader in coastal ocean literacy. Of the 26 Reserves, 24 have a full-time education coordinator, and 21 of the sites have a functional education facility. It is estimated that approximately 67,000 students (predominantly middle school) were involved in NERRS education programs nationally in 2002. Tens of thousands more participate annually in virtual estuarine field trips via the EstuaryLive webcast, with the number of participants increasing each year. In addition, approximately 2,000 K-12 educators were involved in professional development programs offered through NERRS sites in 2002.

A unique asset of the NERRS education community is access to Reserve scientists and the scientific data collected through the System-wide Monitoring Program. These data currently include abiotic measurements, and will soon include data related to biotic diversity, and watershed and land use characterizations. Recognizing the educational potential of this data, the NERRS education community seeks to identify and develop effective programs and products that bring this information to K-12 educators/students and the general public.

#### Education/interpretation/outreach goals of the NERRS

In 1993, NOAA and state reserve representatives worked collaboratively to develop the first integrated, system-wide education plan for the reserve system. Completed in 1994, the education component of the strategic plan envisions the reserve as a national system of resource centers specializing in estuarine and watershed education. The goal is to design and implement a comprehensive program of education and interpretation based on established scientific principles to strengthen the understanding, appreciation, and stewardship of estuaries and associated coastal habitats. This goal capitalizes on the reserve system's unique ability to link education, research, stewardship, resource management, and restoration activities. Within the reserve program, each reserve is responsible for developing and implementing a program that links education to scientific research.

#### National Guidelines and Policies for Education

The National Estuarine Research Reserve Strategic Plan defined guiding principles for designing and implementing individual educational programs. These principles are to:

- Develop education programs that will further the goals of the system;
- Target a culturally diverse audience of educators and students, environmental professionals, coastal resource decision-makers, and resource users;
- Function as a "system of sites" to nationally coordinate estuarine education efforts;
- Develop the reserve system as resource centers specializing in estuarine and watershed education - taking into account the diversity of differences of each reserve site;
- Capitalize on the reserve system's ability to directly link education, research, stewardship, resource

- management, and restoration;
- Ensure education priorities are based on program evaluation results; and
- Encourage reserve education coordinators to be active participants in the education community.

Another guideline document, "National Estuarine Research Reserve Education: A Field Perspective," lists the following more specific education objectives for reserves:

- Develop and operate as a system of sites;
- Link education programs with research, management, and stewardship;
- Develop programs that encourage citizen stewardship of estuaries;
- Develop reserves as resource centers that address coastal issues of global, national, regional, state and local significance;
- Maintain a cadre of professional environmental educators in the reserve system; and
- Evaluate program quality and program cost effectiveness. (Program effectiveness is measured as it relates to education objectives and resource management goals).

#### Background and Education Priorities of the Reserve

The University of Texas at Austin is the state sponsor of the Reserve. Program offices for the Reserve will be housed at the UT Marine Science Institute (UTMSI), established in 1946 and located on the central Texas Gulf coast. The Institute's missions are basic research, undergraduate and graduate education, and public outreach. The Marine Education Services (MES) program was created in 1974 and serves as the formal and informal outreach education program for UTMSI. MES program offices are located in a small visitors center which houses seven marine aquaria, an auditorium, and the library. Current program offerings include a visiting class program, teacher workshops, public seminars and movies, hands-on touch labs for elementary school groups, and the UT-Mustang Island ELDERHOSTEL program. In early 2005, a Wetlands Education Center (WEC) will be constructed on-site at UTMSI. The WEC, a joint program between the Army Corps of Engineers (USACOE) and UTMSI, will create a 2.5 acre high and low salt marsh with 1.5 acres of sheltering dunes adjacent to a 1200 sq. ft. pier laboratory.

#### Existing UTMSI Marine Education Programs

##### *Visiting Class Program*

The visiting class program annually hosts an average of 250+, 5th-12 grade class groups, as well as college and ELDERHOSTEL groups, aboard a 57' research vessel, the RV KATY. Each cruise hosts a group of 25 participants on a 4-hour excursion into the local bays. Once onboard, participants collect and study coastal plankton, sediment samples and sort through otter trawls, examining the adaptations, form and function of a myriad of fish and invertebrates. The goal of this program is to create an awareness of the abundance and diversity of life in coastal bay systems and to gain an understanding of relationships between different trophic levels and the physical setting. Man's role and impact on the coastal environment is also stressed.

##### *Teacher Training*

The MES program currently hosts several K-12 teacher workshops each year as well as annual conferences for the Texas Council for Elementary Science (TCES), Texas Marine Educators Association (TMEA), and the Informal Science Educators Association (ISEA) of Texas. The current MES Education Director serves as the Marine Activities, Resources, and Education (MARE) Texas program trainer. MARE is a K-8th grade, habitat specific, marine education curriculum developed by Lawrence Hall of Science, UC Berkeley. He also serves as the only Texas facilitator for the Fluid Earth and Living Ocean high school marine science curriculum disseminated through the University of Hawaii, Curriculum, Research, and Design Group. These curricula as well as site specific curricula and activities are used in the teacher training programs.

##### *UT-Mustang Island ELDERHOSTEL*

This program serves participants over 55 and focuses on Coastal and Marine Ecology and the abundant and diverse

resident and migratory birds found along the Texas coast. There are currently over 23+ weeks of programs offered which host 450+ participants each year. One of the Reserve partners, the Aransas National Wildlife Refuge (ANWR), hosts the only wild, migratory flock of the endangered Whooping Cranes found in the nation. An opportunity to study the whooping cranes and other resident and migratory species also focuses participant's attention on a wide variety of coastal habitats and man's role and impact on them. Another reserve partner is Fennessey Ranch. The 3500 acre ranch is bordered by over nine miles of the Mission River, and includes access to a riparian forest. Currently, the Fennessey hosts ELDERHOSTEL wildlife and birding field trips and provides exciting opportunities for expanding outreach efforts related to the Reserve.

#### *Wetland Education Center*

The first stage of the WEC will create a 2.5 acre salt marsh on-site at UTMSI. Material excavated from the site will be used to create 1.5 acres of sheltering dunes around the site. Creating the WEC is a joint project between the USACOE and The University under Section 206 of the Waterways Restoration Act. The second stage will include the construction of public boardwalks, an amphitheater, educational signage and floating educational program platforms. A K-12 curriculum has been developed for the WEC.

#### *Visitors Center and Auditorium*

The current center and auditorium hosts 25,000+ visitors annually. There are seven marine aquaria in the lobby that provide a window into a variety of marine influenced habitats in the NERR. The auditorium supports conferences, public seminars, and daily video presentations open to visitors. Displays in an adjacent building highlight current research programs at UTMSI.

#### *GK-12*

The GK-12 Program is sponsored by the National Science Foundation to partner graduate students in the sciences with K-12 teachers to enhance science education through new classroom activities, workshops, and field projects. The project is designed to provide K-12 teachers and students with recent knowledge and innovative learning strategies in the areas of biology, environmental science, aquatic science, geology and oceanography. The current program provides support for graduate Fellows based at the Marine Science Institute (Port Aransas), the Environmental Science Institute (Austin), and the Institute of Geophysics (Austin). The field and classroom theme for the UTMSI component is bay and estuary education (UTMSI). Expansion of the GK-12 UTMSI program to additional local schools is a goal of the Reserve education and outreach plan.

The establishment of the Reserve will create opportunities to expand current MES program offerings as well as create new programs in cooperation with the partner organizations and land holders adjacent to the site. As outlined in the following sections, the education programs developed for this site will place priority on improving access to the wide range of habitats that make up the coastal watershed, open bays, marshes and the barrier island encompassed with the Reserve boundary.

The following site-specific goals and objectives expand upon current MES programs described earlier. These goals and objectives are also based on the following statements of guiding principals. The intent of the Reserve education program is to design an interdisciplinary and interactive program of education and interpretation that emphasizes the site's unique biological, geological, hydrological, archaeological characteristics and historical and cultural uses. A focus of the education program will be to place these assets in context with ongoing research, monitoring, and coastal management issues that have local, regional, and global significance.

## 9.2 Program Goals and Objectives

### Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function

#### *Objective 1-10: Increase K-12 student participation in Reserve research and monitoring*

##### **Action 1: Develop a keystone species monitoring program**

Students and teachers will be encouraged to participate in the keystone species monitoring program described in objective 3-12, action 1.

### Goal 2: Increase understanding of coastal ecosystems by diverse audiences

#### *Objective 2-12: Enhance existing formal and informal education programs*

##### **Action 1: Use partnerships to enhance existing programs**

Partnerships between the Reserve and interested schools and educators will be established to facilitate on-site and outreach programs. The types formal and informal education programming currently offered through the UTMSI/MES programs were described earlier and will be incorporated into the Reserve education programs. Using those program formats, expanded programs will be specifically developed for the Reserve, while others are examples of existing programs that can be offered at specific partner sites. Existing programs are indicated with an asterisk (\*) along with the sponsoring agency or group.

##### **Activities**

- Interpretive Center Tours \*(UTMSI, ANWR, Rockport Maritime Museum [RMM])
- Nature Trail Tours \*(ANWR, Fennessey Ranch, Matagorda Island), WEC
- Boat Tours \*(UTMSI, ANWR)
- Lecture/Seminar Series \*(UTMSI, ANWR, RMM)
- Night-time Programs
- Self-Directed Programs
- Field Days/Special Events (UTMSI open house, Earth Day, Wonders of Wetlands)
- Group Research /Monitoring Programs
- On-Line Activities (website)

##### **Workshops/Conferences**

- Resource Management Workshops
- Scientific/Professional Conferences \*(Sea Grant, Coastal Research)
- Public and Private Sector Workshops, Conferences and Training Programs
- Professional Training Programs

##### **Teacher Training**

- K-12 MES program workshops \*(TMEA, TCES, ISEA)
- Project Wild \*(TPWD)
- Marine Activities, Resource and Education \*(UTMSI)
- Fluid Earth, Living Ocean Curriculum \*(UTMSI)

##### **Exhibits \*(all at UTMSI, ANWR, RMM)**

- Static Displays
- Touch Tanks
- Aquariums
- Research Results Bulletin Board / Poster Display
- Monitoring Results Bulletin Board / Display
- Visiting Displays
- Local Art and Photography

##### **Trails**

- Nature trails at WEC
- Trails/observation decks/areas at remote locations \*(ANWR, Matagorda Island, Fennessey Ranch)

***Objective 2-13: Increase science literacy for K-12 students by using science as a language to understand coastal habitats***

**Action 1: Develop and enhance education programs for K-12 students**

Science literacy for K-12 students will be increased with the promotion of education programs that use inquiry-based science as a language or way of understanding both basic estuarine science and applied topics relative to coastal management issues. Actions to meet this objective include:

- Establish and coordinate a seminar series that includes 1) presentations about specific results of basic and applied research conducted at the NERR (presented by researchers working there as required by the research program), and 2) presentations on a diverse range of basic estuarine topics and pertinent coastal resource issues (presented by invited speakers, coordinated with a NERR speakers bureau - see below) directed toward the general public. NOTE: This series will be promoted through the publication and dissemination of a "Calendar of Events" (separately or as part of a periodic NERR newsletter)
- Establish a speakers bureau consisting of names of local and regional
- Invitation of experts and others to make presentations as part of on-site or off-site programs
- Incorporate coastal management issues into on-site and outreach interpretive programs
- Expand K-5th programs available through the WEC
- Offer scholarships to needy schools for visiting class program
- Develop and expand on-site indoor and outdoor inquiry-based classroom/lab programs/activities for K-12 students
- Develop and expand outreach programs and exhibits
- Develop and expand interpretive displays / exhibits
- Develop and expand nature trail excursions
- Expand boat excursions/tours

**Action 2: Increase visitations by under served groups**

Educational opportunities and programs will be developed that target a broad range of under served audiences from throughout the public and private sectors. Efforts will be made to encourage participation from a diverse spectrum of ethnic communities. In addition, needy local and regional schools will be targeted for transportation and housing scholarships. Funding mechanisms are listed under objective 2-1, action 5.

**Action 3: Provide interpretive opportunities at public access sites**

Interpretive materials and signs promoting public appreciation and support for stewardship of coastal resources will be created to and placed at public access sites.

***Objective 2-14: Increase public literacy about Texas coastal ecosystems***

**Action 1: Develop and enhance community outreach programs**

Community outreach programs will be developed and enhanced by the following actions:

- Add/develop innovative, hands-on, and interactive activities/field trips to existing Aransas National Wildlife Refuge, Matagorda Island Education center, Fennessey Ranch, and MES classroom and outdoor programs that emphasize inquiry-based science education methods.
- Identify and obtain the necessary materials (existing print, video, etc.) and funding resources to develop and maintain a mobile outreach and interpretation program (e.g., vehicle, equipment, resources, etc.), coordinated with NERR staff and volunteers.
- Develop a program for the dissemination of NERRS educational and research information and the environment through local, regional, and national print, electronic (world wide web) and video media (coordinated with the research and monitoring programs).
- Develop a process for evaluating on-site and off-site programs, results of which will be used to revise or direct

- future program improvements.
- Develop educational outreach programs for communities within NERR boundary watersheds, such as Refugio and San Patricio county

*Objective 2-15: Enhance the transfer of knowledge, information, and skills to coastal-decision makers*

**Action 1: Develop a Coastal Training Program**

The Coastal Training Program will provide up-to-date scientific information and skill-building opportunities to individuals who are responsible for making decisions that affect coastal resources. Detailed information on this program is listed under objective 2-2.

**Goal 3: Promote public appreciation and support for stewardship of coastal resources**

*Objective 3-14: Promote public ownership of Texas coastal resources*

**Action 1: Enhance informal education programs and information dissemination**

Public ownership will be promoted through the new and existing education programs offered by the Reserve. Information will also be disseminated to inform the public about the Reserve, objective 3-15.

**Action 2: Promote green building techniques to communities along the Texas coast**

As new facilities are built, the Reserve will strive to build in the most sustainable manner possible. Building sustainable or "green" buildings is the practice of creating healthier and more resource-efficient models of construction, renovation, operation, maintenance, and demolition. Building green will benefit the environment by reducing the impacts of natural resource consumption. The sustainable plan and "green" facilities will also be used to educate the public on sustainable living.

*Objective 3-15: Increase public awareness of the Reserve and the NERR System*

**Action 1: Develop and distribute materials about the Reserve and NERR system**

Materials that may be developed to increase public awareness may include:

- Printed informational materials to be distributed or used in any of the above listed on-site or outreach programs
- A traveling exhibit/activities program for use in K-12 schools and/or festivals and other community events (scheduled and coordinated by NERR staffer volunteers)
- A portable informational display for use at local, regional or national meetings and other appropriate venues
- A video and/or slide show presentations that can be distributed to interested groups (e.g., schools, civic and private groups)

**Action 2: Increase visitations by under served groups**

Educational opportunities and programs will be developed that target a broad range of under served audiences from throughout the public and private sectors. Efforts will be made to encourage participation from a diverse spectrum of ethnic communities. In addition, needy local and regional schools will be targeted for transportation and housing scholarships. Funding mechanisms are listed under objective 2-1, action 5.

**Action 3: Provide interpretive opportunities at public access sites.**

Interpretive materials and signs promoting public appreciation and support for stewardship of coastal resources will be created to and placed at public access sites.

***Objective 3-16: Provide outdoor educational experiences to scouting and other community organizations***

**Action 1:** Partner with organizations, such as the Aransas National Wildlife Refuge (ANWR), to provide educational experiences

The Stewardship Training program for Boy Scouts and Girl Scouts will be operated through the stewardship program. The ANWR currently operates scout trips through their Youth and Environmental Training Area (YETA). These scout trips focus on service and stewardship. This program can be expanded through NERR by incorporating estuarine based activities such as Oceanography Day. Oceanography Day was a one-day scouting event offered by UTMSI every three years to provide scouts the opportunity to earn an oceanography merit badge. The Oceanography Day schedule included a series of displays, films, lectures and laboratory work that took place at the UTMSI facilities and a trip aboard a research vessel. Scouts would prepared for the trip by submitting a report, covering the first six requirements of the oceanography merit badge, to the Marine Science Institute prior to the trip. During this process, the scouts had to demonstrate their knowledge of the various branches of oceanography and the characteristics of different types of ocean waves. They had to understand and draw a cross-section of underwater topography and be familiar with various descriptive terms related to the ocean floor. They compared the depths of oceans to the heights of mountains on land. The scouts learned about the properties of seawater and studied plants and animals that live in the sea. Perhaps the most interesting part of the adventure in Port Aransas was a trip in Corpus Christi Bay aboard the research vessels *Katy* and *Longhorn*. During the one-hour adventure scouts learned about the role of research vessels and observed some of research equipment in operation. The scouts were also able to observe plankton and nekton that had been previously captured by the crew of the vessels. Integration of Oceanography Day and the YETA programs would be exciting for scouts and a means of educating young people about the value of estuarine systems and why it is important to become good stewards of the land/sea interface.



## 10.0 VOLUNTEER PLAN

### 10.1 Introduction

The policy of the Reserve volunteer program will be to ensure that opportunities exist for any interested person or persons to volunteer. The policy would recognize that potential volunteers include persons with a wide range of backgrounds such as the local citizenry, local and regional schools, local and regional environmental and civic groups, and local and regional businesses and industries. The philosophy would also recognize that volunteers are crucial contributors to the success of any program. The goal of the volunteer program is to recruit as many interested persons as possible and to recognize and promote them as important to the success of the Reserve.

#### Existing Volunteer Programs

The Edith McAlister Animal Rehabilitation Keep (ARK) currently has an extensive volunteer program at the UTMSI. Operation of the ARK is greatly dependent on volunteer staff. A training program for ARK volunteers is already established. Expansion of the existing volunteer network of the ARK is a goal for the Reserve's volunteer plan.

### 10.2 Program Goals and Objectives

#### Goal 1: Improve understanding of Texas coastal zone ecosystems structure and function

##### *Objective 1-11: Increase Reserve's monitoring capacity*

###### **Action 1: Develop a volunteer network**

A volunteer network will be created by the volunteer coordinator. This network will be utilized to conduct monitoring of keystone species that will not be monitored by the biological monitoring program. The volunteer network will likely partner with existing programs such as Master Naturalist. More information on the keystone species monitoring program is listed under objective 3-12, action 1.

#### Goal 2: Increase understanding of coastal ecosystems by diverse audiences

##### *Objective 2-16: Increase the Reserve's capacity to provide educational experiences to K-12 students*

###### **Action 1: Recruit and train docent/volunteers**

Docents will be trained to increase their knowledge of estuaries. A cadre of docents/volunteers will be recruited and trained to increase educational capacity at reserve sites including the Wetland Education Center, University of Texas Marine Science Institute (UTMSI) Visitors Center, and satellite reserve centers in the Rockport area. The central Texas coast is an ecotourism destination for winter visitors and retired professionals who are willing and eager to become involved in educational outreach efforts. Training of research and monitoring documentation, methods and techniques will be conducted through interpretive programs, lectures, and seminars.

###### **Action 2: Develop a volunteer network**

A volunteer network will be created by the volunteer coordinator. This network will be utilized to increase educational capacity at reserve sites including the WEC, UTMSI Visitors Center, and satellite reserve centers in the Rockport area.

**Goal 3: Promote public appreciation and support for stewardship of coastal resources**

***Objective 3-17: Foster a stewardship ethic within local communities***

**Action 1: Ensure public participation in stewardship activities**

The volunteer coordinator will provide actions for encouraging membership in the volunteer network. Participation in stewardship activities will also be promoted through the Reserve website, coordinated events, and volunteer incentive and appreciation programs.

***Objective 3-18: Increase the Reserve's capacity to promote public appreciation of Texas coastal resources***

**Action 1: Develop a Friends network**

A Friends network will be created by the research manager. This network will be utilized to support the Reserve in promoting public appreciation of Texas coastal resources. The Friends network will target individuals who would like to support the Reserve in a capacity other than the research and education/outreach programs.

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## SUBCHAPTER B—OCEAN AND COASTAL RESOURCE MANAGEMENT

### PART 921—NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM REG- ULATIONS

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**AUTHORITY:** Section 315 of the Coastal Zone Management Act, as amended (16 U.S.C. 1461).

**SOURCE:** 58 FR 38215, July 15, 1993, unless otherwise noted.

#### Subpart A—General

##### § 921.1 Mission, goals and general provisions.

(a) The mission of the National Estuarine Research Reserve Program is the establishment and management, through Federal-state cooperation, of a national system (National Estuarine Research Reserve System or System) of estuarine research reserves (National Estuarine Research Reserves or Reserves) representative of the various regions and estuarine types in the United States. National Estuarine Research Reserves are established to provide opportunities for long-term research, education, and interpretation.

(b) The goals of the Program are to:

- (1) Ensure a stable environment for research through long-term protection of National Estuarine Research Reserve resources;
- (2) Address coastal management issues identified as significant through coordinated estuarine research within the System;

(3) Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;

(4) Promote Federal, state, public and private use of one or more Reserves within the System when such entities conduct estuarine research; and

(5) Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

(c) National Estuarine Research Reserves shall be open to the public to the extent permitted under state and Federal law. Multiple uses are allowed to the degree compatible with each Reserve's overall purpose as provided in the management plan (see §921.13) and consistent with paragraphs (a) and (b) of this section. Use levels are set by the state where the Reserve is located and analyzed in the management plan. The Reserve management plan shall describe the uses and establish priorities among these uses. The plan shall identify uses requiring a state permit, as well as areas where uses are encouraged or prohibited. Consistent with resource protection and research objectives, public access and use may be restricted to certain areas or components within a Reserve.

(d) Habitat manipulation for research purposes is allowed consistent with the following limitations. Manipulative research activities must be specified in the management plan, be consistent with the mission and goals of the program (see paragraphs (a) and (b) of this section) and the goals and objectives set forth in the Reserve's management plan, and be limited in nature and extent to the minimum manipulative activity necessary to accomplish the stated research objective. Manipulative research activities with a significant or long-term impact on Reserve resources require the prior approval of the state and the National Oceanic and Atmospheric Administration (NOAA). Manipulative research activities which can reasonably be expected to have a significant adverse impact on the estuarine resources and habitat of a Reserve, such that the activities themselves or their resulting short- and

long-term consequences compromise the representative character and integrity of a Reserve, are prohibited. Habitat manipulation for resource management purposes is prohibited except as specifically approved by NOAA as: (1) A restoration activity consistent with paragraph (e) of this section; or (2) an activity necessary for the protection of public health or the preservation of other sensitive resources which have been listed or are eligible for protection under relevant Federal or state authority (e.g., threatened/endangered species or significant historical or cultural resources) or if the manipulative activity is a long-term pre-existing use (i.e., has occurred prior to designation) occurring in a buffer area. If habitat manipulation is determined to be necessary for the protection of public health, the preservation of sensitive resources, or if the manipulation is a long-term pre-existing use in a buffer area, then these activities shall be specified in the Reserve management plan in accordance with §921.13(a)(10) and shall be limited to the reasonable alternative which has the least adverse and shortest term impact on the representative and ecological integrity of the Reserve.

(e) Under the Act an area may be designated as an estuarine Reserve only if the area is a representative estuarine ecosystem that is suitable for long-term research. Many estuarine areas have undergone some ecological change as a result of human activities (e.g., hydrological changes, intentional/unintentional species composition changes—introduced and exotic species). In those areas proposed or designated as National Estuarine Research Reserves, such changes may have diminished the representative character and integrity of the site. Although restoration of degraded areas is not a primary purpose of the System, such activities may be permitted to improve the representative character and integrity of a Reserve. Restoration activities must be carefully planned and approved by NOAA through the Reserve management plan. Historical research may be necessary to determine the "natural" representative state of an estuarine area (i.e., an estuarine ecosystem minimally affected by



human activity or influence). Frequently, restoration of a degraded estuarine area will provide an excellent opportunity for management oriented research.

(f) NOAA may provide financial assistance to coastal states, not to exceed, per Reserve, 50 percent of all actual costs or \$5 million whichever amount is less, to assist in the acquisition of land and waters, or interests therein. NOAA may provide financial assistance to coastal states not to exceed 70 percent of all actual costs for the management and operation of, the development and construction of facilities, and the conduct of educational or interpretive activities concerning Reserves (see subpart I). NOAA may provide financial assistance to any coastal state or public or private person, not to exceed 70 percent of all actual costs, to support research and monitoring within a Reserve. Notwithstanding any financial assistance limits established by this Part, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available. Predesignation, acquisition and development, operation and management, special research and monitoring, and special education and interpretation awards are available under the National Estuarine Reserve Program. Predesignation awards are for site selection/feasibility, draft management plan preparation and conduct of basic characterization studies. Acquisition and development awards are intended primarily for acquisition of interests in land, facility construction and to develop and/or upgrade research, monitoring and education programs. Operation and management awards provide funds to assist in implementing, operating and managing the administrative, and basic research, monitoring and education programs, outlined in the Reserve management plan. Special research and monitoring awards provide funds to conduct estuarine research and monitoring projects with the System. Special educational and interpretive awards provide funds to conduct estuarine educational and

interpretive projects within the System.

(g) Lands already in protected status managed by other Federal agencies, state or local governments, or private organizations may be included within National Estuarine Research Reserves only if the managing entity commits to long-term management consistent with paragraphs (d) and (e) of this section in the Reserve management plan. Federal lands already in protected status may not comprise a majority of the key land and water areas of a Reserve (see § 921.11(c)(3)).

(h) To assist the states in carrying out the Program's goals in an effective manner, NOAA will coordinate a research and education information exchange throughout the National Estuarine Research Reserve System. As part of this role, NOAA will ensure that information and ideas from one Reserve are made available to others in the System. The network will enable Reserves to exchange information and research data with each other, with universities engaged in estuarine research, and with Federal, state, and local agencies. NOAA's objective is a system-wide program of research and monitoring capable of addressing the management issues that affect long-term productivity of our Nation's estuaries.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998]

#### § 921.2 Definitions.

(a) *Act* means the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451 *et seq.*

(b) *Assistant Administrator* means the Assistant Administrator for Ocean Services and Coastal Zone Management or delegatee.

(c) *Coastal state* means a state of the United States, in or bordering on, the Atlantic, Pacific, or Arctic Ocean, the Gulf of Mexico, Long Island Sound, or one or more of the Great Lakes. For the purposes of these regulations the term also includes Puerto Rico, the Virgin Islands, Guam, the Commonwealth of the Northern Mariana Islands, the Trust Territories of the Pacific Islands, and American Samoa (see 16 U.S.C. 1453(4)).

(d) *State agency* means an instrumentality of a coastal state to whom the coastal state has delegated the authority and responsibility for the creation and/or management/operation of a National Estuarine Research Reserve. Factors indicative of this authority may include the power to receive and expend funds on behalf of the Reserve, acquire and sell or convey real and personal property interests, adopt rules for the protection of the Reserve, enforce rules applicable to the Reserve, or develop and implement research and education programs for the reserve. For the purposes of these regulations, the terms "coastal state" and "State agency" shall be synonymous.

(e) *Estuary* means that part of a river or stream or other body of water having unimpaired connection with the open sea, where the sea water is measurably diluted with fresh water derived from land drainage. The term also includes estuary-type areas with measurable freshwater influence and having unimpaired connections with the open sea, and estuary-type areas of the Great Lakes and their connecting waters (see 16 U.S.C. 1453(7)).

(f) *National Estuarine Research Reserve* means an area that is a representative estuarine ecosystem suitable for long-term research, which may include all of the key land and water portion of an estuary, and adjacent transitional areas and uplands constituting to the extent feasible a natural unit, and which is set aside as a natural field laboratory to provide long-term opportunities for research, education, and interpretation on the ecological relationships within the area (see 16 U.S.C. 1453(8)) and meets the requirements of 16 U.S.C. 1461(b). This includes those areas designated as National Estuarine Sanctuaries or Reserves under section 315 of the Act prior to enactment of the Coastal Zone Act Reauthorization Amendments of 1990 and each area subsequently designated as a National Estuarine Research Reserve.

**§921.3 National Estuarine Research Reserve System Biogeographic Classification Scheme and Estuarine Typologies.**

(a) National Estuarine Research Reserves are chosen to reflect regional

differences and to include a variety of ecosystem types. A biogeographic classification scheme based on regional variations in the nation's coastal zone has been developed. The biogeographic classification scheme is used to ensure that the National Estuarine Research Reserve System includes at least one site from each region. The estuarine typology system is utilized to ensure that sites in the System reflect the wide range of estuarine types within the United States.

(b) The biogeographic classification scheme, presented in appendix I, contains 29 regions. Figure 1 graphically depicts the biogeographic regions of the United States.

(c) The typology system is presented in appendix II.

**§921.4 Relationship to other provisions of the Coastal Zone Management Act, and to the Marine Protection, Research and Sanctuaries Act.**

(a) The National Estuarine Research Reserve System is intended to provide information to state agencies and other entities involved in addressing coastal management issues. Any coastal state, including those that do not have approved coastal management programs under section 306 of the Act, is eligible for an award under the National Estuarine Research Reserve Program (see §921.2(c)).

(b) For purposes of consistency review by states with a federally approved coastal management program, the designation of a National Estuarine Research Reserve is deemed to be a Federal activity, which, if directly affecting the state's coastal zone, must be undertaken in a manner consistent to the maximum extent practicable with the approved state coastal management program as provided by section 1456(c)(1) of the Act, and implementing regulations at 15 CFR part 930, subpart C. In accordance with section 1456(c)(1) of the Act and the applicable regulations NOAA will be responsible for certifying that designation of the Reserve is consistent with the state's approved coastal management program. The state must concur with or object to the certification. It is recommended that the lead state agency for Reserve designation consult, at the

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earliest practicable time, with the appropriate state officials concerning the consistency of a proposed National Estuarine Research Reserve.

(c) The National Estuarine Research Reserve Program will be administered in close coordination with the National Marine Sanctuary Program (Title III of the Marine Protection, Research and Sanctuaries Act, as amended, 16 U.S.C. 1431-1445), also administered by NOAA. Title III authorizes the Secretary of Commerce to designate discrete areas of the marine environment as National Marine Sanctuaries to protect or restore such areas for their conservation, recreational, ecological, historical, research, educational or esthetic values. National Marine Sanctuaries and Estuarine Research Reserves may not overlap, but may be adjacent.

### Subpart B—Site Selection, Post Site Selection and Management Plan Development

#### § 921.10 General.

(a) A coastal state may apply for Federal financial assistance for the purpose of site selection, preparation of documents specified in § 921.13 (draft management plan (DMP) and environmental impact statement (EIS)), and the conduct of limited basic characterization studies. The total Federal share of this assistance may not exceed \$100,000. Federal financial assistance for preacquisition activities under § 921.11 and § 921.12 is subject to the total \$5 million for which each Reserve is eligible for land acquisition. Notwithstanding the above, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available. In the case of a biogeographic region (see appendix I) shared by two or more coastal states, each state is eligible for Federal financial assistance to establish a separate National Estuarine Research Reserve within their respective portion of the shared biogeographic region. Each separate National Estuarine Research Reserve is eligible for the full complement of

funding. Financial assistance application procedures are specified in subpart I.

(b) In developing a Reserve program, a state may choose to develop a multiple-site Reserve reflecting a diversity of habitats in a single biogeographic region. A multiple-site Reserve allows the state to develop complementary research and educational programs within the individual components of its multi-site Reserve. Multiple-site Reserves are treated as one Reserve in terms of financial assistance and development of an overall management framework and plan. Each individual site of a proposed multiple-site Reserve shall be evaluated both separately under § 921.11(c) and collectively as part of the site selection process. A coastal state may propose to establish a multiple-site Reserve at the time of the initial site selection, or at any point in the development or operation of the Reserve. If the state decides to develop a multiple-site National Estuarine Research Reserve after the initial acquisition and development award is made for a single site, the proposal is subject to the requirements set forth in § 921.33(b). However, a state may not propose to add one or more sites to an already designated Reserve if the operation and management of such Reserve has been found deficient and uncorrected or the research conducted is not consistent with the Estuarine Research Guidelines referenced in § 921.51. In addition, Federal funds for the acquisition of a multiple-site Reserve remain limited to \$5,000,000 (see § 921.20). The funding for operation of a multiple-site Reserve is limited to the maximum allowed for any one Reserve per year (see § 921.32(c)) and preacquisition funds are limited to \$100,000 per Reserve. Notwithstanding the above, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available.

[58 FR 38215, July 15, 1993, as amended at 63 FR 26717, May 14, 1998]

**§921.11 Site selection and feasibility.**

(a) A coastal state may use Federal funds to establish and implement a site selection process which is approved by NOAA.

(b) In addition to the requirements set forth in subpart I, a request for Federal funds for site selection must contain the following programmatic information:

(1) A description of the proposed site selection process and how it will be implemented in conformance with the biogeographic classification scheme and typology (§921.3);

(2) An identification of the site selection agency and the potential management agency; and

(3) A description of how public participation will be incorporated into the process (see §921.11(d)).

(c) As part of the site selection process, the state and NOAA shall evaluate and select the final site(s). NOAA has final authority in approving such sites. Site selection shall be guided by the following principles:

(1) The site's contribution to the biogeographical and typological balance of the National Estuarine Research Reserve System. NOAA will give priority consideration to proposals to establish Reserves in biogeographic regions or subregions or incorporating types that are not represented in the system. (see the biogeographic classification scheme and typology set forth in §921.3 and appendices I and II);

(2) The site's ecological characteristics, including its biological productivity, diversity of flora and fauna, and capacity to attract a broad range of research and educational interests. The proposed site must be a representative estuarine ecosystem and should, to the maximum extent possible, be an estuarine ecosystem minimally affected by human activity or influence (see §921.1(e)).

(3) Assurance that the site's boundaries encompass an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation. Boundary size will vary greatly depending on the nature of the ecosystem. Reserve boundaries must encompass the area within which adequate control has or will be established

by the managing entity over human activities occurring within the Reserve. Generally, Reserve boundaries will encompass two areas: Key land and water areas (or "core area") and a buffer zone. Key land and water areas and a buffer zone will likely require significantly different levels of control (see §921.13(a)(7)). The term "key land and water areas" refers to that core area within the Reserve that is so vital to the functioning of the estuarine ecosystem that it must be under a level of control sufficient to ensure the long-term viability of the Reserve for research on natural processes. Key land and water areas, which comprise the core area, are those ecological units of a natural estuarine system which preserve, for research purposes, a full range of significant physical, chemical and biological factors contributing to the diversity of fauna, flora and natural processes occurring within the estuary. The determination of which land and water areas are "key" to a particular Reserve must be based on specific scientific knowledge of the area. A basic principle to follow when deciding upon key land and water areas is that they should encompass resources representative of the total ecosystem, and which if compromised could endanger the research objectives of the Reserve. The term *buffer zone* refers to an area adjacent to or surrounding key land and water areas and essential to their integrity. Buffer zones protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. When determined appropriate by the state and approved by NOAA, the buffer zone may also include an area necessary for facilities required for research and interpretation. Additionally, buffer zones should be established sufficient to accommodate a shift of the core area as a result of biological, ecological or geomorphological change which reasonably could be expected to occur. National Estuarine Research Reserves may include existing Federal or state lands already in a protected status where mutual benefit can be enhanced. However, NOAA will not approve a site

for potential National Estuarine Research Reserve status that is dependent primarily upon the inclusion of currently protected Federal lands in order to meet the requirements for Reserve status (such as key land and water areas). Such lands generally will be included within a Reserve to serve as a buffer or for other ancillary purposes; and may be included, subject to NOAA approval, as a limited portion of the core area;

(4) The site's suitability for long-term estuarine research, including ecological factors and proximity to existing research facilities and educational institutions;

(5) The site's compatibility with existing and potential land and water uses in contiguous areas as well as approved coastal and estuarine management plans; and

(6) The site's importance to education and interpretive efforts, consistent with the need for continued protection of the natural system.

(d) Early in the site selection process the state must seek the views of affected landowners, local governments, other state and Federal agencies and other parties who are interested in the area(s) being considered for selection as a potential National Estuarine Research Reserve. After the local government(s) and affected landowner(s) have been contacted, at least one public meeting shall be held in the vicinity of the proposed site. Notice of such a meeting, including the time, place, and relevant subject matter, shall be announced by the state through the area's principal newspaper at least 15 days prior to the date of the meeting and by NOAA in the FEDERAL REGISTER.

(e) A state request for NOAA approval of a proposed site (or sites in the case of a multi-site Reserve) must contain a description of the proposed site(s) in relationship to each of the site selection principals (§921.11(c)) and the following information:

(1) An analysis of the proposed site(s) based on the biogeographical scheme/typology discussed in §921.3 and set forth in appendices I and II;

(2) A description of the proposed site(s) and its (their) major resources, including location, proposed bound-

aries, and adjacent land uses. Maps are required;

(3) A description of the public participation process used by the state to solicit the views of interested parties, a summary of comments, and, if interstate issues are involved, documentation that the Governor(s) of the other affected state(s) has been contacted. Copies of all correspondence, including contact letters to all affected landowners must be appended;

(4) A list of all sites considered and a brief statement of the reasons why a site was not preferred; and

(5) A nomination of the proposed site(s) for designation as a National Estuarine Research Reserve by the Governor of the coastal state in which the state is located.

(f) A state proposing to reactivate an inactive site, previously approved by NOAA for development as an Estuarine Sanctuary or Reserve, may apply for those funds remaining, if any, provided for site selection and feasibility (§921.11a)) to determine the feasibility of reactivation. This feasibility study must comply with the requirements set forth in §921.11 (c) through (e).

#### §921.12 Post site selection.

(a) At the time of the coastal state's request for NOAA approval of a proposed site, the state may submit a request for funds to develop the draft management plan and for preparation of the EIS. At this time, the state may also submit a request for the remainder of the predesignation funds to perform a limited basic characterization of the physical, chemical and biological characteristics of the site approved by NOAA necessary for providing EIS information to NOAA. The state's request for these post site selection funds must be accompanied by the information specified in subpart I and, for draft management plan development and EIS information collection, the following programmatic information:

(1) A draft management plan outline (see §921.13(a) below); and

(2) An outline of a draft memorandum of understanding (MOU) between the state and NOAA detailing the Federal-state role in Reserve management during the initial period of Federal funding and expressing the

state's long-term commitment to operate and manage the Reserve.

(b) The state is eligible to use the funds referenced in § 921.12(a) after the proposed site is approved by NOAA under the terms of § 921.11.

**§ 921.13 Management plan and environmental impact statement development.**

(a) After NOAA approves the state's proposed site and application for funds submitted pursuant to § 921.12, the state may begin draft management plan development and the collection of information necessary for the preparation by NOAA of an EIS. The state shall develop a draft management plan, including an MOU. The plan shall set out in detail:

(1) Reserve goals and objectives, management issues, and strategies or actions for meeting the goals and objectives;

(2) An administrative plan including staff roles in administration, research, education/interpretation, and surveillance and enforcement;

(3) A research plan, including a monitoring design;

(4) An education/interpretive plan;

(5) A plan for public access to the Reserve;

(6) A construction plan, including a proposed construction schedule, general descriptions of proposed developments and general cost estimates. Information should be provided for proposed minor construction projects in sufficient detail to allow these projects to begin in the initial phase of acquisition and development. A categorical exclusion, environmental assessment, or EIS may be required prior to construction;

(7)(i) An acquisition plan identifying the ecologically key land and water areas of the Reserve, ranking these areas according to their relative importance, and including a strategy for establishing adequate long-term state control over these areas sufficient to provide protection for Reserve resources to ensure a stable environment for research. This plan must include an identification of ownership within the proposed Reserve boundaries, including land already in the public domain; the method(s) of acquisition which the

state proposes to use—acquisition (including less-than-fee simple options) to establish adequate long-term state control; an estimate of the fair market value of any property interest—which is proposed for acquisition; a schedule estimating the time required to complete the process of establishing adequate state control of the proposed research reserve; and a discussion of any anticipated problems. In selecting a preferred method(s) for establishing adequate state control over areas within the proposed boundaries of the Reserve, the state shall perform the following steps for each parcel determined to be part of the key land and water areas (control over which is necessary to protect the integrity of the Reserve for research purposes), and for those parcels required for research and interpretive support facilities or buffer purposes:

(A) Determine, with appropriate justification, the minimum level of control(s) required [e.g., management agreement, regulation, less-than-fee simple property interest (e.g., conservation easement), fee simple property acquisition, or a combination of these approaches]. This does not preclude the future necessity of increasing the level of state control;

(B) Identify the level of existing state control(s);

(C) Identify the level of additional state control(s), if any, necessary to meet the minimum requirements identified in paragraph (a)(7)(i)(A) of this section;

(D) Examine all reasonable alternatives for attaining the level of control identified in paragraph (a)(7)(i)(C) of this section, and perform a cost analysis of each; and

(E) Rank, in order of cost, the methods (including acquisition) identified in paragraph (a)(7)(i)(D) of this section.

(ii) An assessment of the relative cost-effectiveness of control alternatives shall include a reasonable estimate of both short-term costs (e.g., acquisition of property interests, regulatory program development including associated enforcement costs, negotiation, adjudication, etc.) and long-term costs (e.g., monitoring, enforcement,

adjudication, management and coordination). In selecting a preferred method(s) for establishing adequate state control over each parcel examined under the process described above, the state shall give priority consideration to the least costly method(s) of attaining the minimum level of long-term control required. Generally, with the possible exception of buffer areas required for support facilities, the level of control(s) required for buffer areas will be considerably less than that required for key land and water areas. This acquisition plan, after receiving the approval of NOAA, shall serve as a guide for negotiations with landowners. A final boundary for the reserve shall be delineated as a part of the final management plan;

(8) A resource protection plan detailing applicable authorities, including allowable uses, uses requiring a permit and permit requirements, any restrictions on use of the research reserve, and a strategy for research reserve surveillance and enforcement of such use restrictions, including appropriate government enforcement agencies;

(9) If applicable, a restoration plan describing those portions of the site that may require habitat modification to restore natural conditions;

(10) If applicable, a resource manipulation plan, describing those portions of the Reserve buffer in which long-term pre-existing (prior to designation) manipulation for reasons not related to research or restoration is occurring. The plan shall explain in detail the nature of such activities, shall justify why such manipulation should be permitted to continue within the reserve buffer; and shall describe possible effects of this manipulation on key land and water areas and their resources;

(11) A proposed memorandum of understanding (MOU) between the state and NOAA regarding the Federal-state relationship during the establishment and development of the National Estuarine Research Reserve, and expressing a long-term commitment by the state to maintain and manage the Reserve in accordance with section 315 of the Act, 16 U.S.C. 1461, and applicable regulations. In conjunction with the MOU, and where possible under state law, the state will consider taking appropriate

administrative or legislative action to ensure the long-term protection and operation of the National Estuarine Research Reserve. If other MOUs are necessary (such as with a Federal agency, another state agency or private organization), drafts of such MOUs must be included in the plan. All necessary MOU's shall be signed prior to Reserve designation; and

(12) If the state has a federally approved coastal management program, a certification that the National Estuarine Research Reserve is consistent to the maximum extent practicable with that program. See §§921.4(b) and 921.30(b).

(b) Regarding the preparation of an EIS under the National Environmental Policy Act on a National Estuarine Research Reserve proposal, the state and NOAA shall collect all necessary information concerning the socioeconomic and environmental impacts associated with implementing the draft management plan and feasible alternatives to the plan. Based on this information, the state will draft and provide NOAA with a preliminary EIS.

(c) Early in the development of the draft management plan and the draft EIS, the state and NOAA shall hold a scoping meeting (pursuant to NEPA) in the area or areas most affected to solicit public and government comments on the significant issues related to the proposed action. NOAA will publish a notice of the meeting in the FEDERAL REGISTER at least 15 days prior to the meeting. The state shall be responsible for publishing a similar notice in the local media.

(d) NOAA will publish a FEDERAL REGISTER notice of Intent to prepare a draft EIS. After the draft EIS is prepared and filed with the Environmental Protection Agency (EPA), a Notice of Availability of the draft EIS will appear in the FEDERAL REGISTER. Not less than 30 days after publication of the notice, NOAA will hold at least one public hearing in the area or areas most affected by the proposed national estuarine research reserve. The hearing will be held no sooner than 15 days after appropriate notice of the meeting has been given in the principal news media by the state and in the FEDERAL REGISTER by NOAA. After a 45-day

comment period, a final EIS will be prepared by the state and NOAA.

### Subpart C—Acquisition, Development and Preparation of the Final Management Plan

#### § 921.20 General.

The acquisition and development period is separated into two major phases. After NOAA approval of the site, draft management plan and draft MOU, and completion of the final EIS, a coastal state is eligible for an initial acquisition and development award(s). In this initial phase, the state should work to meet the criteria required for formal research reserve designation; *e.g.*, establishing adequate state control over the key land and water areas as specified in the draft management plan and preparing the final management plan. These requirements are specified in § 921.30. Minor construction in accordance with the draft management plan may also be conducted during this initial phase. The initial acquisition and development phase is expected to last no longer than three years. If necessary, a longer time period may be negotiated between the state and NOAA. After Reserve designation, a state is eligible for a supplemental acquisition and development award(s) in accordance with § 921.31. In this post-designation acquisition and development phase, funds may be used in accordance with the final management plan to construct research and educational facilities, complete any remaining land acquisition, for program development, and for restorative activities identified in the final management plan. In any case, the amount of Federal financial assistance provided to a coastal state with respect to the acquisition of lands and waters, or interests therein, for any one National Estuarine Research Reserve may not exceed an amount equal to 50 percent of the costs of the lands, waters, and interests therein or \$5,000,000, whichever amount is less, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of all actual costs of activities carried out

with this assistance, as long as such funds are available.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998]

#### § 921.21 Initial acquisition and development awards.

(a) Assistance is provided to aid the recipient prior to designation in:

(1) Acquiring a fee simple or less-than-fee simple real property interest in land and water areas to be included in the Reserve boundaries (see § 921.13(a)(7); § 921.30(d));

(2) Minor construction, as provided in paragraphs (b) and (c) of this section;

(3) Preparing the final management plan; and

(4) Initial management costs, *e.g.*, for implementing the NOAA approved draft management plan, hiring a Reserve manager and other staff as necessary and for other management-related activities. Application procedures are specified in subpart I.

(b) The expenditure of Federal and state funds on major construction activities is not allowed during the initial acquisition and development phase. The preparation of architectural and engineering plans, including specifications, for any proposed construction, or for proposed restorative activities, is permitted. In addition, minor construction activities, consistent with paragraph (c) of this section also are allowed. The NOAA-approved draft management plan must, however, include a construction plan and a public access plan before any award funds can be spent on construction activities.

(c) Only minor construction activities that aid in implementing portions of the management plan (such as boat ramps and nature trails) are permitted during the initial acquisition and development phase. No more than five (5) percent of the initial acquisition and development award may be expended on such activities. NOAA must make a specific determination, based on the final EIS, that the construction activity will not be detrimental to the environment.



(d) Except as specifically provided in paragraphs (a) through (c) of this section, construction projects, to be funded in whole or in part under an acquisition and development award(s), may not be initiated until the Reserve receives formal designation (see § 921.30). This requirement has been adopted to ensure that substantial progress in establishing adequate state control over key land and water areas has been made and that a final management plan is completed before major sums are spent on construction. Once substantial progress in establishing adequate state control/acquisition has been made, as defined by the state in the management plan, other activities guided by the final management plan may begin with NOAA's approval.

(e) For any real property acquired in whole or part with Federal funds for the Reserve, the state shall execute suitable title documents to include substantially the following provisions, or otherwise append the following provisions in a manner acceptable under applicable state law to the official land record(s):

(1) Title to the property conveyed by this deed shall vest in the [recipient of the award granted pursuant to section 315 of the Act, 16 U.S.C. 1461 or other NOAA approved state agency] subject to the condition that the designation of the [name of National Estuarine Reserve] is not withdrawn and the property remains part of the federally designated [name of National Estuarine Research Reserve]; and

(2) In the event that the property is no longer included as part of the Reserve, or if the designation of the Reserve of which it is part is withdrawn, then NOAA or its successor agency, after full and reasonable consultation with the State, may exercise the following rights regarding the disposition of the property:

(i) The recipient may retain title after paying the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the current fair market value of the property;

(ii) If the recipient does not elect to retain title, the Federal Government

may either direct the recipient to sell the property and pay the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the proceeds from the sale (after deducting actual and reasonable selling and repair or renovation expenses, if any, from the sale proceeds), or direct the recipient to transfer title to the Federal Government. If directed to transfer title to the Federal Government, the recipient shall be entitled to compensation computed by applying the recipient's percentage of participation in the cost of the original project to the current fair market value of the property; and

(iii) Fair market value of the property must be determined by an independent appraiser and certified by a responsible official of the state, as provided by Department of Commerce regulations at 15 CFR part 24, and Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally assisted programs at 15 CFR part 11.

(f) Upon instruction by NOAA, provisions analogous to those of § 921.21(e) shall be included in the documentation underlying less-than-fee-simple interests acquired in whole or part with Federal funds.

(g) Federal funds or non-Federal matching share funds shall not be spent to acquire a real property interest in which the state will own the land concurrently with another entity unless the property interest has been identified as a part of an acquisition strategy pursuant to § 921.13(7) which has been approved by NOAA prior to the effective date of these regulations.

(h) Prior to submitting the final management plan to NOAA for review and approval, the state shall hold a public meeting to receive comment on the plan in the area affected by the estuarine research reserve. NOAA will publish a notice of the meeting in the FEDERAL REGISTER at least 15 days prior to the public meeting. The state shall be responsible for having a similar notice published in the local newspaper(s).

**Subpart D—Reserve Designation and Subsequent Operation**

**§921.30 Designation of National Estuarine Research Reserves.**

(a) The Under Secretary may designate an area proposed for designation by the Governor of the state in which it is located, as a National Estuarine Research Reserve if the Under Secretary finds:

(1) The area is a representative estuarine ecosystem that is suitable for long-term research and contributes to the biogeographical and typological balance of the System;

(2) Key land and water areas of the proposed Reserve, as identified in the management plan, are under adequate state control sufficient to provide long-term protection for reserve resources to ensure a stable environment for research;

(3) Designation of the area as a Reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation;

(4) A final management plan has been approved by NOAA;

(5) An MOU has been signed between the state and NOAA ensuring a long-term commitment by the state to the effective operation and implementation of the area as a National Estuarine Research Reserve;

(6) All MOU's necessary for reserve management (i.e., with relevant Federal, state, and local agencies and/or private organizations) have been signed; and

(7) The coastal state in which the area is located has complied with the requirements of subpart B.

(b) NOAA will determine whether the designation of a National Estuarine Research Reserve in a state with a federally approved coastal zone management program directly affects the coastal zone. If the designation is found to directly affect the coastal zone, NOAA will make a consistency determination pursuant to §307(c)(1) of the Act, 16 U.S.C. 1456, and 15 CFR part 930, subpart C. See §921.4(b). The results of this consistency determination will be published in the FEDERAL REG-

ISTER when the notice of designation is published. See §921.30(c).

(c) NOAA will publish the notice of designation of a National Estuarine Research Reserve in the FEDERAL REGISTER. The state shall be responsible for having a similar notice published in the local media.

(d) The term *state control* in §921.30(a)(3) does not necessarily require that key land and water areas be owned by the state in fee simple. Acquisition of less-than-fee simple interests e.g., conservation easements) and utilization of existing state regulatory measures are encouraged where the state can demonstrate that these interests and measures assure adequate long-term state control consistent with the purposes of the research reserve (see also §§921.13(a)(7); 921.21(g)). Should the state later elect to purchase an interest in such lands using NOAA funds, adequate justification as to the need for such acquisition must be provided to NOAA.

**§921.31 Supplemental acquisition and development awards.**

After National Estuarine Research Reserve designation, and as specified in the approved management plan, a coastal state may request a supplemental acquisition and/or development award(s) for acquiring additional property interests identified in the management plan as necessary to strengthen protection of key land and water areas and to enhance long-term protection of the area for research and education, for facility and exhibit construction, for restorative activities identified in the approved management plan, for administrative purposes related to acquisition and/or facility construction and to develop and/or upgrade research, monitoring and education/interpretive programs. Federal financial assistance provided to a National Estuarine Research Reserve for supplemental development costs directly associated with facility construction (i.e., major construction activities) may not exceed 70 percent of the total project cost, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100

percent of the costs. NOAA must make a specific determination that the construction activity will not be detrimental to the environment. Acquisition awards for the acquisition of lands or waters, or interests therein, for any one reserve may not exceed an amount equal to 50 percent of the costs of the lands, waters, and interests therein of \$5,000,000, whichever amount is less, except when the financial assistance is provided from amounts recovered as result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available. In the case of a biogeographic region (see appendix I) shared by two or more states, each state is eligible independently for Federal financial assistance to establish a separate National Estuarine Research Reserve within their respective portion of the shared biogeographic region. Application procedures are specified in subpart I. Land acquisition must follow the procedures specified in §§ 921.13(a)(7), 921.21(e) and (f) and 921.81.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998]

**§ 921.32 Operation and management: Implementation of the management plan.**

(a) After the Reserve is formally designated, a coastal state is eligible to receive Federal funds to assist the state in the operation and management of the Reserve including the management of research, monitoring, education, and interpretive programs. The purpose of this Federally funded operation and management phase is to implement the approved final management plan and to take the necessary steps to ensure the continued effective operation of the Reserve.

(b) State operation and management of the Reserves shall be consistent with the mission, and shall further the goals of the National Estuarine Research Reserve program (see § 921.1).

(c) Federal funds are available for the operation and management of the Reserve. Federal funds provided pursuant to this section may not exceed 70 percent of the total cost of operating and

managing the Reserve for any one year, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs. In the case of a biogeographic region (see Appendix I) shared by two or more states, each state is eligible for Federal financial assistance to establish a separate Reserve within their respective portion of the shared biogeographic region (see § 921.10).

(d) Operation and management funds are subject to the following limitations:

(1) Eligible coastal state agencies may apply for up to the maximum share available per Reserve for that fiscal year. Share amounts will be announced annually by letter from the Sanctuary and Reserves Division to all participating states. This letter will be provided as soon as practicable following approval of the Federal budget for that fiscal year.

(2) No more than ten percent of the total amount (state and Federal shares) of each operation and management award may be used for construction-type activities.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

**§ 921.33 Boundary changes, amendments to the management plan, and addition of multiple-site components.**

(a) Changes in the boundary of a Reserve and major changes to the final management plan, including state laws or regulations promulgated specifically for the Reserve, may be made only after written approval by NOAA. NOAA may require public notice, including notice in the FEDERAL REGISTER and an opportunity for public comment before approving a boundary or management plan change. Changes in the boundary of a Reserve involving the acquisition of properties not listed in the management plan or final EIS require public notice and the opportunity for comment; in certain cases, a categorical exclusion, an environmental assessment and possibly an environmental impact statement may be required.

NOAA will place a notice in the FEDERAL REGISTER of any proposed changes in Reserve boundaries or proposed major changes to the final management plan. The state shall be responsible for publishing an equivalent notice in the local media. See also requirements of §§ 921.4(b) and 921.13(a)(11).

(b) As discussed in § 921.10(b), a state may choose to develop a multiple-site National Estuarine Research Reserve after the initial acquisition and development award for a single site has been made. NOAA will publish notice of the proposed new site including an invitation for comments from the public in the FEDERAL REGISTER. The state shall be responsible for publishing an equivalent notice in the local newspaper(s). An EIS, if required, shall be prepared in accordance with section § 921.13 and shall include an administrative framework for the multiple-site Reserve and a description of the complementary research and educational programs within the Reserve. If NOAA determines, based on the scope of the project and the issues associated with the additional site(s), that an environmental assessment is sufficient to establish a multiple-site Reserve, then the state shall develop a revised management plan which, concerning the additional component, incorporates each of the elements described in § 921.13(a). The revised management plan shall address goals and objectives for all components of the multi-site Reserve and the additional component's relationship to the original site(s).

(c) The state shall revise the management plan for a Reserve at least every five years, or more often if necessary. Management plan revisions are subject to (a) above.

(d) NOAA will approve boundary changes, amendments to management plans, or the addition of multiple-site components, by notice in the FEDERAL REGISTER. If necessary NOAA will revise the designation document (findings) for the site.

### Subpart E—Ongoing Oversight, Performance Evaluation and Withdrawal of Designation

#### § 921.40 Ongoing oversight and evaluations of designated National Estuarine Research Reserves.

(a) The Sanctuaries and Reserve Division shall conduct, in accordance with section 312 of the Act and procedures set forth in 15 CFR part 928, ongoing oversight and evaluations of Reserves. Interim sanctions may be imposed in accordance with regulations promulgated under 15 CFR part 928.

(b) The Assistant Administrator may consider the following indicators of non-adherence in determining whether to invoke interim sanctions:

(1) Inadequate implementation of required staff roles in administration, research, education/interpretation, and surveillance and enforcement. Indicators of inadequate implementation could include: No Reserve Manager, or no staff or insufficient staff to carry out the required functions.

(2) Inadequate implementation of the required research plan, including the monitoring design. Indicators of inadequate implementation could include: Not carrying out research or monitoring that is required by the plan, or carrying out research or monitoring that is inconsistent with the plan.

(3) Inadequate implementation of the required education/interpretation plan. Indicators of inadequate implementation could include: Not carrying out education or interpretation that is required by the plan, or carrying out education/interpretation that is inconsistent with the plan.

(4) Inadequate implementation of public access to the Reserve. Indicators of inadequate implementation of public access could include: Not providing necessary access, giving full consideration to the need to keep some areas off limits to the public in order to protect fragile resources.

(5) Inadequate implementation of facility development plan. Indicators of inadequate implementation could include: Not taking action to propose and

budget for necessary facilities, or not undertaking necessary construction in a timely manner when funds are available.

(6) Inadequate implementation of acquisition plan. Indicators of inadequate implementation could include: Not pursuing an aggressive acquisition program with all available funds for that purpose, not requesting promptly additional funds when necessary, and evidence that adequate long-term state control has not been established over some core or buffer areas, thus jeopardizing the ability to protect the Reserve site and resources from offsite impacts.

(7) Inadequate implementation of Reserve protection plan. Indicators of inadequate implementation could include: Evidence of non-compliance with Reserve restrictions, insufficient surveillance and enforcement to assure that restrictions on use of the Reserve are adhered to, or evidence that Reserve resources are being damaged or destroyed as a result of the above.

(8) Failure to carry out the terms of the signed Memorandum of Understanding (MOU) between the state and NOAA, which establishes a long-term state commitment to maintain and manage the Reserve in accordance with section 315 of the Act. Indicators of failure could include: State action to allow incompatible uses of state-controlled lands or waters in the Reserve, failure of the state to bear its fair share of costs associated with long-term operation and management of the Reserve, or failure to initiate timely updates of the MOU when necessary.

#### § 921.41 Withdrawal of designation.

The Assistant Administrator may withdraw designation of an estuarine area as a National Estuarine Research Reserve pursuant to and in accordance with the procedures of section 312 and 315 of the Act and regulations promulgated thereunder.

### Subpart F—Special Research Projects

#### § 921.50 General.

(a) To stimulate high quality research within designated National Estuarine Research Reserves, NOAA may provide financial support for research

projects which are consistent with the Estuarine Research Guidelines referenced in § 921.51. Research awards may be awarded under this subpart to only those designated Reserves with approved final management plans. Although research may be conducted within the immediate watershed of the Reserve, the majority of research activities of any single research project funded under this subpart may be conducted within Reserve boundaries. Funds provided under this subpart are primarily used to support management-related research projects that will enhance scientific understanding of the Reserve ecosystem, provide information needed by Reserve management and coastal management decision-makers, and improve public awareness and understanding of estuarine ecosystems and estuarine management issues. Special research projects may be oriented to specific Reserves; however, research projects that would benefit more than one Reserve in the National Estuarine Research System are encouraged.

(b) Funds provided under this subpart are available on a competitive basis to any coastal state or qualified public or private person. A notice of available funds will be published in the FEDERAL REGISTER. Special research project funds are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with § 921.81(e)(4) ("allowable costs"), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

#### § 921.51 Estuarine research guidelines.

(a) Research within the National Estuarine Research Reserve System shall be conducted in a manner consistent with Estuarine Research Guidelines developed by NOAA.

(b) A summary of the Estuarine Research Guidelines is published in the

FEDERAL REGISTER as a part of the notice of available funds discussed in § 921.50(c).

(c) The Estuarine Research Guidelines are reviewed annually by NOAA. This review will include an opportunity for comment by the estuarine research community.

**§ 921.52 Promotion and coordination of estuarine research.**

(a) NOAA will promote and coordinate the use of the National Estuarine Research Reserve System for research purposes.

(b) NOAA will, in conducting or supporting estuarine research other than that authorized under section 315 of the Act, give priority consideration to research that make use of the National Estuarine Research Reserve System.

(c) NOAA will consult with other Federal and state agencies to promote use of one or more research reserves within the National Estuarine Research Reserve System when such agencies conduct estuarine research.

**Subpart G—Special Monitoring Projects**

**§ 921.60 General.**

(a) To provide a systematic basis for developing a high quality estuarine resource and ecosystem information base for National Estuarine Research Reserves and, as a result, for the System, NOAA may provide financial support for basic monitoring programs as part of operations and management under § 921.32. Monitoring funds are used to support three major phases of a monitoring program:

(1) Studies necessary to collect data for a comprehensive site description/characterization;

(2) Development of a site profile; and

(3) Formulation and implementation of a monitoring program.

(b) Additional monitoring funds may be available on a competitive basis to the state agency responsible for Reserve management or a qualified public or private person or entity. However, if the applicant is other than the managing entity of a Reserve that applicant must submit as a part of the application a letter from the Reserve manager indicating formal support of

the application by the managing entity of the Reserve. Funds provided under this subpart for special monitoring projects are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with § 921.81(e)(4) ("allowable costs"), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.

(c) Monitoring projects funded under this subpart must focus on the resources within the boundaries of the Reserve and must be consistent with the applicable sections of the Estuarine Research Guidelines referenced in § 921.51. Portions of the project may occur within the immediate watershed of the Reserve beyond the site boundaries. However, the monitoring proposal must demonstrate why this is necessary for the success of the project.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

**Subpart H—Special Interpretation and Education Projects**

**§ 921.70 General.**

(a) To stimulate the development of innovative or creative interpretive and educational projects and materials to enhance public awareness and understanding of estuarine areas, NOAA may fund special interpretive and educational projects in addition to those activities provided for in operations and management under § 921.32. Special interpretive and educational awards may be awarded under this subpart to only those designated Reserves with approved final management plans.

(b) Funds provided under this subpart may be available on a competitive basis to any state agency. However, if the applicant is other than the managing entity of a Reserve, that applicant must submit as a part of the application a letter from the Reserve manager indicating formal support of the application by the managing entity

of the Reserve. These funds are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with § 921.81(e)(4) ("allowable costs"), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.

(c) Applicants for education/interpretive projects that NOAA determines benefit the entire National Estuarine Research Reserve System may receive Federal assistance of up to 100% of project costs.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

### Subpart I—General Financial Assistance Provisions

#### § 921.80 Application information.

(a) Only a coastal state may apply for Federal financial assistance awards for preacquisition, acquisition and development, operation and management, and special education and interpretation projects under subpart H. Any coastal state or public or private person may apply for Federal financial assistance awards for special estuarine research or monitoring projects under subpart G. The announcement of opportunities to conduct research in the System appears on an annual basis in the FEDERAL REGISTER. If a state is participating in the national Coastal Zone Management Program, the applicant for an award under section 315 of the Act shall notify the state coastal management agency regarding the application.

(b) An original and two copies of the formal application must be submitted at least 120 working days prior to the proposed beginning of the project to the following address: Sanctuaries and Reserves Division Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, 1825 Connecticut Avenue, NW., suite 714, Washington, DC 20235. Application for Federal Assistance Standard Form 424 (Non-construction Program) con-

stitutes the formal application for site selection, post-site selection, operation and management, research, and education and interpretive awards. The Application for Federal Financial Assistance Standard Form 424 (Construction Program) constitutes the formal application for land acquisition and development awards. The application must be accompanied by the information required in subpart B (predesignation), subpart C and § 921.31 (acquisition and development), and § 921.32 (operation and management) as applicable. Applications for development awards for construction projects, or restorative activities involving construction, must include a preliminary engineering report, a detailed construction plan, a site plan, a budget and categorical exclusion check list or environmental assessment. All applications must contain back up data for budget estimates (Federal and non-Federal shares), and evidence that the application complies with the Executive Order 12372, "Intergovernmental Review of Federal Programs." In addition, applications for acquisition and development awards must contain:

(1) State Historic Preservation Office comments;

(2) Written approval from NOAA of the draft management plan for initial acquisition and development award(s); and

(3) A preliminary engineering report for construction activities.

#### § 921.81 Allowable costs.

(a) Allowable costs will be determined in accordance with applicable OMB Circulars and guidance for Federal financial assistance, the financial assistance agreement, these regulations, and other Department of Commerce and NOAA directives. The term "costs" applies to both the Federal and non-Federal shares.

(b) Costs claimed as charges to the award must be reasonable, beneficial and necessary for the proper and efficient administration of the financial assistance award and must be incurred during the award period.

(c) Costs must not be allocable to or included as a cost of any other Federally-financed program in either the current or a prior award period.

(d) General guidelines for the non-Federal share are contained in Department of Commerce Regulations at 15 CFR part 24 and OMB Circular A-110. Copies of Circular A-110 can be obtained from the Sanctuaries and Reserves Division; 1825 Connecticut Avenue, NW., suite 714; Washington, DC 20235. The following may be used in satisfying the matching requirement:

(1) *Site selection and post site selection awards.* Cash and in-kind contributions (value of goods and services directly benefiting and specifically identifiable to this part of the project) are allowable. Land may not be used as match.

(2) *Acquisition and development awards.* Cash and in-kind contributions are allowable. In general, the fair market value of lands to be included within the Reserve boundaries and acquired pursuant to the Act, with other than Federal funds, may be used as match. However, the fair market value of real property allowable as match is limited to the fair market value of a real property interest equivalent to, or required to attain, the level of control over such land(s) identified by the state and approved by the Federal Government as that necessary for the protection and management of the National Estuarine Research Reserve. Appraisals must be performed according to Federal appraisal standards as detailed in Department of Commerce regulations at 15 CFR part 24 and the Uniform Relocation Assistance and Real Property Acquisition for Federal land Federally assisted programs in 15 CFR part 11. The fair market value of privately donated land, at the time of donation, as established by an independent appraiser and certified by a responsible official of the state, pursuant to 15 CFR part 11, may also be used as match. Land, including submerged lands already in the state's possession, may be used as match to establish a National Estuarine Research Reserve. The value of match for these state lands will be calculated by determining the value of the benefits foregone by the state, in the use of the land, as a result of new restrictions that may be imposed by Reserve designation. The appraisal of the benefits foregone must be made by an independent appraiser in accordance with Federal appraisal standards pursuant

to 15 CFR part 24 and 15 CFR part 11. A state may initially use as match land valued at greater than the Federal share of the acquisition and development award. The value in excess of the amount required as match for the initial award may be used to match subsequent supplemental acquisition and development awards for the National Estuarine Research Reserve (see also §921.20). Costs related to land acquisition, such as appraisals, legal fees and surveys, may also be used as match.

(3) *Operation and management awards.* Generally, cash and in-kind contributions (directly benefiting and specifically identifiable to operations and management), except land, are allowable.

(4) *Research, monitoring, education and interpretive awards.* Cash and in-kind contributions (directly benefiting and specifically identifiable to the scope of work), except land, are allowable.

#### §921.82 Amendments to financial assistance awards.

Actions requiring an amendment to the financial assistance award, such as a request for additional Federal funds, revisions of the approved project budget or original scope of work, or extension of the performance period must be submitted to NOAA on Standard Form 424 and approved in writing.

#### APPENDIX I TO PART 921— BIOGEOGRAPHIC CLASSIFICATION SCHEME

##### *Acadian*

1. Northern of Maine (Eastport to the Sheepscot River.)
2. Southern Gulf of Maine (Sheepscot River to Cape Cod.)

##### *Virginian*

3. Southern New England (Cape Cod to Sandy Hook.)
4. Middle Atlantic (Sandy Hook to Cape Hatteras.)
5. Chesapeake Bay.

##### *Carolinian*

6. North Carolinas (Cape Hatteras to Santee River.)
7. South Atlantic (Santee River to St. John's River.)
8. East Florida (St. John's River to Cape Canaveral.)



*West Indian*

- 9. Caribbean (Cape Canaveral to Ft. Jefferson and south.)
- 10. West Florida (Ft. Jefferson to Cedar Key.)

*Louisianian*

- 11. Panhandle Coast (Cedar Key to Mobile Bay.)
- 12. Mississippi Delta (Mobile Bay to Galveston.)
- 13. Western Gulf (Galveston to Mexican border.)

*Californian*

- 14. Southern California (Mexican border to Point Conception.)
- 15. Central California (Point Conception to Cape Mendocino.)
- 16. San Francisco Bay.

*Columbian*

- 17. Middle Pacific (Cape Mendocino to the Columbia River.)
- 18. Washington Coast (Columbia River to Vancouver Island.)
- 19. Puget Sound.

*Great Lakes*

- 20. Lake Superior (Including St. Mary's River.)
- 21. Lakes Michigan and Huron (Including Straits of Mackinac, St. Clair River, and Lake St. Clair.)
- 22. Lake Erie (Including Detroit River and Niagara Falls.)
- 23. Lake Ontario (Including St. Lawrence River.)

*Fjord*

- 24. Southern Alaska (Prince of Wales Island to Cook Inlet.)
- 25. Aleutian Island (Cook Inlet Bristol Bay.)

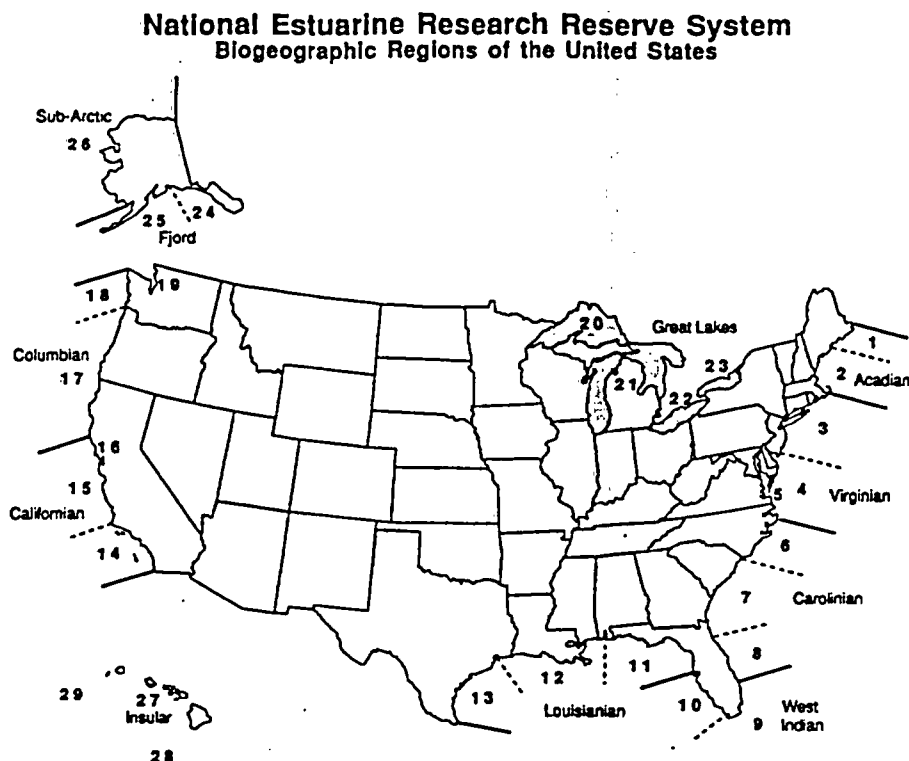
*Sub-Arctic*

- 26. Northern Alaska (Bristol Bay to Demarcation Point.)

*Insular*

- 27. Hawaiian Islands.
- 28. Western Pacific Island.
- 29. Eastern Pacific Island.

FIGURE 1



#### APPENDIX II TO PART 921— TYPOLOGY OF NATIONAL ESTUARINE RESEARCH RE- SERVES

This typology system reflects significant differences in estuarine characteristics that are not necessarily related to regional location. The purpose of this type of classification is to maximize ecosystem variety in the selection of national estuarine reserves. Priority will be given to important ecosystem types as yet unrepresented in the reserve system. It should be noted that any one site may represent several ecosystem types or physical characteristics.

##### *Class I—Ecosystem Types*

##### *Group I—Shorelands*

**A. Maritime Forest-Woodland.** That have developed under the influence of salt spray. It can be found on coastal uplands or recent features such as barrier islands and beaches,

and may be divided into the following biomes:

**1. Northern coniferous forest biome:** This is an area of predominantly evergreens such as the sitka spruce (*Picea*), grand fir (*Abies*), and white cedar (*Thuja*), with poor development of the shrub and herb layer, but high annual productivity and pronounced seasonal periodicity.

**2. Moist temperate (Mesothermal) coniferous forest biome:** Found along the west coast of North America from California to Alaska, this area is dominated by conifers, has relatively small seasonal range, high humidity with rainfall ranging from 30 to 150 inches, and a well-developed understory of vegetation with an abundance of mosses and other moisture-tolerant plants.

**3. Temperate deciduous forest biome:** This biome is characterized by abundant, evenly distributed rainfall, moderate temperatures which exhibit a distinct seasonal pattern,

well-developed soil biota and herb and shrub layers, and numerous plants which produce pulpy fruits and nuts. A distinct subdivision of this biome is the pine edible forest of the southeastern coastal plain, in which only a small portion of the area is occupied by climax vegetation, although it has large areas covered by edaphic climax pines.

4. Broad-leaved evergreen subtropical forest biome: The main characteristic of this biome is high moisture with less pronounced differences between winter and summer. Examples are the hammocks of Florida and the live oak forests of the Gulf and South Atlantic coasts. Floral dominants include pines, magnolias, bays, hollies, wild tamarine, strangler fig, gumbo limbo, and palms.

*B. Coast shrublands.* This is a transitional area between the coastal grasslands and woodlands and is characterized by woody species with multiple stems and a few centimeters to several meters above the ground developing under the influence of salt spray and occasional sand burial. This includes thickets, scrub, scrub savanna, heathlands, and coastal chaparral. There is a great variety of shrubland vegetation exhibiting regional specificity:

1. Northern areas: Characterized by Hudsonia, various erinaceous species, and thickets of Myrica, prunus, and Rosa.

2. Southeast areas: Floral dominants include Myrica, Baccharis, and Iles.

3. Western areas: Adenostoma, arcotophylos, and eucalyptus are the dominant floral species.

*C. Coastal grasslands.* This area, which possesses sand dunes and coastal flats, has low rainfall (10 to 30 inches per year) and large amounts of humus in the soil. Ecological succession is slow, resulting in the presence of a number of seral stages of community development. Dominant vegetation includes mid-grasses (5 to 8 feet tall), such as Spartina, and trees such as willow (Salix sp.), cherry (Prunus sp.), and cottonwood (Pupulus deltoides.) This area is divided into four regions with the following typical strand vegetation:

1. Arctic/Boreal: Elymus;

2. Northeast/West: Ammophila;

3. Southeast Gulf: Uniola; and

4. Mid-Atlantic/Gulf: Spartina patens.

*D. Coastal tundra.* This ecosystem, which is found along the Arctic and Boreal coasts of North America, is characterized by low temperatures, a short growing season, and some permafrost, producing a low, treeless mat community made up of mosses, lichens, heath, shrubs, grasses, sedges, rushes, and herbaceous and dwarf woody plants. Common species include arctic/alpine plants such as Empetrum nigrum and Betula nana, the lichens Cetraria and Cladonia, and herbaceous plants such as Potentilla tridentata and Rubus chamaemorus. Common species

on the coastal beach ridges of the high arctic desert include Bryas intergrifolia and Saxifrage oppositifolia. This area can be divided into two main subdivisions:

1. Low tundra: Characterized by a thick, spongy mat of living and undecayed vegetation, often with water and dotted with ponds when not frozen; and

2. High Tundra: A bare area except for a scanty growth of lichens and grasses, with underlying ice wedges forming raised polygonal areas.

*E. Coastal cliffs.* This ecosystem is an important nesting site for many sea and shore birds. It consists of communities of herbaceous, graminoid, or low woody plants (shrubs, heath, etc.) on the top or along rocky faces exposed to salt spray. There is a diversity of plant species including mosses, lichens, liverworts, and "higher" plant representatives.

#### GROUP II—TRANSITION AREAS

*A. Coastal marshes.* These are wetland areas dominated by grasses (Poacea), sedges (Cyperaceae), rushes (Juncaceae), cattails (Typhaceae), and other graminoid species and is subject to periodic flooding by either salt or freshwater. This ecosystem may be subdivided into: (a) Tidal, which is periodically flooded by either salt or brackish water; (b) nontidal (freshwater); or (c) tidal freshwater. These are essential habitats for many important estuarine species of fish and invertebrates as well as shorebirds and waterfowl and serve important roles in shore stabilization, flood control, water purification, and nutrient transport and storage.

*B. Coastal swamps.* These are wet lowland areas that support mosses and shrubs together with large trees such as cypress or gum.

*C. Coastal mangroves.* This ecosystem experiences regular flooding on either a daily, monthly, or seasonal basis, has low wave action, and is dominated by a variety of salt-tolerant trees, such as the red mangrove (Rhizophora mangle), black mangrove (Avicennia Nitida), and the white mangrove (Laguncularia racemosa.) It is also an important habitat for large populations of fish, invertebrates, and birds. This type of ecosystem can be found from central Florida to extreme south Texas to the islands of the Western Pacific.

*D. Intertidal beaches.* This ecosystem has a distinct biota of microscopic animals, bacteria, and unicellular algae along with macroscopic crustaceans, mollusks, and worms with a detritus-based nutrient cycle. This area also includes the driftline communities found at high tide levels on the beach. The dominant organisms in this ecosystem include crustaceans such as the mole crab (Emerita), amphipods (Gammaridae), ghost crabs (Ocypode), and bivalve mollusks such

as the coquina (Donax) and surf clams (Spisula and Mactra.)

*E. Intertidal mud and sand flats.* These areas are composed of unconsolidated, high organic content sediments that function as a short-term storage area for nutrients and organic carbons. Macrophytes are nearly absent in this ecosystem, although it may be heavily colonized by benthic diatoms, dinoflagellates, filamentous blue-green and green algae, and chemosynthetic purple sulfur bacteria. This system may support a considerable population of gastropods, bivalves, and polychaetes, and may serve as a feeding area for a variety of fish and wading birds. In sand, the dominant fauna include the wedge shell Donax, the scallop Pecten, tellin shells Tellina, the heart urchin Echinocardium, the lug worm Arenicola, sand dollar Dendraster, and the sea pansy Renilla. In mud, faunal dominants adapted to low oxygen levels include the terebellid Amphitrite, the boring clam Playdon, the deep sea scallop Placopecten, the Quahog Mercenaria, the echiurid worm Urechis, the mud snail Nassarius, and the sea cucumber Thyone.

*F. Intertidal algal beds.* These are hard substrates along the marine edge that are dominated by macroscopic algae, usually thaloid, but also filamentous or unicellular in growth form. This also includes the rocky coast tidepools that fall within the intertidal zone. Dominant fauna of these areas are barnacles, mussels, periwinkles, anemones, and chitons. Three regions are apparent:

1. Northern latitude rocky shores: It is in this region that the community structure is best developed. The dominant algal species include Chondrus at the low tide level, Fucus and Ascophyllum at the mid-tidal level, and Laminaria and other kelp-like algae just beyond the intertidal, although they can be exposed at extremely low tides or found in very deep tidepools.

2. Southern latitudes: The communities in this region are reduced in comparison to those of the northern latitudes and possess algae consisting mostly of single-celled or filamentous green, blue-green, and red algae, and small thaloid brown algae.

3. Tropical and subtropical latitudes: The intertidal in this region is very reduced and contains numerous calcareous algae such as Porolithon and Lithothamnion, as well as green algae with calcareous particles such as Halimeda, and numerous other green, red, and brown algae.

#### GROUP III—SUBMERGED BOTTOMS

*A. Subtidal hardbottoms.* This system is characterized by a consolidated layer of solid rock or large pieces of rock (neither of biotic origin) and is found in association with geomorphological features such as submarine canyons and fjords and is usually covered with assemblages of sponges, sea fans, bivalves, hard corals, tunicates, and

other attached organisms. A significant feature of estuaries in many parts of the world is the oyster reef, a type of subtidal hardbottom. Composed of assemblages of organisms (usually bivalves), it is usually found near an estuary's mouth in a zone of moderate wave action, salt content, and turbidity. If light levels are sufficient, a covering of microscopic and attached macroscopic algae, such as kelp, may also be found.

*B. Subtidal softbottoms.* Major characteristics of this ecosystem are an unconsolidated layer of fine particles of silt, sand, clay, and gravel, high hydrogen sulfide levels, and anaerobic conditions often existing below the surface. Macrophytes are either sparse or absent, although a layer of benthic microalgae may be present if light levels are sufficient. The faunal community is dominated by a diverse population of deposit feeders including polychaetes, bivalves, and burrowing crustaceans.

*C. Subtidal plants.* This system is found in relatively shallow water (less than 8 to 10 meters) below mean low tide. It is an area of extremely high primary production that provides food and refuge for a diversity of faunal groups, especially juvenile and adult fish, and in some regions, manatees and sea turtles. Along the North Atlantic and Pacific coasts, the seagrass Zostera marina predominates. In the South Atlantic and Gulf coast areas, Thalassia and Diplanthera predominate. The grasses in both areas support a number of epiphytic organisms.

#### Class II—Physical Characteristics

##### GROUP I—GEOLOGIC

*A. Basin type.* Coastal water basins occur in a variety of shapes, sizes, depths, and appearances. The eight basic types discussed below will cover most of the cases:

1. Exposed coast: Solid rock formations or heavy sand deposits characterize exposed ocean shore fronts, which are subject to the full force of ocean storms. The sand beaches are very resilient, although the dunes lying just behind the beaches are fragile and easily damaged. The dunes serve as a sand storage area making them chief stabilizers of the ocean shoreline.

2. Sheltered coast: Sand or coral barriers, built up by natural forces, provide sheltered areas inside a bar or reef where the ecosystem takes on many characteristics of confined waters—abundant marine grasses, shellfish, and juvenile fish. Water movement is reduced, with the consequent effects pollution being more severe in this area than in exposed coastal areas.

3. Bay: Bays are larger confined bodies of water that are open to the sea and receive strong tidal flow. When stratification is pronounced the flushing action is augmented by

river discharge. Bays vary in size and in type of shorefront.

4. **Embayment:** A confined coastal water body with narrow, restricted inlets and with a significant freshwater inflow can be classified as an embayment. These areas have more restricted inlets than bays, are usually smaller and shallower, have low tidal action, and are subject to sedimentation.

5. **Tidal river:** The lower reach of a coastal river is referred to as a tidal river. The coastal water segment extends from the sea or estuary into which the river discharges to a point as far upstream as there is significant salt content in the water, forming a salt front. A combination of tidal action and freshwater outflow makes tidal rivers well-flushed. The tidal river basin may be a simple channel or a complex of tributaries, small associated embayments, marshfronts, tidal flats, and a variety of others.

6. **Lagoon:** Lagoons are confined coastal bodies of water with restricted inlets to the sea and without significant freshwater inflow. Water circulation is limited, resulting in a poorly flushed, relatively stagnant body of water. Sedimentation is rapid with a great potential for basin shoaling. Shores are often gently sloping and marshy.

7. **Perched coastal wetlands:** Unique to Pacific Islands, this wetland type found above sea level in volcanic crater remnants forms as a result of poor drainage characteristics of the crater rather than from sedimentation. Floral assemblages exhibit distinct zonation while the faunal constituents may include freshwater, brackish, and/or marine species. **EXAMPLE:** Aunu's Island, American Samoa.

8. **Anchialine systems:** These small coastal exposures of brackish water form in lava depressions or elevated fossil reefs have only a subsurface connection in the ocean, but show tidal fluctuations. Differing from true estuaries in having no surface continuity with streams or ocean, this system is characterized by a distinct biotic community dominated by benthic algae such as *Rhizoclonium*, the mineral encrusting *Schizothrix*, and the vascular plant *Ruppia maritima*. Characteristic fauna which exhibit a high degree of endemism, include the mollusks *Theosoxus neglectus* and *Tecariosus*. Although found throughout the world, the high islands of the Pacific are the only areas within the U.S. where this system can be found.

**B. Basin structure.** Estuary basins may result from the drowning of a river valley (coastal plains estuary), the drowning of a glacial valley (fjord), the occurrence of an offshore barrier (bar-bounded estuary), some tectonic process (tectonic estuary), or volcanic activity (volcanic estuary).

1. **Coastal plains estuary:** Where a drowned valley consists mainly of a single channel, the form of the basin is fairly regular form-

ing a simple coastal plains estuary. When a channel is flooded with numerous tributaries an irregular estuary results. Many estuaries of the eastern United States are of this type.

2. **Fjord:** Estuaries that form in elongated steep headlands that alternate with deep U-shaped valleys resulting from glacial scouring are called fjords. They generally possess rocky floors or very thin veneers of sediment, with deposition generally being restricted to the head where the main river enters. Compared to total fjord volume river discharge is small. But many fjords have restricted tidal ranges at their mouths due to sills, or upreaching sections of the bottom which limit free movement of water, often making river flow large with respect to the tidal prism. The deepest portions are in the upstream reaches, where maximum depths can range from 800m to 1200m while sill depths usually range from 40m to 150m.

3. **Bar-bounded estuary:** These result from the development of an offshore barrier such as a beach strand, a line of barrier islands, reef formations a line of moraine debris, or the subsiding remnants of a deltaic lobe. The basin is often partially exposed at low tide and is enclosed by a chain of offshore bars of barrier islands broken at intervals by inlets. These bars may be either deposited offshore or may be coastal dunes that have become isolated by recent sea level rises.

4. **Tectonic estuary:** These are coastal indentures that have formed through tectonic processes such as slippage along a fault line (San Francisco Bay), folding or movement of the earth's bedrock often with a large inflow of freshwater.

5. **Volcanic estuary:** These coastal bodies of open water, a result of volcanic processes are depressions or craters that have direct and/or subsurface connections with the ocean and may or may not have surface continuity with streams. These formations are unique to island areas of volcanic origin.

**C. Inlet type.** Inlets in various forms are an integral part of the estuarine environment as they regulate to a certain extent, the velocity and magnitude of tidal exchange, the degree of mixing, and volume of discharge to the sea.

1. **Unrestricted:** An estuary with a wide unrestricted inlet typically has slow currents, no significant turbulence, and receives the full effect of ocean waves and local disturbances which serve to modify the shoreline. These estuaries are partially mixed, as the open mouth permits the incursion of marine waters to considerable distances upstream, depending on the tidal amplitude and stream gradient.

2. **Restricted:** Restrictions of estuaries can exist in many forms: Bars, barrier islands, spits, sills, and more. Restricted inlets result in decreased circulation, more pronounced longitudinal and vertical salinity gradients, and more rapid sedimentation. However, if

the estuary mouth is restricted by depositional features or land closures, the incoming tide may be held back until it suddenly breaks forth into the basin as a tidal wave, or bore. Such currents exert profound effects on the nature of the substrate, turbidity, and biota of the estuary.

3. Permanent: Permanent inlets are usually opposite the mouths of major rivers and permit river water to flow into the sea.

4. Temporary (Intermittent): Temporary inlets are formed by storms and frequently shift position, depending on tidal flow, the depth of the sea, and sound waters, the frequency of storms, and the amount of littoral transport.

*D. Bottom composition.* The bottom composition of estuaries attests to the vigorous, rapid, and complex sedimentation processes characteristic of most coastal regions with low relief. Sediments are derived through the hydrologic processes of erosion, transport, and deposition carried on by the sea and the stream.

1. Sand: Near estuary mouths, where the predominating forces of the sea build spits or other depositional features, the shore and substrates of the estuary are sandy. The bottom sediments in this area are usually coarse, with a gradation toward finer particles in the head region and other zones of reduced flow, fine silty sands are deposited. Sand deposition occurs only in wider or deeper regions where velocity is reduced.

2. Mud: At the base level of a stream near its mouth, the bottom is typically composed of loose muds, silts, and organic detritus as a result of erosion and transport from the upper stream reaches and organic decomposition. Just inside the estuary entrance, the bottom contains considerable quantities of sand and mud, which support a rich fauna. Mud flats, commonly built up in estuarine basins, are composed of loose, coarse, and fine mud and sand, often dividing the original channel.

3. Rock: Rocks usually occur in areas where the stream runs rapidly over a steep gradient with its coarse materials being derived from the higher elevations where the stream slope is greater. The larger fragments are usually found in shallow areas near the stream mouth.

4. Oyster shell: Throughout a major portion of the world, the oyster reef is one of the most significant features of estuaries, usually being found near the mouth of the estuary in a zone of moderate wave action, salt content, and turbidity. It is often a major factor in modifying estuarine current systems and sedimentation, and may occur as an elongated island or peninsula oriented across the main current, or may develop parallel to the direction of the current.

#### GROUP II—HYDROGRAPHIC

*A. Circulation.* Circulation patterns are the result of combined influences of freshwater inflow, tidal action, wind and oceanic forces, and serve many functions: Nutrient transport, plankton dispersal, ecosystem flushing, salinity control, water mixing, and more.

1. Stratified: This is typical of estuaries with a strong freshwater influx and is commonly found in bays formed from "drowned" river valleys, fjords, and other deep basins. There is a net movement of freshwater outward at the top layer and saltwater at the bottom layer, resulting in a net outward transport of surface organisms and net inward transport of bottom organisms.

2. Non-stratified: Estuaries of this type are found where water movement is sluggish and flushing rate is low, although there may be sufficient circulation to provide the basis for a high carrying capacity. This is common to shallow embayments and bays lacking a good supply of freshwater from land drainage.

3. Lagoonal: An estuary of this type is characterized by low rates of water movement resulting from a lack of significant freshwater influx and a lack of strong tidal exchange because of the typically narrow inlet connecting the lagoon to the sea. Circulation whose major driving force is wind, is the major limiting factor in biological productivity within lagoons.

*B. Tides.* This is the most important ecological factor in an estuary as it affects water exchange and its vertical range determines the extent of tidal flats which may be exposed and submerged with each tidal cycle. Tidal action against the volume of river water discharged into an estuary results in a complex system whose properties vary according to estuary structure as well as the magnitude of river flow and tidal range. Tides are usually described in terms of the cycle and their relative heights. In the United States, tide height is reckoned on the basis of average low tide, which is referred to as datum. The tides, although complex, fall into three main categories:

1. Diurnal: This refers to a daily change in water level that can be observed along the shoreline. There is one high tide and one low tide per day.

2. Semidiurnal: This refers to a twice daily rise and fall in water that can be observed along the shoreline.

3. Wind/Storm tides: This refers to fluctuations in water elevation to wind and storm events, where influence of lunar tides is less.

*C. Freshwater.* According to nearly all the definitions advanced, it is inherent that all estuaries need freshwater, which is drained from the land and measurably dilutes seawater to create a brackish condition. Freshwater enters an estuary as runoff from the

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land either from a surface and/or subsurface source.

1. **Surface water:** This is water flowing over the ground in the form of streams. Local variation in runoff is dependent upon the nature of the soil (porosity and solubility), degree of surface slope, vegetational type and development, local climatic conditions, and volume and intensity of precipitation.

2. **Subsurface water:** This refers to the precipitation that has been absorbed by the soil and stored below the surface. The distribution of subsurface water depends on local climate, topography, and the porosity and permeability of the underlying soils and rocks. There are two main subtypes of surface water:

a. **Vadose water:** This is water in the soil above the water table. Its volume with respect to the soil is subject to considerable fluctuation.

b. **Groundwater:** This is water contained in the rocks below the water table, is usually of more uniform volume than vadose water, and generally follows the topographic relief of the land being high hills and sloping into valleys.

### GROUP III—CHEMICAL

A. **Salinity.** This reflects a complex mixture of salts, the most abundant being sodium chloride, and is a very critical factor in the distribution and maintenance of many estuarine organisms. Based on salinity, there are two basic estuarine types and eight different salinity zones (expressed in parts per thousand-ppt.)

1. **Positive estuary:** This is an estuary in which the freshwater influx is sufficient to maintain mixing, resulting in a pattern of increasing salinity toward the estuary mouth. It is characterized by low oxygen concentration in the deeper waters and considerable organic content in bottom sediments.

2. **Negative estuary:** This is found in particularly arid regions, where estuary evaporation may exceed freshwater inflow, resulting in increased salinity in the upper part of the basin, especially if the estuary mouth is restricted so that tidal flow is inhibited. These are typically very salty (hyperhaline), moderately oxygenated at depth, and possess bottom sediments that are poor in organic content.

3. **Salinity zones (expressed in ppt):**

a. **Hyperhaline**—greater than 40 ppt.

b. **Euhaline**—40 ppt to 30 ppt.

c. **Mixhaline**—30 ppt to 0.5 ppt.

(1) **Mixoeuhaline**—greater than 30 ppt but less than the adjacent euhaline sea.

(2) **Polyhaline**—30 ppt to 18 ppt.

(3) **Mesohaline**—18 ppt to 5 ppt.

(4) **Oligohaline**—5 ppt to 0.5 ppt.

d. **Limnetic:** Less than 0.5 ppt.

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B. **pH Regime:** This is indicative of the mineral richness of estuarine waters and falls into three main categories:

1. **Acid:** Waters with a pH of less than 5.5.

2. **Circumneutral:** A condition where the pH ranges from 5.5 to 7.4.

3. **Alkaline:** Waters with a pH greater than 7.4.

## PART 922—NATIONAL MARINE SANCTUARY PROGRAM REGULATIONS

### Subpart A—General

#### Sec.

922.1 Applicability of regulations.

922.2 Mission, goals, and special policies.

922.3 Definitions.

922.4 Effect of National Marine Sanctuary designation.

### Subpart B—Site Evaluation List (SEL)

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### Subpart C—Designation of National Marine Sanctuaries

922.20 Standards and procedures for designation.

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922.47 Pre-existing authorizations or rights and certifications of pre-existing authorizations or rights.

922.48 National Marine Sanctuary permits—application procedures and issuance criteria.

## EXISTING RESOURCE PROTECTION

Existing resource protection, surveillance, and enforcement within the proposed NERR is maintained by the regulatory programs and policies of the applicable authorities and appropriate government enforcement agencies for the allowable uses (oil and gas, recreational and commercial fishing, water uses and freshwater inflow, transportation).

### Current Activities and Uses in the Proposed Reserve

#### *Oil and Gas Activities*

The Western Gulf of Mexico Biogeographic Subregion is blessed with abundant hydrocarbon deposits, making this region the most economically advantaged in the nation in terms of mineral wealth. No part of the region is without oil or gas wells and pipelines, including all wetland and open water habitats (Warner 1939). In fact, the Texas Constitution requires that State owned lands including coastal submerged lands, be utilized to produce income to benefit the Public School Fund. Typically this entails the leasing of, exploration for, and production of geologic resources, mainly crude oil and natural gas, on State Lands including State Submerged Lands. Although much of the past production in the proposed site has been depleted, recent drilling has been successful at deeper depths (10,000 to 15,000 feet) and it is likely that further exploration and drilling will be conducted in the area. In addition, technology is improving and interest is beginning to be seen that indicates even deeper depths (20,000 + feet) will be explored in the near future. Exactly where this deeper exploration will be focused is impossible to determine at this time. Offshore, the presence of oil and gas platforms can be environmentally beneficial because they create reef habitats (Montagna et al. 2002). The effects of inshore activities on fish habitat are not well known, thus presenting a great opportunity for NERR studies.

The liquefied natural gas (LNG) industry is growing in the US with creation both onshore and offshore terminals. There are currently four proposals for LNG facilities in San Patricio County along the La Quinta Channel:

- Cheniere Energy Incorporated and its partner Sherwin Alumina have a proposal to build a terminal on 1,100-acre industrial area west of Sherwin Alumina. This project issued a draft environmental impact statement in November 2004.
- ExxonMobil have a proposal to build a terminal (Vista del Sol) either on Welder Trust property in Ingleside between Oxychem and the Kiewit property or DuPont-owned land between its plant in Ingleside and the Sherwin Alumina plant in Portland. This project issued a draft environmental impact statement in December 2004.
- Occidental Petroleum Corporation has a proposal to build a terminal (Ingleside Energy) in Ingleside, but has yet to file a formal permit application. This project has not yet issued a draft environmental impact statement.
- ChevronTexaco has a proposal to build a storage tank for an offshore Port Pelican terminal on Harbor Island. Currently this project has been postponed.

If the environmental impact statements are approved, these terminals could be operational by 2008.

The Federal Energy Regulatory Commission (FERC) regulates the majority of LNG terminal actions. The Commission's responsibilities include:

- Regulation of pipeline, storage, and liquefied natural gas facility construction;
- Regulation of natural gas transportation in interstate commerce;
- Issuance of certificates of public convenience and necessity to prospective companies providing energy services or constructing and operating interstate pipelines and storage facilities;
- Regulation of facility abandonment;
- Establishment of rates for services;
- Regulation of the transportation of natural gas as authorized by the NGPA (Natural Gas Policy Act) and the OCSLA (Outer Continental Shelf Lands Act); and
- Oversight of the construction and operation of pipeline facilities at U.S. points of entry for the import or export of natural gas.

The FERC also helps safeguard the environment by managing permits through the NEPA process. FERC also determines the range of environmental issues requiring analysis and holds scoping meetings when appropriate.



### *Recreational and Commercial Fishing*

The habitats in the Reserve support both commercial and recreational fisheries, including shrimp, crabs, oysters, and fin fish resources (Table 1). The life history strategies of these organisms are dependent upon estuarine-based life cycles. The estuary systems are nursery grounds for many of the commercially viable species, such as penaeid shrimp, in the Mission-Aransas Estuary. It has been estimated that up to 97.5% of the commercial fisheries in the Gulf of Mexico rely on estuaries for a portion of their life histories (Gunter 1967).

Commercial landings of finfish, shrimp, and shellfish appear to be on an upward trend in the Mission-Aransas Estuary (Figure 1). Abundance of finfish, shrimp, and blue crab harvests were nearly equal to each other from 1972 - 1976. After 1976, the percentage of finfish harvests began to decrease in relation to shrimp and blue crab harvests. After 1981, and up to the present time, shrimp harvests increased in relation to finfish and blue crab harvests, and are now the major fishery for the Mission-Aransas estuary (Robinson et al. 1994).

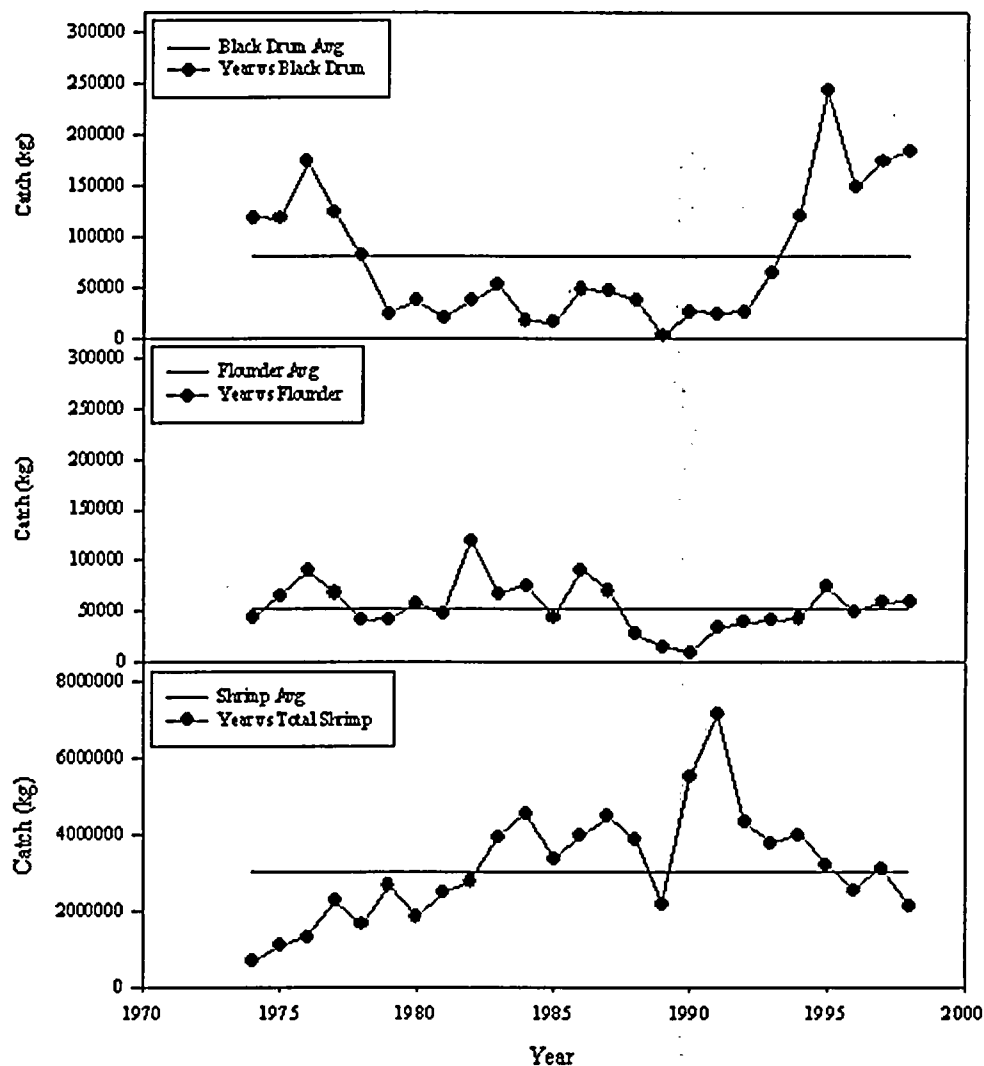
Commercial shrimping was a minor activity in the 1920's, but since then this fishery has grown rapidly. Brown shrimp (*Farfantepenaeus aztecus*), white shrimp (*Litopenaeus setiferus*), and pink shrimp (*Farfantepenaeus duorarum*), each are estuarine dependent species and usually concentrate in estuarine waters less than three feet deep where there is attached vegetation and or abundant detritus. For the shrimp fishery, a limited entry and buyback (license) management plan was established in 1995. Since implementation of the buyback plan TPWD had purchased and retired 815 commercial shrimp boat licenses (Cook 2002). Trawling can cause disturbance to benthic communities. The amount of disturbance is dependent on two factors: (1) time spent trawling (i.e. effort) and (2) the area covered per unit time (i.e. net size multiplied by towing speed) (Montagna et al. 1998). Schubel et al. (1979) reported high levels of suspended sediment concentrations behind shrimp trawls and found levels comparable to that caused by dredge disposal activities. Some possible impacts of trawling include increased mortality, predation, bioavailability of toxic contaminants, reduction of food, changes in community structure, and stimulation of phytoplankton production (Messeih et al. 1991).

In addition, recreational fishing is also pressure for the fisheries in the Reserve. Annual coastal wide private-boat fishing pressure in the Mission-Aransas Estuary has been increasing. Aransas Bay accounts for about 23% of the coastwide landings and pressure of party-boat fishing (Warren et al. 1994). Disturbance to seagrass beds from propellers, known as "prop scarring," can also result from boating in shallow seagrass habitats. Twenty-three percent of the area in Redfish Bay has moderate to severe scarring (Montagna et al. 1998). Prop scarring can lead to loss of critical seagrass habitat.

Table 1. Mean catch rates and mean total lengths (mm) of selected fishes and blue crab caught in bay system during 1992 for commercial use. Mean catch rates are No./h for seasonal gill nets, trawls and dredge; annual bag seines are in No./ha. ND indicates no measurement taken. Table is adapted from Boyd et al. (1995).

Species	Gear	Aransas		Coast wide	
		Mean catch	Length	Mean catch	Length
Total Finfish	gill net (spring)	7.1	412	7	414
Total Finfish	gill net (fall)	6.2	419	5.4	389
Total Finfish	18.3m bag seine	2622	57	4188	54
Total Finfish	6.1m trawl	443	97	281	111
Blue Crab	gill net (spring)	0.1	142	0.1	147
Blue Crab	gill net (fall)	0.1	140	0.1	144
Blue Crab	18.3m bag seine	140	34	103	37
Blue Crab	6.1m trawl	38	56	24	65
Brown Shrimp	18.3m bag seine	455	62	565	57
Brown Shrimp	6.1m trawl	64	81	37	84
Pink Shrimp	18.3m bag seine	32	53	38	57
Pink Shrimp	6.1m trawl	7	77	3	89
White Shrimp	18.3m bag seine	211	71	383	58
White Shrimp	6.1m trawl	53	93	36	94
Market Oyster	46 cm dredge	40	83	384	87

Figure 1. Commercial fishing trends in Mission-Aransas Estuary from 1974 through 1998. Data obtained from TPWD.



#### *Water Uses and Freshwater Inflow*

There are several small watersheds in the Reserve (Figure 2). Most of these watersheds drain into Copano Bay, but one drains into Port Bay and one drains into St. Charles Bay. The Mission and Aransas Rivers are small and primarily coastal compared to other rivers in Texas. Texas law (first passed in 1957) ensures that sufficient flows are maintained for "receiving bay and estuary system that is necessary for the maintenance of productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent" (Texas Water Code, § 11.147).

About 40% of all the water used in Texas is supplied by surface water structures. The cities and towns in the region of the Mission-Aransas Estuary are largely served by the City of Corpus Christi and ground water (well-water) systems. The City operates two dams on the Nueces River, and is the major water wholesaler to municipal and county water resellers. Neither the Mission River nor the Aransas River has dams, or is used as water supplies for cities in the region. In fact, all the other major rivers in Texas have dams or other surface water supply structures. For this reason, the Mission-Aransas Estuary is an ideal location for the proposed Texas NERR.

Groundwater supplies 60% of the water used in Texas, but 81% of that use is for irrigation. The watersheds lie above the vast Gulf Coast Aquifer, which stretches the length of the entire coastal plain of Texas. The Gulf Coast Aquifer represents 15% of the groundwater in Texas and is the second largest aquifer after the Ogallala. Groundwater conservation districts are just in the beginning phases of operation in this region.

The Mission-Aransas Estuary is one of the few estuaries on the Texas coast that still has enough surface fresh water inflow to maintain a healthy estuary. The National Wildlife Federation recently published a report that described the health of Texas estuaries based on full use of existing freshwater permits (Johns 2004). Out of the 7 bay systems studied, the Mission-Aransas Estuary was one of the two bay systems that received a good ranking (Figure 3). Existing water-use permits for the Mission and Aransas Rivers authorize 1,900 acre-feet of surface water diversions. Although surface waters in the Mission and Aransas Rivers are not currently at risk, the future growth of south Texas cities pose a significant threat to these valuable surface waters.

Figure 2. Watersheds of Reserve.

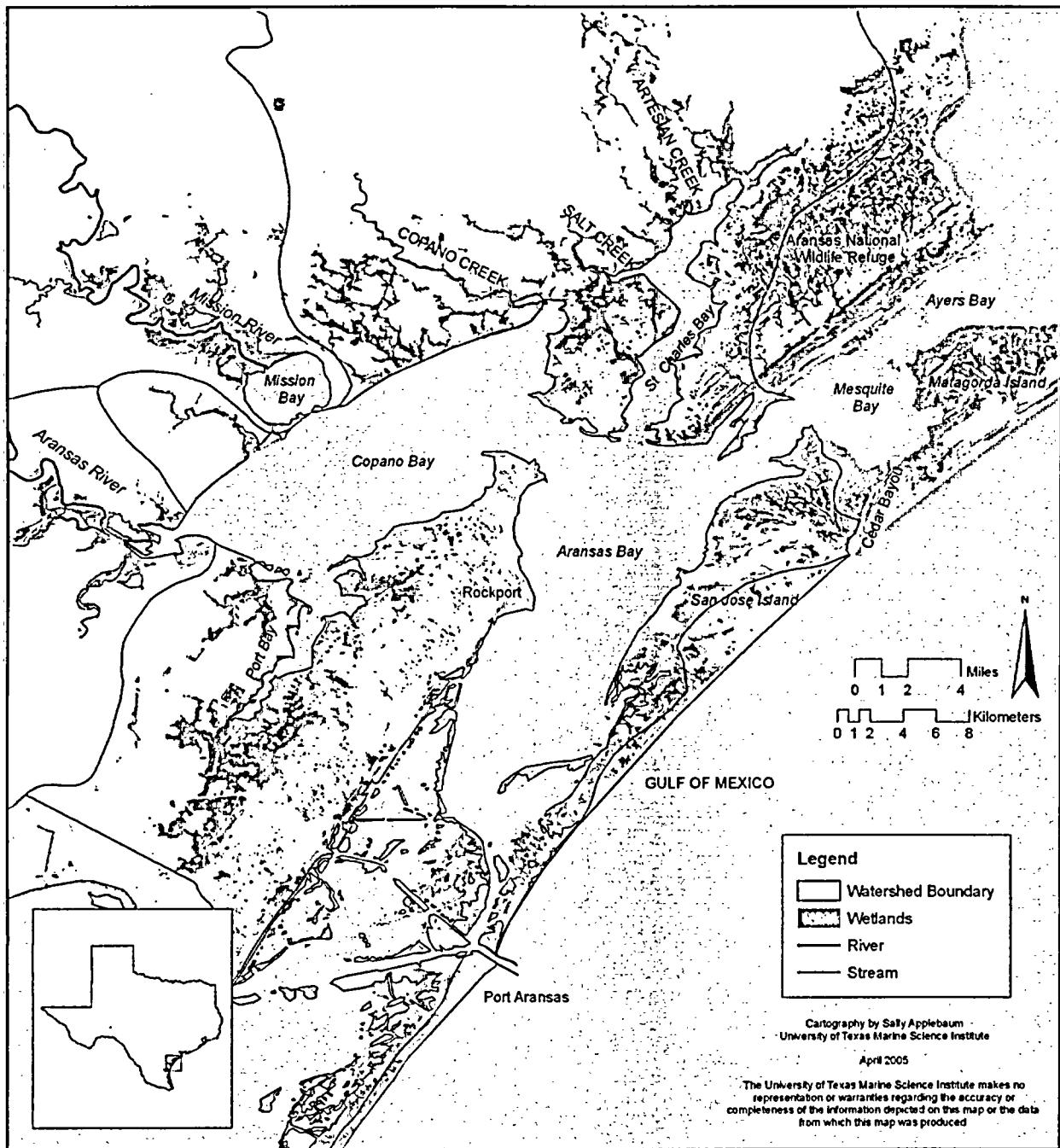
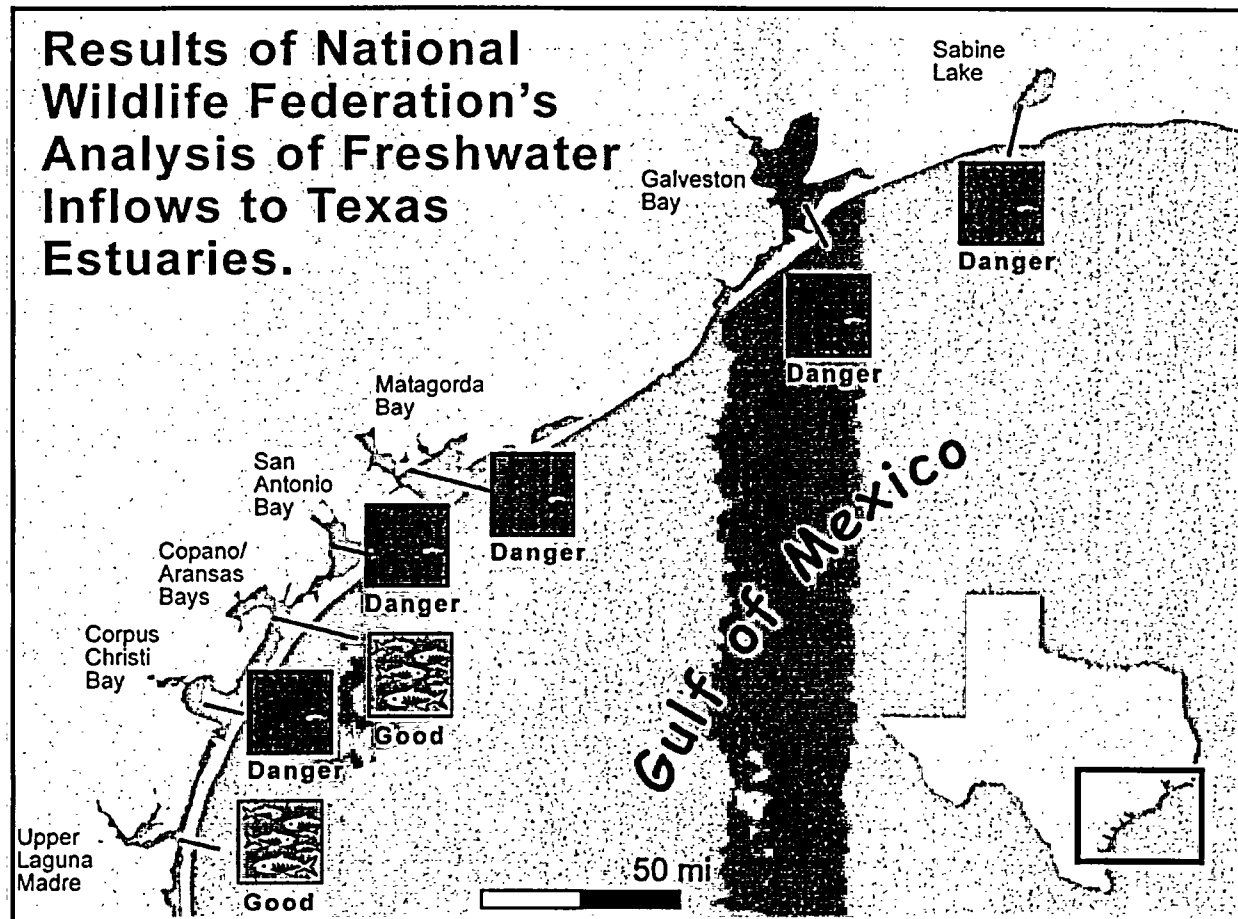


Figure 3. Results of the National Wildlife Federation's analysis of freshwater inflows to Texas estuaries.



## Transportation

### Marine Navigation

The Gulf Intracoastal Waterway is a major industrial water transportation canal that bisects Aransas Bay within the proposed site. The waterway was first dredged in 1905 and is approximately 125 feet wide by 12 feet deep and links seaports along the Northern Gulf of Mexico. The easement for the waterway is 300 feet and there is additionally 2000 feet of easement within the NERR site for dredge material disposal (Texas Governmental Code, Sec. 2204.601). The waterway serves many uses, such as a commercial trade link, national defense, and protective passage for recreational and working vessels (TxDOT 1996). It is economically imperative to the Texas Coast because it facilitates transporting petrochemicals and agricultural as well as industrial products that would otherwise be too costly or impossible transport by road. In 1994, over 78 million short tons were moved on the Texas waterway, which values up to twenty-two billion in revenue (TxDOT 1996). The US Army Corps of Engineers must annually dredge 8 million cubic yards of shoaled material to maintain the waterway (TxDOT 1996).

Maintaining the navigation channels through Texas' shallow bays systems plus vessel use creates localized impacts to the ecosystem, within 1000 feet of the channel (Scot Sullivan TxDOT, personnel communication). In areas with hard-bottom substrate, dredging has been shown to have detrimental effects to the benthos. However, a five year study conducted in soft-bottomed Corpus Christi Bay concluded that the present benthic communities have a high resilience to disturbance by dredging and trawling (Flint and Younk 1983). This resilience is likely because of a large source of colonist species.

Natural spoil islands are present in the Reserve. The majority of the dredged spoil islands run along the west of the intracoastal, about 600 yards out, excluding Lydia Ann Channel. The section of the intracoastal waterway that extends along the ANWR shoreline contains the Dunham spoil island and levee to the east of the waterway. This spoil island was created to the east of the waterway so as not to impede upon whooping crane habitat. In November 1995, in a section 216 feasibility study, the Corps of Engineers addressed the 30 mile reach of the waterway that is adjacent to the ANWR. In this study, the following items were addressed: 1) evaluation of possible realignment of the waterway, 2) identified beneficial uses of dredged material, and 3) generated a plan for reducing the bank erosion along the ANWR (TxDOT 1996). Although habitat loss is caused by dredge spoil islands, these islands are also ideal nesting for several species of birds and usually contain plant communities of mesquite, salt cedar (*Tamarix* spp.), popinac (*Leucaena leucocephala*), granjeno (*Celtis laevigata*), and oleander (*Oleander* spp.) (Chaney et al. 1996). Besides the dredging of the intracoastal waterway additional dredging may occur from time to time to maintain the navigation channel to Goose Island State Park or to maintain other channels within the Reserve (Mary Perez and Scot Sullivan TxDOT, personnel communication).

Although there are no future plans for dredging Cedar Bayou Pass, there is some local support for dredging Cedar Bayou Pass. This natural pass was dredged in September 1987 and closed around 1999. The dredging of Cedar Bayou was initiated by TPWD in effort to increase water flow, fish, shrimp and crab abundances, as well as increase the public utilization of the bayou as a recreational fishing area (Heffernan 1985).

### Bridges and Runway Protection Zone

The Copano Bay Causeway bisects the NERR between Aransas and Copano Bay. There are also numerous state roadways adjacent to the NERR boundary. These roadways include state highways, farm to market roads, and park roads. Periodic maintenance of these facilities will be occurring (Table 2). In addition, a parcel of land (~2500'x1750') west of the Rockport/Fulton Airport that extends out into Copano Bay is designated as a runway protection zone. A map of the airport and protection zones are provided in the site nomination document.

**Table 2. Future maintenance on state roadways within proposed boundary.**

State Roadways	Future projects
State Highway 35 Copano Bay Causeway	Scheduled for replacement, some dredging may be required during construction
State Highway 35 parallel to the ANWR	Bridge replacement scheduled at Copano and Salt Creek Bridges
Farm Road 136 Bridge at Copano Bay	No projects scheduled
Farm Road 2678 Mission River Bridge	No projects scheduled
State Highway 188 Copano Bay Bridge	Long term plans call for the bridge to be widened

#### **Activities on Properties Adjacent to the Proposed Texas NERR**

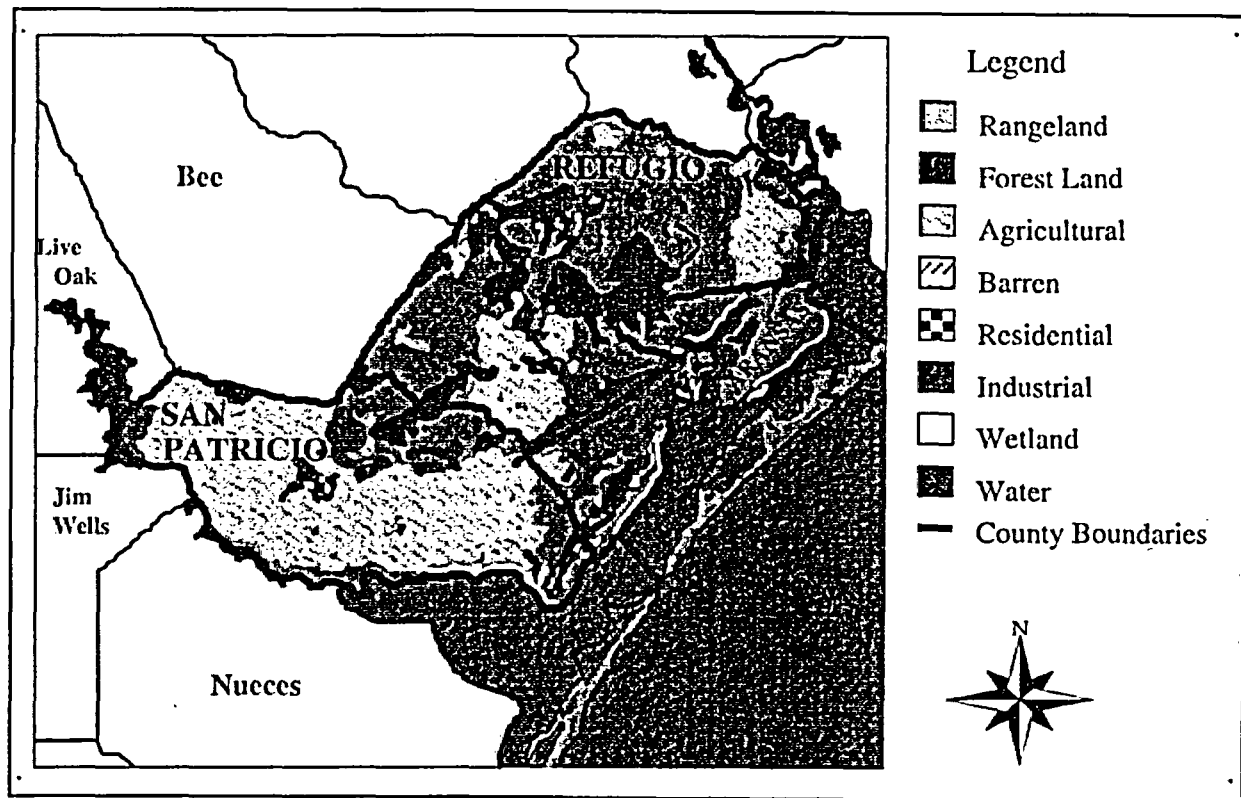
Description of land use adjacent to the Reserve is largely based on a wetland conservation plan by Smith and Dilworth (1999). The majority of the land surrounding the proposed site is used for agriculture and rangeland for cattle (Figure 4). Land use around the Mission-Aransas Estuary is divided into six categories: developed lands, cultivated lands, grasslands, woodlands, shrublands, and bare lands.

San Patricio County, which encompasses a very small portion of the site including Buccaneer Cove Preserve and the southern tip of Port Bay, has the highest percentage of cultivated lands followed by Refugio and Aransas County, respectively (Figure 5). The Aransas River watershed includes Chiltipin Creek and other unnamed tributaries which drain approximately two-thirds of San Patricio County including the cities of Sinton, Odem, and Taft. This drainage includes more than 250,000 acres of intensely managed cotton and grain sorghum row crop farms. Much of the Aransas River watershed lies within the land holdings of the Welder Wildlife Foundation (7,800 acres), whose primary purpose is wildlife management and conservation.

In contrast, Aransas County has the highest percentage of both bare lands and developed lands. Most bare lands in this area are delineated as bay shoreline beaches, creating a significant tourism focus in the county and extensive urban development. Refugio has the most rural land use of the three counties, with the majority of the land identified as agriculture or ranching: limited urban development is centered around the towns of Refugio, Woodsboro, Bayside, Tivoli, and Austwell.

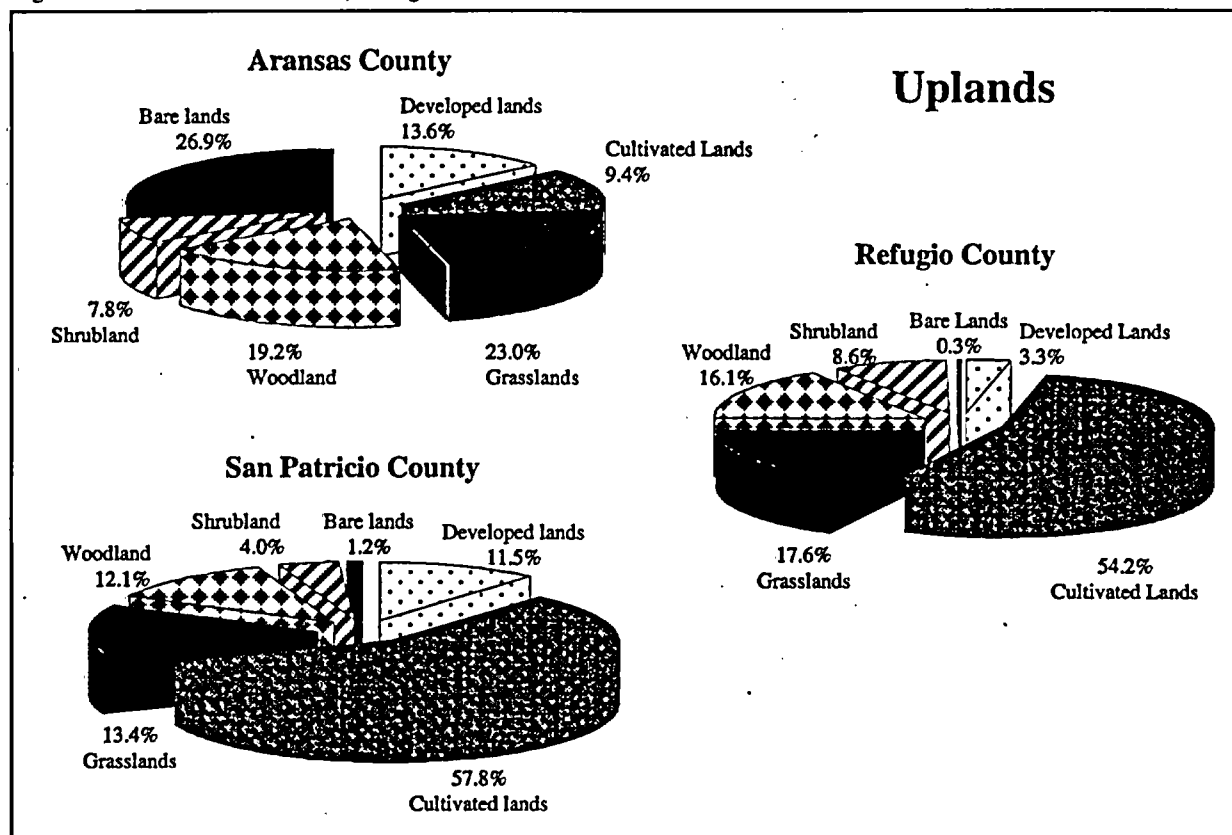


Figure 4. Land uses adjacent to the Reserve.



The city of Corpus Christi with a population of over 250,000 is the largest city in the area and as a result, the Nueces Estuary generally has more anthropogenic activities than the Mission-Aransas or Baffin Bay-Laguna Madre Estuary (Montagna et al. 1998). The Port of Corpus Christi is the sixth largest port in the United States, making marine transportation a dominant industry in the area. The Port of Corpus Christi houses several facilities including: liquid bulk docks, cargo terminals, Rincon Industrial Park, Ortiz Center, and a cold storage terminal. All ship traffic enters through the Aransas Pass, which lies just south of the proposed site.

Figure 5. Land uses of Aransas, Refugio and San Patricio Counties.



#### Regulatory Programs and Policies

The following section includes the regulatory programs and policies of the applicable authorities and appropriate government enforcement agencies for the allowable uses.

#### *Oil and Gas*

Since the state of Texas became independent in 1836, public lands have been given to settlers, soldiers, veterans, and railroads as recompense for service, but more importantly, 52 million acres of public lands were reserved for education, therein creating the Permanent School Fund (PSF). Since the initial donation, most of the school lands have been sold due to poor management and improper classification, but Texas still retains a mineral estate of more than 12 million acres. The Texas General Land Office (GLO) is directly responsible for the management of this land, which is dedicated to the PSF. The growth of the oil industry in the 20th century helped change the state's land policy from an emphasis on income through the sale of land to an emphasis on income through resource development. The GLO leases rights for oil and gas production on state lands, producing revenue and royalties that are funneled into the state's PSF. In 1939, the Texas legislature created the School Land Board (SLB) to help manage mineral lease awards on school lands, and the lands dedicated to the PSF. The legislature dedicated the mineral income from riverbeds, bays and submerged lands to the PSF. Although non-submerged school land can be sold today under the authority of the SLB, this is rarely done. Instead, the land is leased for resource development and the revenues earned are deposited in the PSF, which stands today at over \$7 billion. The interest earned on the PSF investments is deposited in the Available School Fund each year and distributed by the State Board of Education to every school district in Texas on a per-pupil basis. The land office also deposits in that fund fines on unpaid or late royalties, and commercial leasing revenues. Since the PSF was established in 1854, the GLO has deposited more than \$6.8 billion, mostly from oil and gas leases and real estate trades and sales.

In 1991, the Texas Legislature passed the Coastal Coordination Act, which directed the GLO to develop a long-range,

comprehensive plan for the coast in cooperation with state agencies, local governments, and coastal citizens. The act prompted GLO to establish the Coastal Coordination Council (CCC), with the goal to oversee the development of the state's coastal management plan, adopt coast wide management policies, and to implement the plan and designate the physical boundaries for the coastal area. The GLO and CCC effort's resulted in the Coastal Management Plan (CMP), which is a networked program that links the regulations, programs, and expertise of state, federal, and local entities that manage various aspects of coastal resources (Coastal Management Program Guide).

In Texas, there are two primary state agencies that regulate the oil and gas industry. The GLO regulates the leasing, exploration, and development of oil and gas on state submerged lands by means of the provisions of the GLO oil and gas leases issued. The Texas Railroad Commission (RRC) regulates oil and gas production. Both the GLO and RRC have regulations which state that exploration, leasing and production of oil and gas must comply with the policies of the CMP. The CMP sets policies for oil and gas activities that occur within Coastal Natural Resource Areas (CNRAs). The proposed area for the Texas reserve encompasses numerous CNRAs within its boundaries, including tidal waters, submerged lands, coastal wetlands, submerged aquatic vegetation, oyster reefs, and coastal barriers (Table 3). The CMP states that oil and gas in navigable waters are to be conducted in such a manner as to avoid and otherwise minimize adverse effects. The majority of habitats in the Reserve are critical areas, which are defined as coastal wetlands, oyster reefs, hard substrate reefs, submerged aquatic vegetation, tidal sand flats, and mud sand flats. The CMP has already established explicit permit authority to which detailed guidelines apply for the operations of oil and gas that protect the natural resources within the Reserve.

Resource Management Codes (RMCs) are used by lessees of state-owned tracts in Texas bays and estuaries during the permitting process. These codes enhance protection of sensitive natural resources by providing recommendations for minimizing adverse impacts from mineral exploration and development activities. RMCs were created by state and federal resource agencies (U.S. Fish and Wildlife Service, National Marine Fisheries Service, Texas Parks and Wildlife Department, Texas Historical Commission, and U.S. Army Corps of Engineers). RMCs represent development guidelines for activities within the tracts. RMCs may assist state land lessees during the Corps permitting process by informing a prospective operator of restrictions that may be included in the Corps permit. Before beginning work on a state tract, lessees may be required to conduct a survey for sensitive habitats and resources. In most cases, tract development may proceed when an applicant demonstrates that the development plan is not inconsistent with the concerns listed in the codes. When impacts to sensitive habitats or resources are unavoidable, development may be allowed, subject to negotiation for mitigation.

Table 3. Coastal natural resource areas as designated by the Coastal Coordination Act as the focus of the CMP (Coastal Management Program Guide).

CNRAs	Definition
Coastal barrier	An undeveloped area on a barrier island, peninsula, or other protected area, as designated by USFWS.
Coastal historical area	A site that is specifically identified in rules adopted by the Texas Historical Commission as being coastal in character and that is on the national register of historic places or a state archaeological landmark.
Coastal preserve	Any land that is owned by the state and subject to Parks and Wildlife Code, because it is a park, recreation area, scientific area, wildlife refuge, or historic site.
Coastal shore area	An area within 100 feet landward of the high water mark on submerged land.
Coastal wetlands	A wetland located seaward of the Coastal Facility Designation Line, within rivers and streams to the extent of tidal influence, or within one mile of the mean high tide line of rivers and streams.
Critical dune area	A protected sand dune complex on the Gulf shoreline within 1,000 feet of mean high tide.
Critical erosion area	An area designated by the Land Commissioner
Gulf beach	A beach bordering the Gulf of Mexico that is located inland from the mean low tide line to the natural line of vegetation bordering the seaward shore, or an area of public access.

Hard substrate reef	A naturally occurring hard substrate formation, including a rock outcrop or serpulid worm reef, living or dead, in an intertidal or subtidal area.
Oyster reef	A natural or artificial formation that is composed of oyster shell, live oysters, and other living or dead organisms; discrete, contiguous, and clearly distinguishable from scattered oyster shell or oysters; and located in an intertidal or subtidal area.
Special hazard area	An area having special flood, mudslide or mudflow, or flood-related erosion hazards.

### *Exploration and Leasing*

The Texas General Land Office (GLO) and the School Land Board (SLB) regulates the oil and gas exploration and leases in the Reserve. The GLO and SLB must also comply with the policies of the CMP when approving oil, gas, and other mineral lease and granting surface leases, easements, and permits and adopting rules under the Texas Natural Resources Code, Chapters 32, 33 and 51-53, governing oil and gas exploration and production on submerged lands (Texas Administrative Code (TAC), Title 31, Part 16, Ch 501, Rule §501.4).

Aside from the regulations of the CMP, the GLO also has its own regulations in reference to pollution, and other impacts to natural resources (TAC, Title 31, Part 1, Ch 9, Rule §9.11). The GLO states that exploration and leasing of state oil and gas shall be governed by these guidelines:

- All geophysical and geochemical exploration shall be conducted in compliance with all applicable state and federal statutes and regulations relating to pollution of land and water;
- Any physical modification of the surface including, but not limited to, mounding, cratering, or vehicle tracks shall be remedied upon completion of the work and coordinated with and approved by GLO.
- Persons using wheeled or tracked vehicles on state-owned lands shall use reasonable efforts to avoid impact to the area;
- No person operating a vessel, vehicle, or equipment operating under permit shall discharge solid waste (which includes, but is not limited to, non-biodegradable containers, rubbish, or refuse or garbage) into state waters or state-owned lands.
- No geophysical surveying or shooting shall be performed within 1,000 feet of a known bird rookery island, as depicted on maps maintained by GLO, between February 15th and September 1<sup>st</sup>.
- In accordance with Texas Parks and Wildlife Code, §12.301, a permittee or contractor is liable to the state for the value of fish or wildlife taken, killed, or injured by work under a permit.
- Staging areas must be approved by the GLO, and shall not be established in vegetated areas of tidal sand or mud flats, submerged aquatic vegetation, or coastal wetlands, as those terms are defined in §16.1 of this title (relating to Definitions and Scope), or vegetated dune areas.
- Shot holes shall be at least 120 feet below the mudline on submerged lands, unless otherwise authorized in writing by the commissioner.
- No high velocity energy source shall be discharged within 500 feet of any oyster reef, marked oyster lease, marked artificial reef, or marked red snapper bank, or within 500 feet of any dredged channel, dock, pier, causeway, or other structure. Assistance in locating oyster reefs and leases is available from TPWD.
- No shot in excess of 20 pounds shall be discharged within one mile of any pass, jetty, mouth of a river, or other entrance to the Gulf of Mexico from inland waters.

The GLO ensures compliance with the above guideline through permit conditions designed to: avoid adverse impacts to natural resources, minimize unavoidable impacts, and to compensate for those significant and adverse impacts that may occur during the permitted activity (TAC, Title 31, Part 1, Ch 9, Rule §9.11). The GLO and the SLB shall not take a major action that is inconsistent with the following goals or the policies of the TAC coastal protection chapter:

- to protect, preserve, restore, and enhance the diversity, quality, quantity, functions, and values of Coastal Natural Resource Areas (CNRAs);
- to ensure sound management of all coastal resources by allowing for compatible economic development and multiple human uses of the coastal zone;
- to balance the benefits from economic development and multiple human uses of the coastal zone, the benefits from protecting, preserving, restoring, and enhancing CNRAs, the benefits from minimizing loss of human life and property, and the benefits from public access to and enjoyment of the coastal zone.

In addition, the GLO and the SLB shall avoid and otherwise minimize the cumulative adverse effects to CNRAs of each

of its major actions relating to the activity (TAC, Title 31, Part 1, Ch 16, Rule §16.2).

The GLO and SLB have thresholds for referral for actions of exploration and leases. Any action that exceeds these threshold levels will be referred to the Coastal Coordination Council (CCC) for consistency review to the CMP. The approval of a mineral lease exceeds the threshold for potential referral if the authorized activities would adversely affect CNRA acreage greater than the following in the Mission-Aransas Estuary (lower coast): one-half acre of oyster reef, 40 acres of submerged aquatic vegetation, five acres of coastal wetland, 20 acres of algal flat, 20 acres of tidal mud flat, 40 acres of tidal sand flat, 40 acres of waters in the open Gulf of Mexico, 40 acres of open bay waters under tidal influence, or 40 acres of upland area fitting the definition of coastal barrier, coastal shore area, gulf beach, critical dune area, special hazard area, critical erosion area, coastal historic area, or coastal park, wildlife management area, or preserve. The issuance of a geophysical permit for exploration for oil, gas, or other minerals on state-owned lands also exceeds the threshold if the permit authorizes one of the following: a shot in excess of 40 pounds of dynamite equivalent (upland areas), a shot in excess of 20 pounds of dynamite equivalent (submerged areas), a shot hole less than 120 feet below the mud line (submerged areas). In addition, any action described in §16.1 of this title that may adversely affect a CNRA that has not been specifically addressed in this section, exceeds the threshold if the action would adversely affect greater than 40 acres of any such CNRA. (TAC, Title 31, Part 1, Ch 16, Rule §16.4).

#### *Production*

The RRC regulates the oil and gas production in the Reserve. In regard to access of property within the proposed site; the commission or its representatives has access to come upon any lease or property operated or controlled by an operator, producer, or transporter of oil, gas, or geothermal resources, and to inspect any and all leases, properties, and wells and all records of said leases, properties, and wells. Designated agents of the commission are authorized to make any tests on any well at any time necessary to conservation regulation, and the owner of such well is hereby directed to do all things that may be required of him by the commission's agent to make such tests in a proper manner (TAC, Title 16, Part 1, Ch 3, Rule §3.2).

Activities by the RRC of oil, gas, or geothermal resources in the coastal zone must be consistent with the Texas Coastal Management Program (CMP). Activities that must be consistent with the CMP include disposal of oil and gas waste in a pit, discharge of oil and gas wastes to surface waters, compliance with applicable water quality requirements for federal permits for development (including pipelines) in critical areas, dredging, and dredged material disposal. Aside from the regulations of the CMP, the RRC also has their own regulations in reference to pollution prevention. These regulations state that the operator of oil, gas, or geothermal resources shall not pollute the waters of the Texas offshore and adjacent estuarine zones (saltwater bearing bays, inlets, and estuaries) or damage the aquatic life therein. Particularly, the disposal of liquid waste material into the Texas offshore and adjacent estuarine zones shall be limited to saltwater and other materials which have been treated, when necessary, for the removal of constituents which may be harmful to aquatic life or injurious to life or property. The Texas Commission of Environmental Quality (TCEQ) also requires that there be no discharge of oil and gas waste to surface waters which may cause a violation of the Texas Surface Water Quality Standards, codified at TAC, Title 30, Ch 307.

TCEQ standards state that no discharge of oil, grease, or related residue is allowed that will produce a visible film of oil or globules of grease on the surface or coat the banks or bottoms of the watercourse; or cause toxicity to man, aquatic life, or terrestrial life. In reference to brine discharge, salinity gradients in estuaries shall be maintained to support attainable estuarine dependent aquatic life uses (TAC, Title 30, Ch 307, Rule §307.4). In addition, no oil or other hydrocarbons (including deck wash, and oil based drilling muds) in any form or combination with other materials or constituent shall be disposed of into the Texas offshore and adjacent estuarine zones. Immediate corrective action shall be taken in all cases where pollution has occurred. An operator responsible for the pollution shall remove immediately such oil, oil field waste, or other pollution materials from the waters and the shoreline where it is found. Such removal operations will be at the expense of the responsible operator (TAC, Title 16, Part 1, Ch 3, Rule §3.8).

#### *Coastal Management Plan*

The Coastal Management Program (CMP) was created by has several pertinent policies for construction, operation, and maintenance of oil and gas exploration and production facilities in Coastal Natural Resource Areas (CNRAs). CNRAs are located using several methods, depending on the resource: photointerpretation of aerial photography, along with field

verification (seagrasses, coastal wetlands, tidal flats and other CNRAs); side-scan sonar (oyster reefs); field surveys (all CNRAs); or a combination of methods. One of the first steps applicants for permits, leases, or easements must take is to locate CNRAs (if any) within the area of the proposed action. If CNRAs are found, applicants must take steps to avoid, minimize, restore, enhance, protect, or mitigate for any impacts.

The goals of the Texas Coastal Management Program (CMP) are:

1. to protect, preserve, restore, and enhance the diversity, quality, quantity, functions, and values of CNRAs;
2. to ensure sound management of all coastal resources by allowing for compatible economic development and multiple human uses of the coastal zone;
3. to minimize loss of human life and property due to the impairment and loss of protective features of CNRAs;
4. to ensure and enhance planned public access to and enjoyment of the coastal zone in a manner that is compatible with private property rights and other uses of the coastal zone;
5. to balance the benefits from economic development and multiple human uses of the coastal zone, the benefits from protecting, preserving, restoring, and enhancing CNRAs, the benefits from minimizing loss of human life and property, and the benefits from public access to and enjoyment of the coastal zone;
6. to coordinate agency and subdivision decision-making affecting CNRAs by establishing clear, objective policies for the management of CNRAs;
7. to make agency and subdivision decision-making affecting CNRAs efficient by identifying and addressing duplication and conflicts among local, state, and federal regulatory and other programs for the management of CNRAs.
8. to make agency and subdivision decision-making affecting CNRAs more effective by employing the most comprehensive, accurate, and reliable information and scientific data available and by developing, distributing for public comment, and maintaining a coordinated, publicly accessible geographic information system of maps of the coastal zone and CNRAs at the earliest possible date;
9. to make coastal management processes visible, coherent, accessible, and accountable to the people of Texas by providing for public participation in the ongoing development and implementation of the Texas CMP; and
10. to educate the public about the principal coastal problems of state concern and technology available for the protection and improved management of CNRAs.

Oil and gas exploration and production on submerged lands shall also comply with the CMP, including the following policies. In or near critical areas, facilities shall be located and operated and geophysical and other operations shall be located and conducted in such a manner as to avoid and otherwise minimize adverse effects, including those from the disposal of solid waste and disturbance resulting from the operation of vessels and wheeled or tracked vehicles, whether on areas under lease, easement, or permit or on or across access routes thereto. Where practicable, buffer zones for critical areas shall be established and directional drilling or other methods to avoid disturbance, such as pooling or unitization, shall be employed. In addition, lessees, easement holders, and permittees shall construct facilities in a manner that avoids impoundment or draining of coastal wetlands, if practicable, and shall mitigate any adverse effects on coastal wetlands impounded or drained in accordance with the sequencing requirements in this subsection. Upon completion or cessation of operations, lessees, easement holders, and permittees shall also remove facilities and restore any significantly degraded areas to pre-project conditions as closely as practicable, unless facilities can be used for maintenance or enhancement of CNRAs or unless restoration activities would further degrade CNRAs (TAC, Title 31, Part 16, Ch 501, Rule §501.14).

In reference to discharges of wastewater and waste disposal from oil and gas exploration and production activities, the CMP dictates the following regulations. No new commercial oil and gas waste disposal pit shall be located in any CNRA. Oil and gas waste disposal pits shall be designed to prevent releases of pollutants that adversely affect coastal waters or critical areas. All discharges shall comply with all provisions of surface water quality standards established by the TCEQ. To the greatest extent practicable, new wastewater outfalls shall be located where the discharge will not adversely affect critical areas. Existing wastewater outfalls that adversely affect critical areas shall be either discontinued or relocated so as not to adversely affect critical areas within two years of the June 15, 1995 (TAC, Title 31, Part 16, Ch 501, Rule §501.14).

The CMP also states that GLO regulations governing prevention of, response to and remediation of coastal oil spills shall provide for measures to prevent coastal oil spills and to ensure adequate response and removal actions. The GLO regulations for certification of vessels and facilities that handle oil shall be designed to ensure that vessels and facilities

are capable of prompt response and adequate removal of unauthorized discharges of oil. The GLO regulations adopted pursuant to the Oil Spill Prevention and Response Act (OSPRA), Texas Natural Resources Code, Chapter 40, shall be consistent with the State Coastal Discharge Contingency Plan adopted pursuant to OSPRA; and the National Contingency Plan adopted pursuant to the Federal Water Pollution Control Act, 33 United States Code Annotated, Chapter 26. GLO also rules under OSPRA governing the assessment of damages to natural resources injured as the result of an unauthorized discharge of oil into coastal waters shall provide for reasonable and rational procedures for assessing damages and shall take into account the unique circumstances of the spill incident. The costs of assessing the damages shall not be disproportionate to the value of the injured resources. Plans for the restoration, rehabilitation, replacement or acquisition of equivalent resources shall provide for participation by the public and shall be designed to promote the restoration of the injured resources with all deliberate speed.

The GLO rules must be consistent with other state rules and policies and with the CMP goals and policies (TAC, Title 31, Part 16, Ch 501, Rule §501.14). Consistency review is often required to ensure that all agencies (local, state, and federal) comply with CMP goals and policies. The process for conducting consistency reviews addresses four questions:

- Is the proposed project within the CMP boundary?
- Will the proposed project adversely affect CNRAs?
- Is the proposed project subject to review?
- Is the proposed project consistent with the goals and policies of the CMP?

Local consistency review includes coastal cities and counties with authority under Texas Open Beaches Act (TEX. NAT. RES. CODE ANN. Ch. 61), Dune Protection Act (TEX. NAT. RES. CODE ANN. Ch. 63), and Land Office's beach/dune rules (31 TAC Ch. 15). These coastal cities and counties are responsible for permitting and issuing certificates in the beach/dune system and must ensure that CNRAs will not be adversely affected by a proposed action. These actions are limited to construction in the beach/dune, coastal shore protection, and closure, relocation, or reduction in public beach access. State consistency review includes the networked state agencies and subdivisions. Each state agency proposing an action subject to the CMP must ensure that the action is consistent in writing, such as an order, permit, or other document approving or authorizing the document. Federal consistency review includes actions undertaken, licensed, permitted, or funded by a federal agency. The following listed actions are subject to consistency review: federal actions - licenses or permits issued by federal agencies, federal activities and development projects - functions performed by or for a federal agency, and federal assistance - state and local government applications for federal assistance.

Resources management codes assist potential users of state-owned submerged lands with their project planning efforts. State and federal resource agencies assign codes to state-owned tracts in Texas bays and estuaries and Gulf of Mexico waters, representing development guidelines for activities within the tracts. The codes provide recommendations for minimizing adverse impacts to sensitive natural resources from mineral exploration and development activities.

#### *Oil and Gas Permits*

Oil and gas operations are regulated by the GLO and RRC, but before any operation can begin, permit(s) must be obtained from the U.S. Army Corps of Engineers (<http://www.swg.usace.army.mil/reg/permits.asp>). The Nationwide Permits (NWP) required for oil and gas operations in bays and estuaries include NWP 6 for seismic activities and NWP 44 for mining activities. The NWPs have several general conditions relevant to environmental protection. Some of these conditions include compliance with laws regarding water quality, coastal zone management, endangered species, historic properties, shellfish beds, mitigation, waterfowl breeding areas, and designated critical resource waters. The water quality and endangered species laws are two laws that more readily hold up permit approval. In Texas, mining permit activities must be authorized by TCEQ, which sets the state water quality standards for discharges. These standards are based on the Clean Water Act and require discharges to be consistent with the Coastal Management Plan (CMP). The Endangered Species Act of 1973 requires any seismic or mining permit that may allow adverse impacts to threatened or endangered species or their corresponding critical habitats to be approved by the U.S. Fish and Wildlife Service (USFWS) before the permit is authorized. General conditions of NWP designate a NERR site as a critical resource water. Because NERR sites are designated as critical resource waters, no discharges of dredged or fill material are allowed within the site unless it is authorized by the USFWS for compliance with threatened or endangered species. In addition compliance with the Coastal Zone Management Act through the CMP is required for seismic and mining permit approval (33 CFR 330.4(d)). A general permit is also required for directional drilling (permit 14114). A directional

drilling permit is also bound by laws regarding endangered species, historic properties, mitigation, and waterfowl breeding areas. Further information on Corps of Engineers permits required for activities in the proposed site can be found at <http://www.swg.usace.army.mil/reg/permits.asp>.

### *Specific Land Owner Policies*

#### **Aransas National Wildlife Refuge**

Economic uses of the Aransas National Wildlife Refuge (including Matagorda Island) (ANWR) are primarily cattle grazing, and oil and gas development. Grazing is permitted on Myrtle-Foester Whitmire Unit of 3,240 acres. Grazing is permitted not for economic returns, but as a management tool. With the exception of a few scattered tracts, mineral rights on the Aransas and Matagorda Island are still outstanding. Approximately 5 producing wells exist on the Aransas tract (Figure 6), along with the necessary pipelines, storage, and processing facilities (Figures 7 and 8). Regulations for mineral operations on the ANWR are bound to the GLO and RRC regulations. In addition, the mineral recovery operations on the ANWR shall be conducted so as to minimize impact. Several years ago, State and Federal biologists got together, at the request of the GLO, and compiled a list of restrictions for each tract on the refuge. There are now drilling restrictions in many parts of the refuge, including St. Charles Bay, during October 15<sup>th</sup> through April 15<sup>th</sup> (Figure 9). There is no seismic exploration allowed on whooping crane management units between October 15<sup>th</sup> and April 15<sup>th</sup>. Restrictions on the tracts surrounding the refuge are such that development of oil and gas resources is almost impossible from within the tracts. Oil companies bidding on these tracts are well aware of the restrictions, but hope that the US Fish and Wildlife Service (USFWS) will permit certain activities on refuge lands. By law, no Federal agency may authorize any action that may jeopardize an endangered species or adversely modify critical habitat or habitat that may in the future be critical to the survival and recovery of an endangered species. It is believed by the USFWS that the zoning and special restrictions of the refuge imposed on the operator will protect endangered species utilizing the refuge (ANWR 1986).

Figure 6. Designated units of Aransas National Wildlife Refuge.



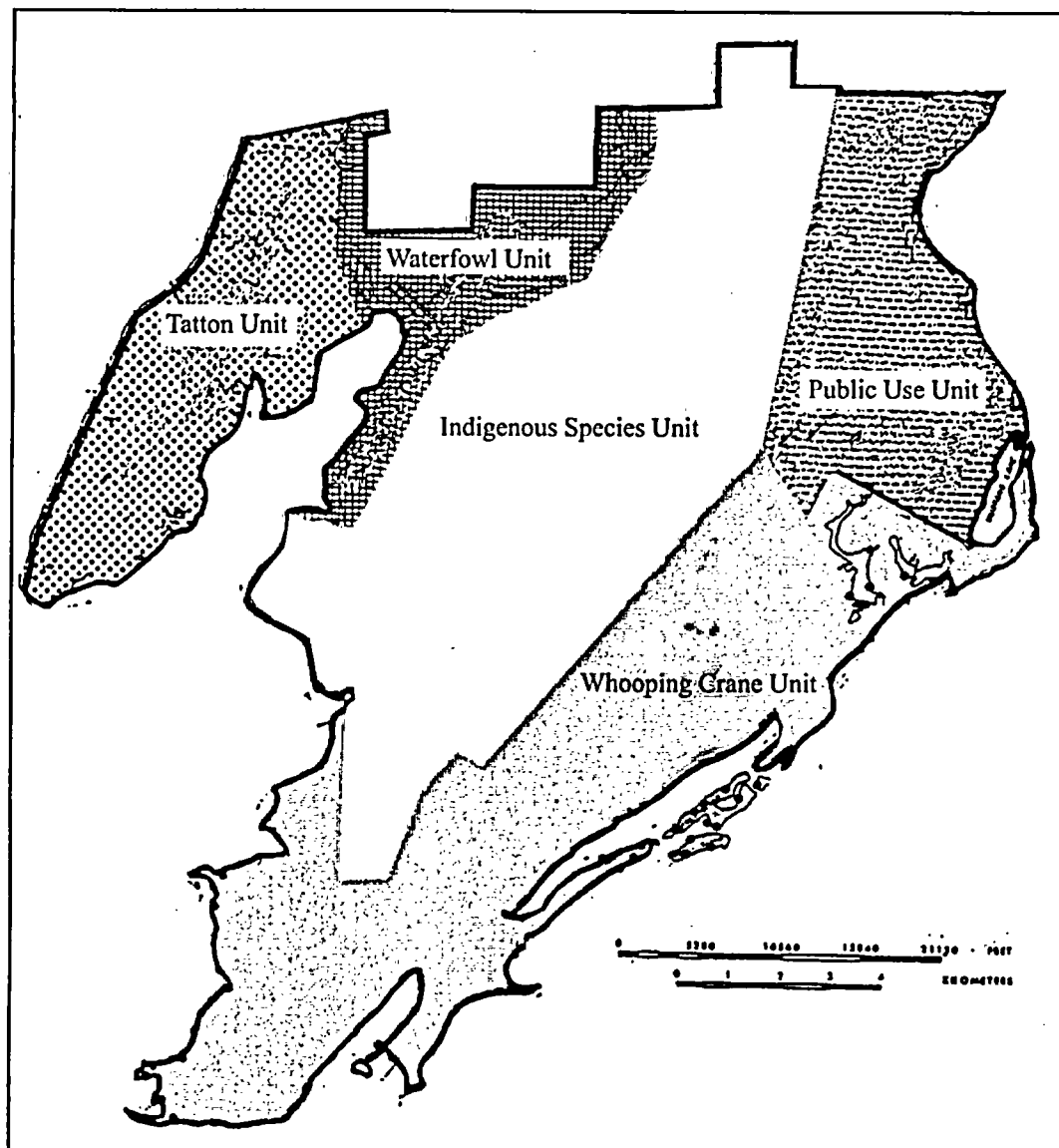


Figure 7. Historical gas and oil wells on the Aransas National Wildlife Refuge. Map provided by ANWR.

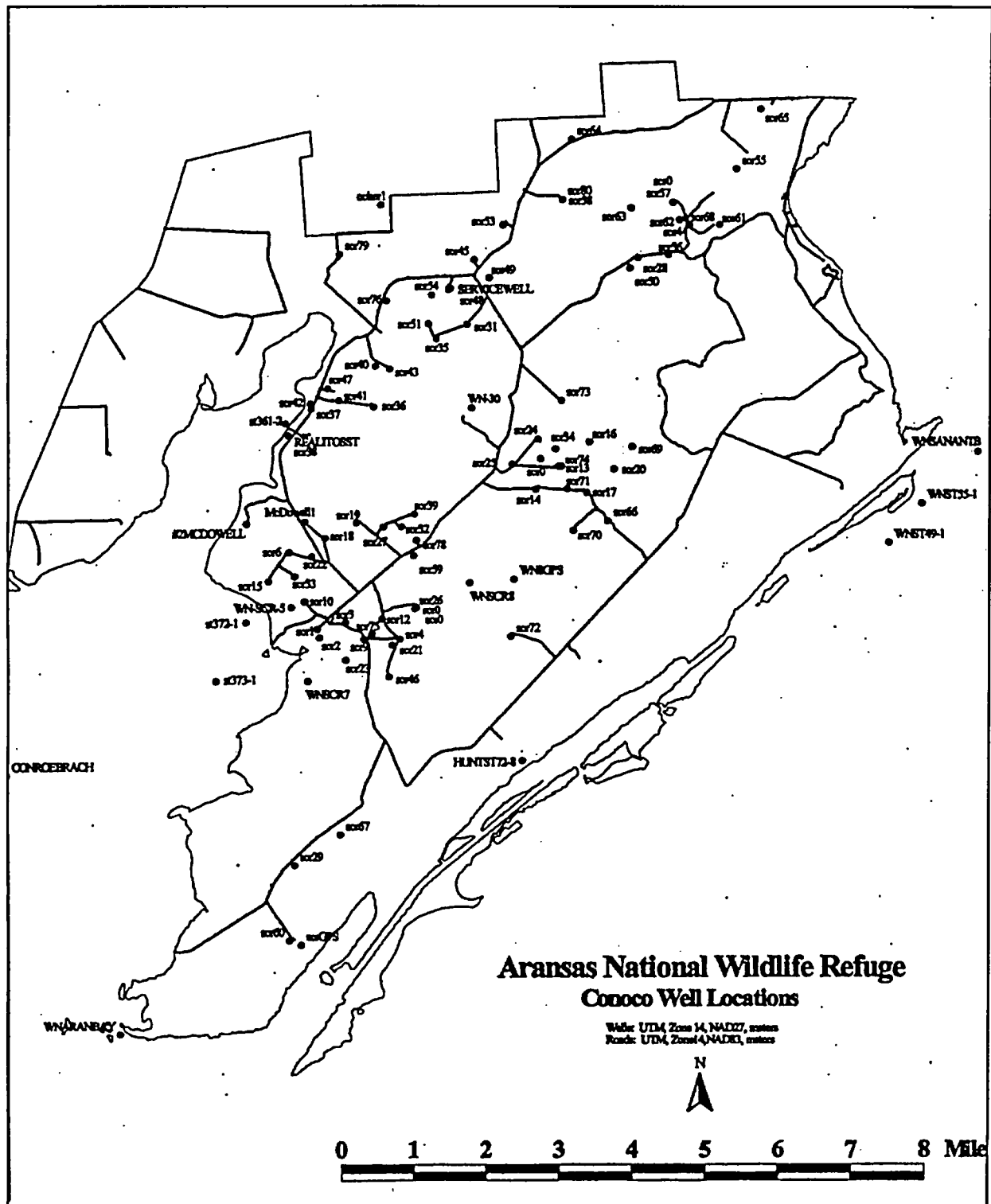


Figure 8. Historical and current gas and oil pipelines on the Aransas National Wildlife Refuge. Map provided by ANWR.

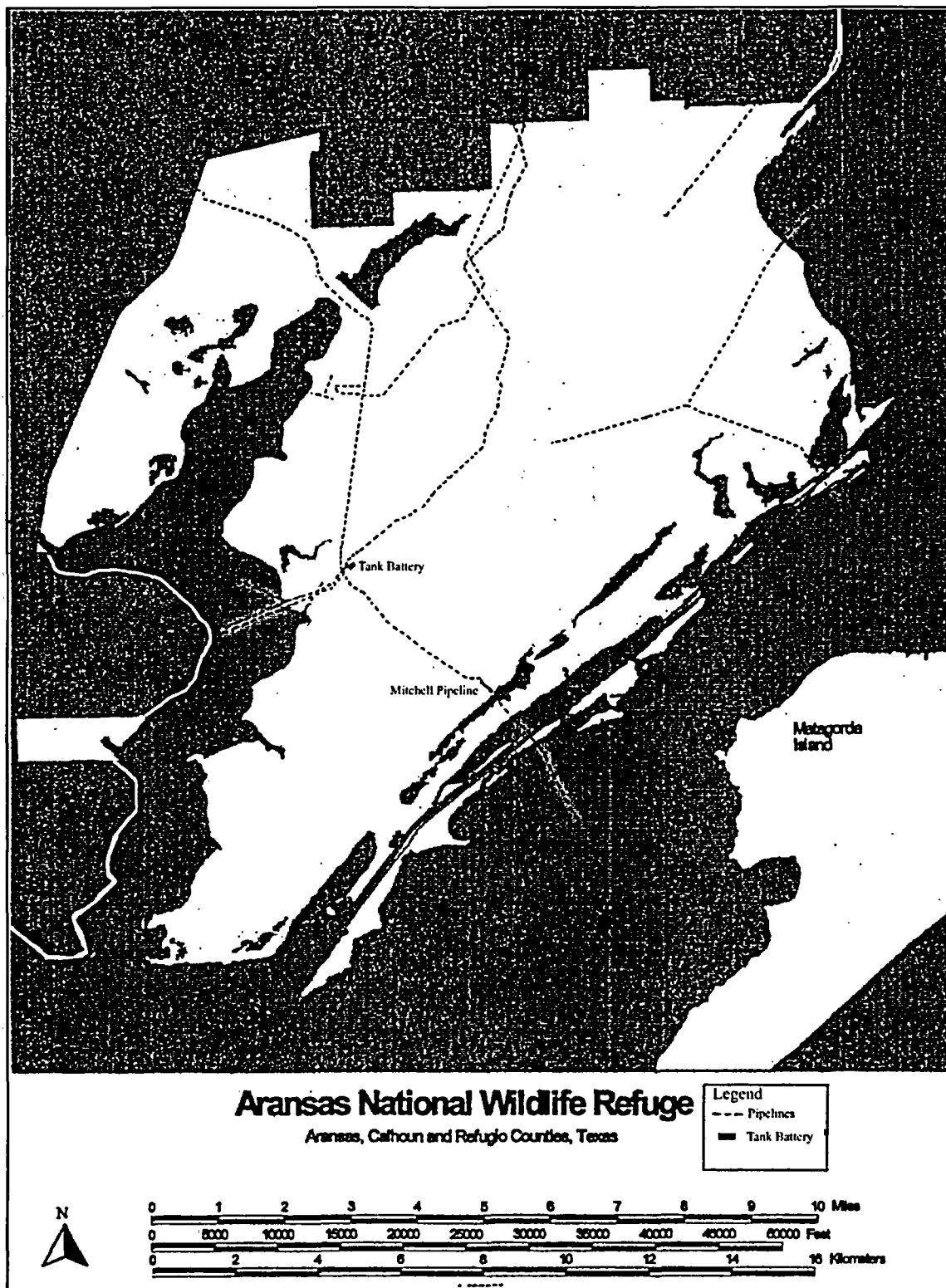
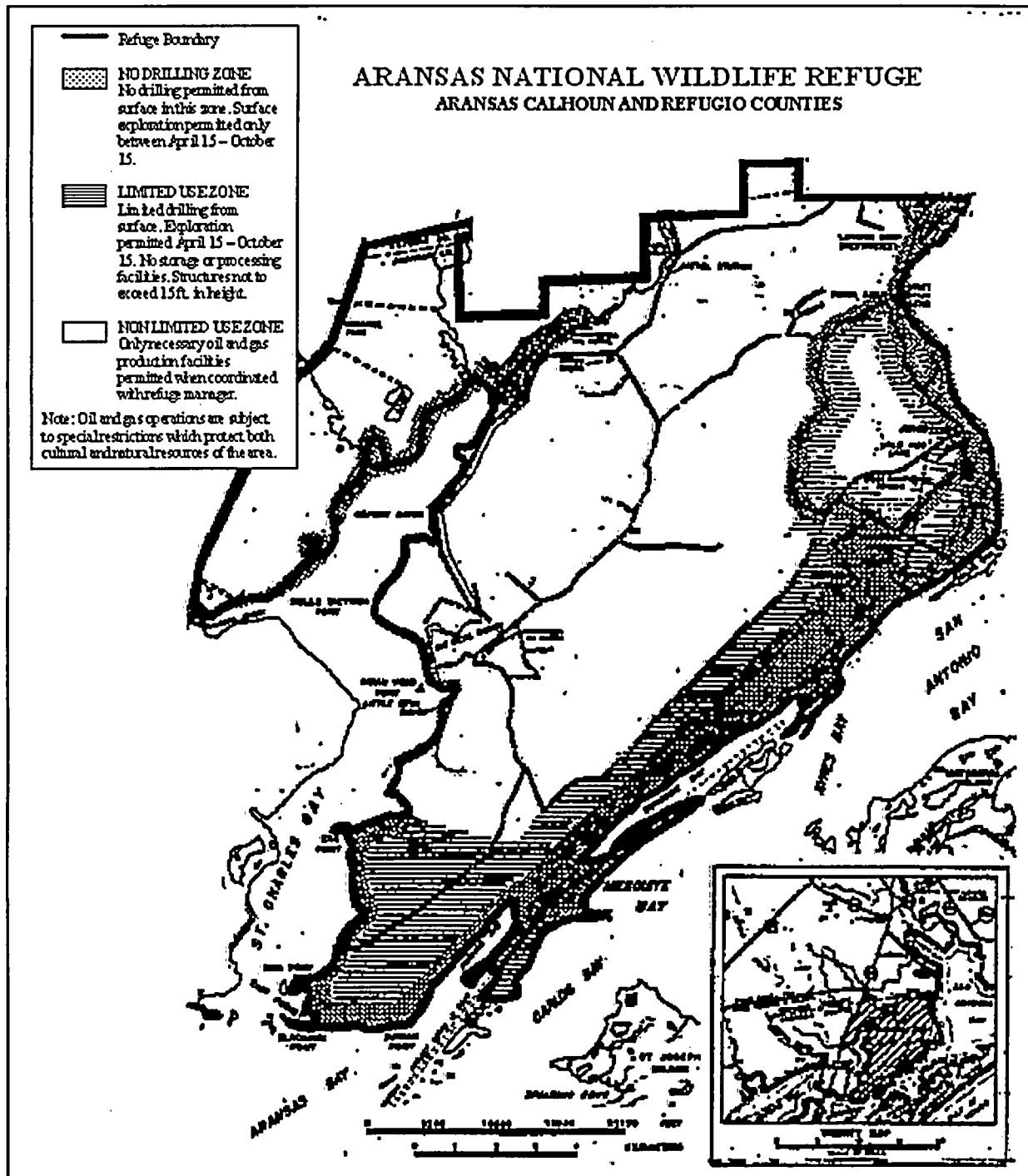


Figure 9. ANWR zones designated by the Oil and Gas Plan (ANWR 1986).



## Texas Parks and Wildlife Department

Goose Island State Park is managed by the Texas Parks and Wildlife Department (TPWD). Regulations for mineral operations on TPWD managed lands are bound to the goals and policies of the CMP and RRC regulations. Oil and gas development on TPWD lands requires a surface lease agreement between the mineral rights owner and TPWD. It is in this surface lease agreement that access routes, staging areas, times of work, and compensation for potential impacts to natural and cultural resources and visitor experiences are worked out. In addition, the staff guidelines for mineral recovery operations on TPWD lands state that operations shall be conducted so as to minimize impact and shall be approved by the land manager. Under general provisions, the guidelines state that TPWD retains the right to make special provisions to protect sensitive resources or to minimize potentially adverse impacts (TPWD staff guidelines gen. provisions *p*). The general provisions also state that reasonable precautions, including consultation with the land manager, shall be taken to avoid disturbance of fish, wildlife or critical plant resources during mineral recovery operations (TPWD staff guidelines gen. provisions *q*). Mineral operations may also be prohibited during nesting, breeding or migration activities of specific species identified by the land manager (TPWD staff guidelines gen. provisions *r*). Restoration of activity sites to preconstruction condition is also required on TPWD managed lands.

## Oil Spills

The Oil Spill Prevention and Response Act of 1991 (OSPR) designated the Texas General Land Office as the lead state agency for preventing and responding to oil spills in the marine environment. In a typical year, the agency's Oil Spill Prevention and Response Program (OSPR) responds to between 850 and 1,000 reported oil spills. A two-cent-per-barrel fee on crude oil loaded or off-loaded in Texas ports funds the OSPR program, which deposits fee proceeds in the Coastal Protection Fund Account. As indicated in its name, the OSPR program emphasizes both the prevention of and response to oil spills. The program maintains an active outreach education effort, visiting schools, associations, and interest groups, teaching that many small, chronic spills can be as detrimental as one large spill. As another prevention step, the OSPR program has completed construction of four oily bilge water reception facilities along the coast. The Oily Bilge Water Reception Facility Program provides operators of pleasure and commercial boats with places to dispose of oily water. To date, over 200,000 gallons of used engine oil have been recycled. Further prevention efforts include increased boat and harbor patrols, which have heightened the Texas General Land Office's presence on the waterfront. The OSPR program maintains a comprehensive, unannounced oil spill drill and audit program designed to measure the readiness level of all sectors of the oil handling community: deep draft vessels, pipelines, and shore-based facilities. Facilities and vessel operators are required to address prevention issues, such as leak detection systems, maintenance, and testing and inspection schedules in Oil Spill Prevention and Response plans, the specifics of which are outlined in regulations developed by the program. The second focus of the OSPR program highlights spill response resources directed at stopping, containing, and cleaning oil spills. The program has compiled a massive spills databank that is used to determine resource allocation, preparedness levels, spill profiles, and corrective activities. In preparation for spills, the program has pre-staged response equipment in sensitive and geographically advantageous locations. The program also maintains a substantial inventory of response equipment including mobile command posts, husbandry and wildlife rehabilitation trailers, fire boom, skimmers, vehicles and vessels. The OSPR program also focuses on research and development, Texas automated buoy system (TABS), clean gulf conference and exhibition, on-line vessel database, regulation review, oil spill prevention task, and the Texas oil spill planning and response toolkit (<http://www.glo.state.tx.us/oilspill/>).

Regulations of the Oil Spill Prevention and Response Act of 1991 is found in the Natural Resource Code Ch. 40; Texas Administrative Code 31 Ch. 19. It is the policy of the state to protect these natural resources and to restore, rehabilitate, replace, and/or acquire the equivalent of these natural resources with all deliberate speed when they have been damaged. It is the intent of the legislature that natural resource damage assessment methodologies be developed for the purpose of reasonably valuing the natural resources of the State of Texas in the event of an oil spill and that the state recover monetary damages or have actions commenced by the spiller as early as possible to expedite the restoration, rehabilitation, and/or replacement of injured natural resources. The OSPRA contains statutes regarding the following:

§ 40.001. Short Title	§ 40.005. Administration of Hazardous Substance
§ 40.002. Policy	Spill Response and
§ 40.003. Definitions	§ 40.006. Interagency Council
§ 40.004. Administration of Oil Spill Response and Cleanup	§ 40.007. General Powers and Duties
	§ 40.008. Railroad Commission Authority

§ 40.051. Notification	§ 40.156. Administration of Fee
§ 40.052. Hazardous Substances Discharges	§ 40.157. Liability of the Fund
§ 40.053. State Coastal Discharge Contingency Plan	§ 40.158. Exceptions to Liability
§ 40.101. Notification and Response	§ 40.159. Claims From Discharges of Oil
§ 40.102. Response Coordination	§ 40.160. Payment of Awards
§ 40.103. Assistance and Compensation	§ 40.161. Reimbursement of Fund
§ 40.104. Qualified Immunity for Response Actions	§ 40.162. Awards Exceeding Fund
§ 40.105. Equipment and Personnel	§ 40.201. Financial Responsibility
§ 40.106. Refusal to Cooperate	§ 40.202. Response Costs and Damages Liability
§ 40.107. Natural Resources Damages	§ 40.203. Liability for Natural Resources Damages
§ 40.108. Derelict Vessels and Structures	§ 40.204. Defenses
§ 40.109. Registration of Terminal Facilities	§ 40.205. Third Parties
§ 40.110. General Terms	§ 40.251. Penalties
§ 40.111. Information	§ 40.252. Administrative Penalties
§ 40.112. Issuance	§ 40.253. Cumulative Enforcement
§ 40.113. Suspension	§ 40.254. Orders and Hearings
§ 40.114. Contingency Plans for Vessels	§ 40.255. Actions
§ 40.115. Entry into Port	§ 40.256. Individual Cause of Action
§ 40.116. Audits, Inspections, and Drills	§ 40.257. Venue
§ 40.117. Regulations	§ 40.258. Federal Law
§ 40.151. Coastal Protection Fund	§ 40.301. Interstate Compacts
§ 40.152. Use of Fund	§ 40.302. Institutions of Higher Education
§ 40.153. Reimbursement of Fund	§ 40.303. Oil Spill Oversight Council
§ 40.154. Coastal Protection Fee; Administrative Costs	§ 40.304. Small Spill Education Program
§ 40.155. Determination of Fee	

#### *Oil and Gas Effects on the Marine Environment*

Oil and gas activities can affect the marine and terrestrial environment. Disturbances can be caused by drill cuttings, drilling muds, produced water, physical disturbance, and oil spills. Drill cuttings are crustal materials brought to the surface during drilling, and can contain heavy metals. Drilling muds have two purposes, 1) to carry small bits of rock (cuttings) from the drilling process to the surface so they can be removed, and 2) to equalize pressure and prevent water or other fluids in underground formations from flowing into the wellbore during drilling. Water-based drilling mud is composed primarily of clay, water, and small amounts of chemical additives to address particular subsurface conditions that may be encountered. In deep wells, oil-based drilling mud is used because water-based mud cannot stand up to the higher temperatures and conditions encountered. The petroleum industry has developed technologies to minimize the environmental effects of the drilling fluids it uses, recycling as much as possible (Society of Petroleum Engineers, <http://www.spe.org>). The disposal oil-based drilling muds in Texas estuarine or offshore zones has been banned since 1969 (TAC, Title 16, Part 1, Ch 3, Rule §3.8(e)). Water-based drill muds have been shown to be relatively benign (Peterson et al. 1996).

Produced water is formation water that is brought to the surface during oil and gas production, and these waters usually contain elevated concentrations of salts and hydrocarbons (NRC 2003). The ratio of produced water to oil normally increases with the age of the well (D'unger et al. 1996). The effects of produced water in estuarine ecosystems is dependent upon the ecosystem. Shallow, turbid, confined systems with a high percentage of clay sediment such as Trinity Bay, Texas are more likely to have decreased diversity and species abundance near produced water outfalls (Armstrong et al. 1979). In a confined stream-like estuary at New Bayou, Texas, a depressed zone of macrobenthic populations extended from the produced water outfall 107 m downstream and 46 m upstream (Nance 1991). Sublethal effects from polycyclic aromatic hydrocarbons (PAHs) were not found for sedimentary microbial and meiofaunal communities when exposed to high (sublethal) doses of PAHs from produced water (Carman et al. 1995). The amount of impact produced water has on estuarine ecosystems is dependent upon the ecosystem's characteristics. Produced water discharges can be toxic to organisms and decrease species abundance, however, current regulations in Texas state that produced waters must meet surface water quality standards adopted by the TCEQ prior to disposal. The amount of oil content in produced water has decreased in Texas and throughout the world (Table 4). The majority of studies that have

shown a decrease in diversity and species abundance from produced waters occurred before the present day regulations were initiated.

Table 4. Estimates of oil discharges to the marine environment from produced water discharges (NCR 2003).

Country	Produced Water (1,000 bbl/yr)		Oil and Grease Discharge (tonnes/yr)	
	1979	1990	1979	1990
USA	311300	745000	2228	2500
Gulf of Mexico Offshore		473000		1700
Louisiana Territorial Seas		186000		600
Texas Territorial Seas		4300		4.5
UK	57400	1620000	486	5700
Norway		450000		2000
Netherlands		74200		230

Physical disturbance is another potential impact created by oil and gas activities. Physical disturbance can be caused by pipeline, access road, and platform construction. Backfilling from pipeline construction is a remediation method and in salt marshes recovery of cordgrass can be rapid, but full recovery of marsh macrofauna is slow and may take longer than four years (Knott et al. 1997). A study conducted on the Padre Island National Seashore documented vegetation recovery was incomplete after extraction operations (Carls et al. 1990). The slow recovery was primarily due to hard surfacing of sites (with oyster and caliche) and the alteration of site elevation. Drilling activities adjacent to Pelican Island in Galveston Bay caused a decrease in bird abundance during drilling 1983 - 1985, but abundance increased in the next breeding season after drilling activities ceased (Mueller and Glass 1988).

Oil spills are another disturbance that can occur with the presence of wells and pipelines. From 1990-1999 forty-eight spills were recorded in the U.S. from coastal pipelines transporting refined products (NRC 2003). Crude oil induced spills had minimal to no effect on marsh macrophytes, macrofauna and meiofauna in Louisiana (Fleeger and Chandler 1983, DeLaune et al. 1984). Diesel fuel induced spills can cause reduced meiofaunal grazing and increased microalgal biomass, which was due to the reduced grazing (Carman et al. 1997). In the event of an oil spill, the GLO has adopted regulations pursuant to the Oil Spill Prevention and Response Act (OSPRA). Since 1998 a total of 55.35 barrels of oil have been spilled in the waters of Aransas County (Table 5), and 74% of those spills were under 0.1 barrels. A relevantly large spill of 28.57 barrels occurred in Redfish Bay during 2002 from a vessel from Brown Water Towing. Although the majority of the spill sources are unknown, 31% of the spills in Aransas County were from vessels, and 5% were from facilities (mostly fishing related). Oil spill statistics for Aransas County were obtain from Ms. Peggy Spies at the GLO.

Table 5. Total amount of oil spilled per water body in Aransas County from 1998 through 2003.

Water Body	Oil (Bbl)
Aransas Bay	19.74
Copano Bay	0.72
Gulf of Mexico	0.13
Harbor Island	0.1
Little Bay	0.06
Redfish Bay	34.6
Total in Aransas County	55.35

There is an existing network of pipelines that transport oil and natural gas from wells to onshore facilities. There are two types of pipelines used in this transport. Gathering pipelines from individual wells feed into larger, main pipelines, which then transport the oil and natural gas to onshore collection sites. The onshore collection sites then distribute or store the oil and gas. Future activity of oil and gas may increase the number of pipelines to the existing network; however it is practice that whenever possible existing pipelines are used to prevent disturbance and minimize cost.

The overall effects of oil and gas on the marine and terrestrial environment appear to be minimal. Disturbance from produced water, drill muds, and drill cuttings are not significant factors because of present day regulations that prohibit and restrict these activities. Research offshore has shown that pollution due to current practices is so low that it is only detectable within 100-200 m of a platform (Montagna and Harper 1996, Kennicutt et al. 1996). The pollutant effects are indistinguishable from artificial reef effects (Montagna et al. 2002). The impacts of oil and gas on the terrestrial ecosystem are restricted to physical disturbance, especially to the beach ecosystem. Remediation of all physical disturbance from oil and gas activities is required by the CMP and can be achieved by methods such as backfilling, revegetation, fertilization, and construction of nesting sites. The OSPRA and the other regulations in place for the Texas Coast ensure that the effects of oil and gas on the marine environment will continue to be minimal.

#### *Current Activities in Texas Bays*

Estuaries along the Gulf of Mexico, including Texas, are rich in oil and gas deposits. Every estuary in the Western Gulf of Mexico Biogeographic Sub-region has oil and gas wells and pipelines. Much of the past production in the Mission-Aransas Estuary has been depleted. However, recent testing indicates that there is interest in deeper exploration and drilling in the area. As drilling technology continues to improve, deeper and deeper depths become prospective. Exactly where deeper drilling would be focused is impossible to tell before additional seismic data is obtained. In addition, the Texas coast has seen "waves" of seismic exploration. It is likely that there will be additional activity (seismic surveying, drilling, and production) in the future. Seismic operations are conducted in an area, and at a later date, when technology has improved the area is investigated with the new technology. There is no reason to believe that the future of seismic exploration will be any different from the past in terms of repeated "waves" of investigation. If so, the proposed site will most likely be investigated again.

Currently, the Mission-Aransas Estuary has a low number of current leases (Figure 10, Table 6) and little production in comparison to all other estuaries along the Texas coast (Table 7). In fact, the Mission-Aransas Estuary has the second lowest number of leases, and Aransas county has the second lowest production rates in comparison to all Texas coastal counties. The low activity of oil and gas in the Mission-Aransas Estuary, along with the representativeness and minimal human populations, makes this estuary an ideal NERR site for the Western Gulf of Mexico Biogeographic Sub-region.



Figure 10. Current state tracts that are leased within the proposed boundary.

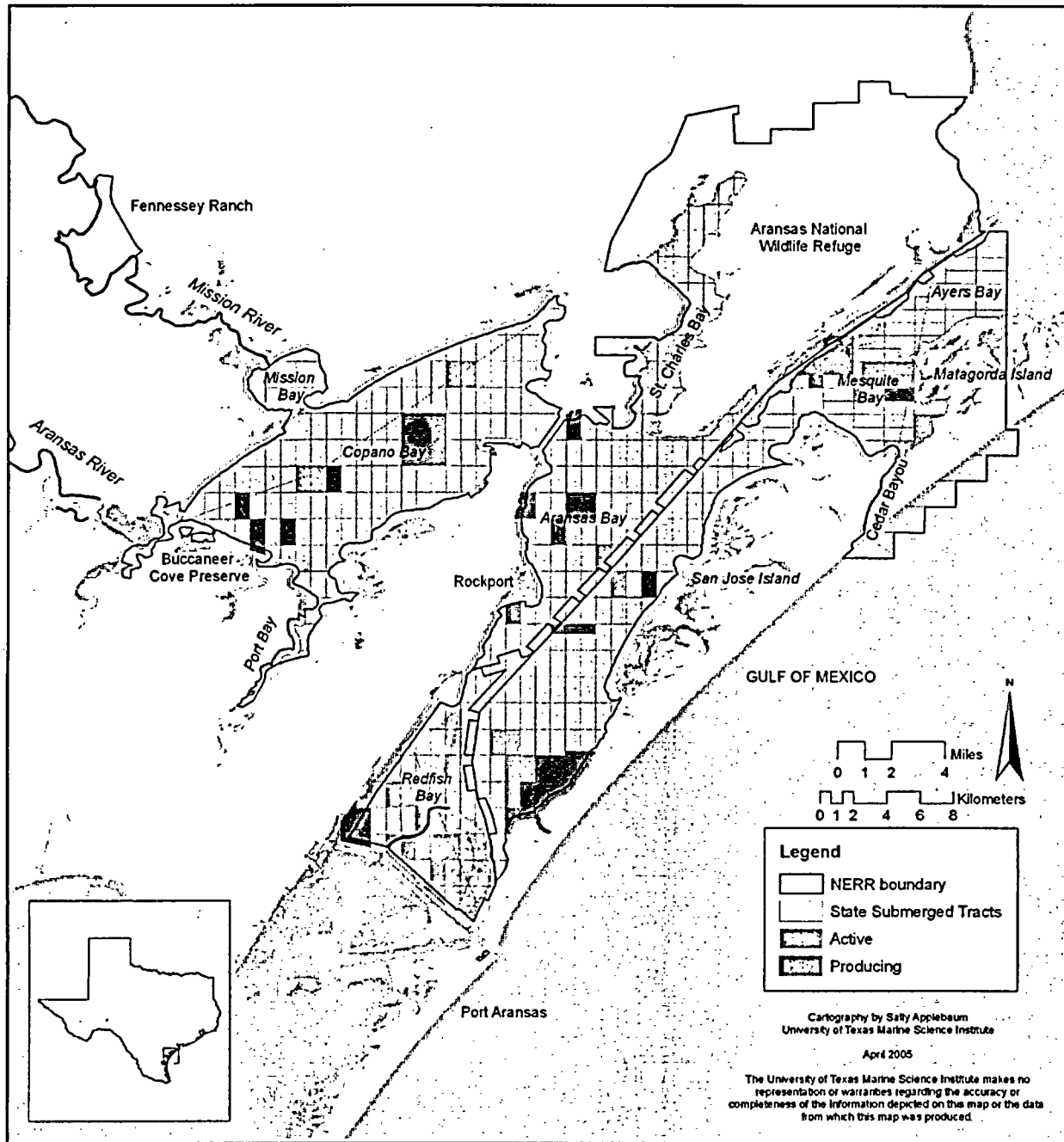
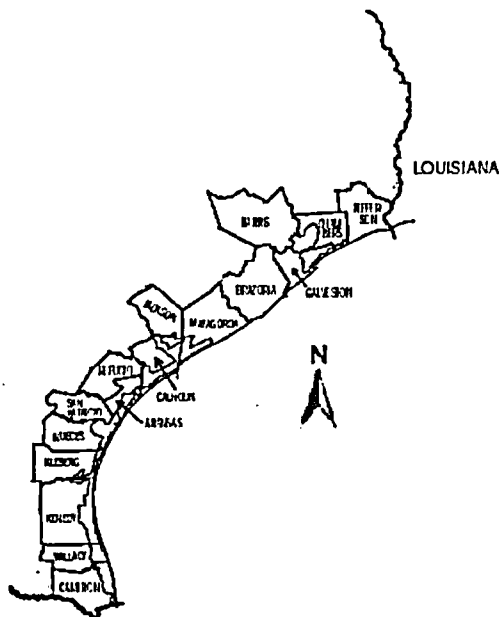


Table 6. Active and producing leases for estuaries along Texas Coast, listed northeast to southwest ([http://www.glo.state.tx.us/energy/ellis/data/rpt\\_SLDBays.pdf](http://www.glo.state.tx.us/energy/ellis/data/rpt_SLDBays.pdf)).

Estuary	Number of Leases	Total Acreage of Leases
Trinity - San Jacinto	164	54343
Lavaca - Colorado	152	53218
Guadalupe	28	11477
Mission - Aransas	51	13107
Nueces	120	42247
Laguna Madre	141	56527

Table 7. Production for onshore oil and gas wells in coastal Texas counties (northeast to southwest) for 2003. Abbreviations: Bbl = barrel (42 U.S. gallons), and Mcf = thousand cubic feet (GLO source, Peter Boone) (<http://www.lib.utexas.edu/maps/texas.html>).



County	Oil (Bbl)	Gas (Mcf)
Jefferson	782,161	24,218,894
Chambers	1,320,293	23,393,879
Harris	1,695,741	35,614,196
Galveston	926,999	19,018,766
Brazoria	1,797,263	46,854,613
Matagorda	1,321,553	27,886,934
Calhoun	497,802	6,920,556
Aransas	79,025	10,759,407
San Patricio	447,644	19,236,853
Nueces	657,847	75,514,672
Kleberg	78,353	49,417,045
Kenedy	144,848	60,333,471
Willacy	558,605	17,563,159
Cameron	758	853,609

### *Past and Present Trends*

The Texas coast stretches nearly 370 miles along the Gulf of Mexico. Along the coastline and far out into the waters of the Gulf of Mexico, geological formations produce oil and gas that have been continually surveyed by exploration companies. Despite a low record of offshore oil and gas production from areas along the Texas coast in the 1940s and 1950s, companies continued to conduct exploratory drilling throughout the 1960s. In 1966, sixty-nine offshore wells were drilled in Texas, though only one produced oil and one gas. Oil and gas production in Texas and Aransas county has been on a steady decline, although the number of wells seem to be increasing (Figures 11 - 13). Subsequently, economic, social, and political life in the state changed greatly. The petroleum industry, more than one-quarter of the state's economy in 1981, fell to half that level ten years later. One-third of oil and gas employment was lost between 1982 and 1994. State and local governments found that lower income from production and property taxes necessitated

austere budgets, and affected communities launched searches for new revenue and increased efforts to diversify their economies. The proportion of state government revenue from the petroleum industry declined to 7 percent in 1993, one-quarter of its level ten years earlier. In the final decade of the twentieth century, a great industry and the aspects of Texas life that were related to it were downsizing. In 1994, Jebco Seismic, Incorporated, and Petroleum Geo-Services contracted with various oil companies to conduct the first 3-D seismic survey within Texas coastal waters in search of gas and oil deposits (<http://www.tsha.utexas.edu/handbook/online/articles/view/OO/doogz.html>).

The first well drilled in the proposed site was in 1940. To date, there have been 649 oil and gas wells drilled in the proposed site. Of these wells drilled, only 315 have produced oil or gas and there are currently 40 active producing wells within the proposed site (Figure 14). Data was provided by Dr. Peter Boone, GLO.

Figure 11. Texas oil and gas production of shallow wells from 1972 through 2002. Abbreviations: Mbbl = million barrels (1 barrel = 42 U.S. gallons), and Mcf = thousand cubic feet (<http://www.rrc.state.tx.us/divisions/og/information-data/oginfo.html>).

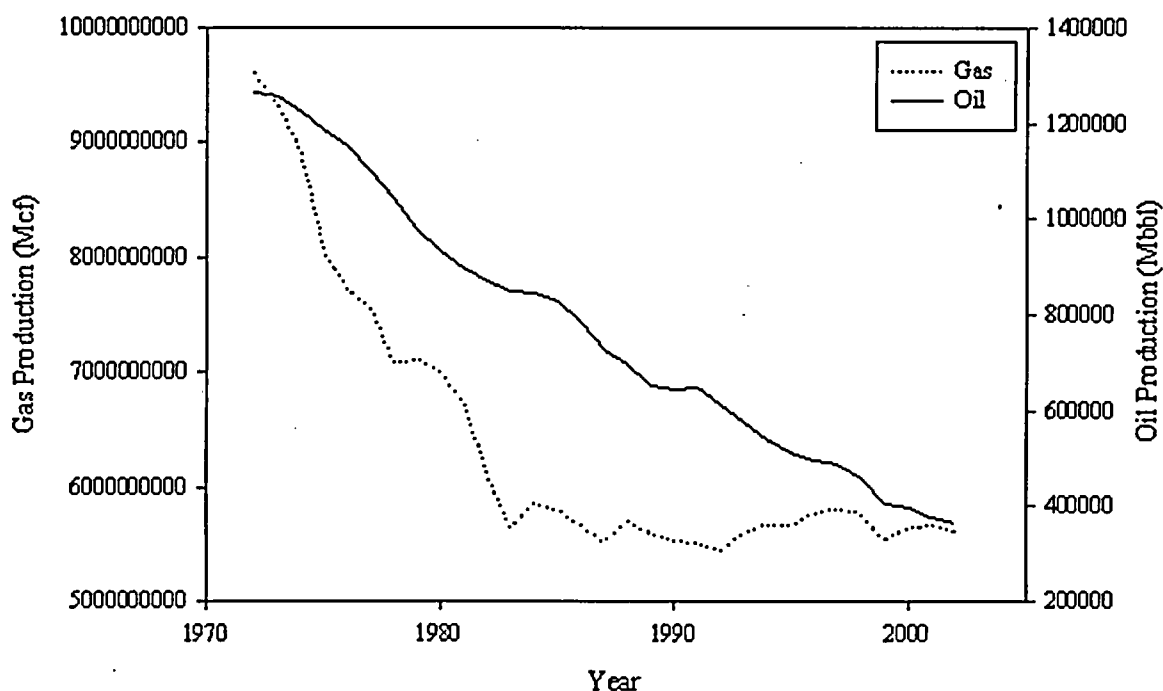


Figure 12. Aransas oil and gas production of shallow wells from 1993 through 2002 ([http://www.rrc.state.tx.us/interactive\\_data.html](http://www.rrc.state.tx.us/interactive_data.html)).

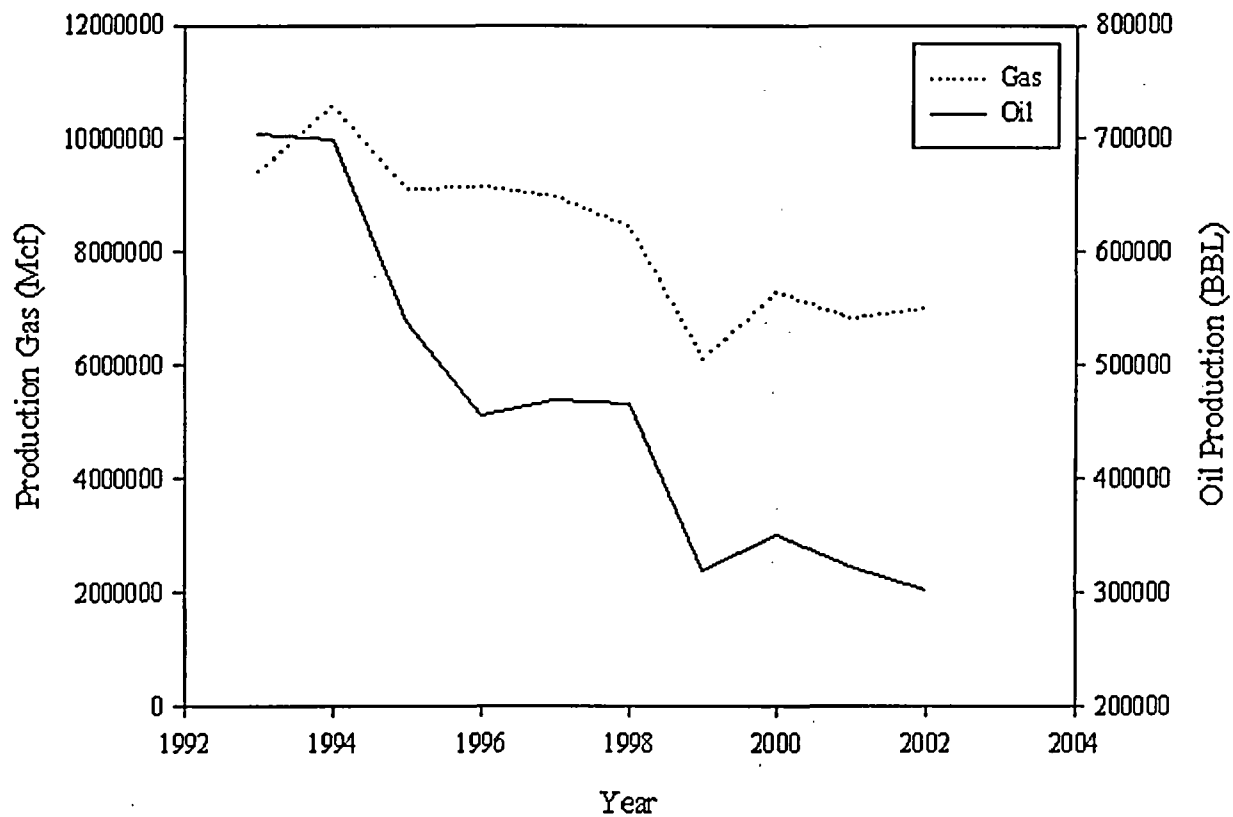


Figure 13. Number of shallow wells drilled and produced per year in the proposed site.

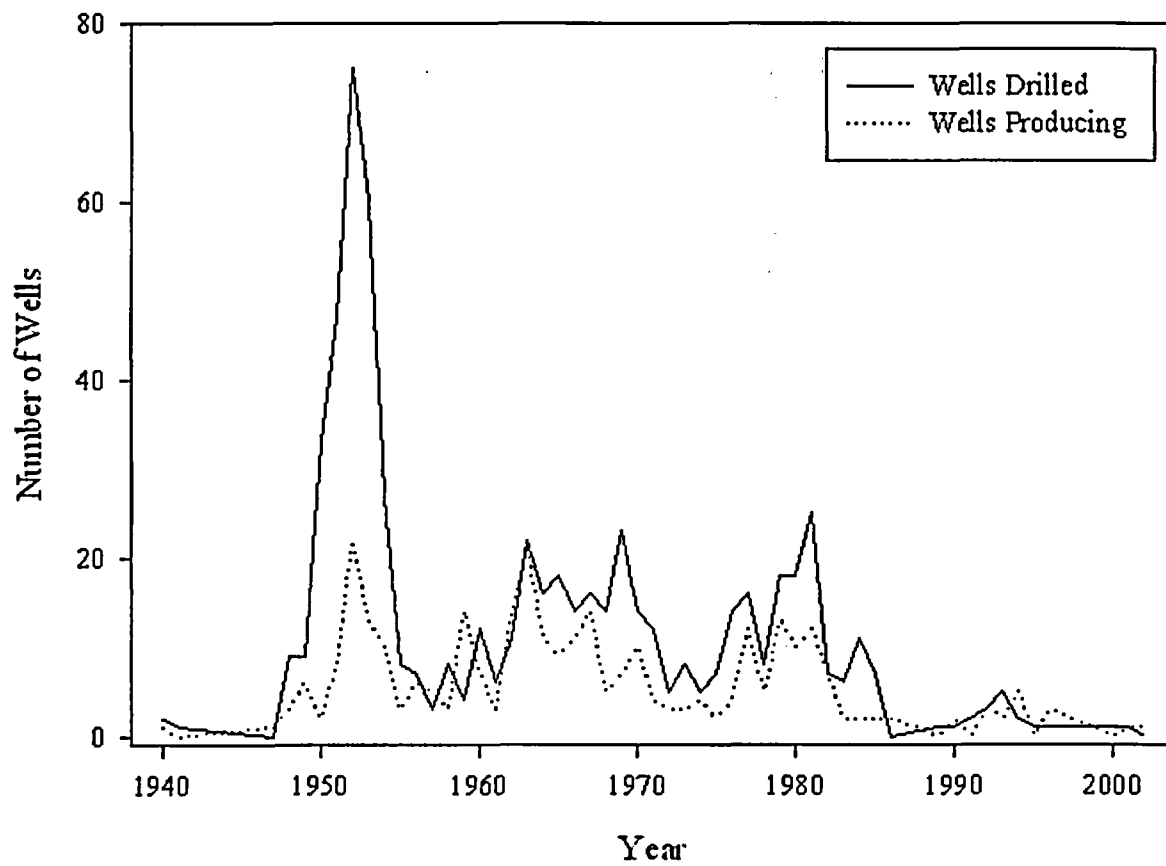
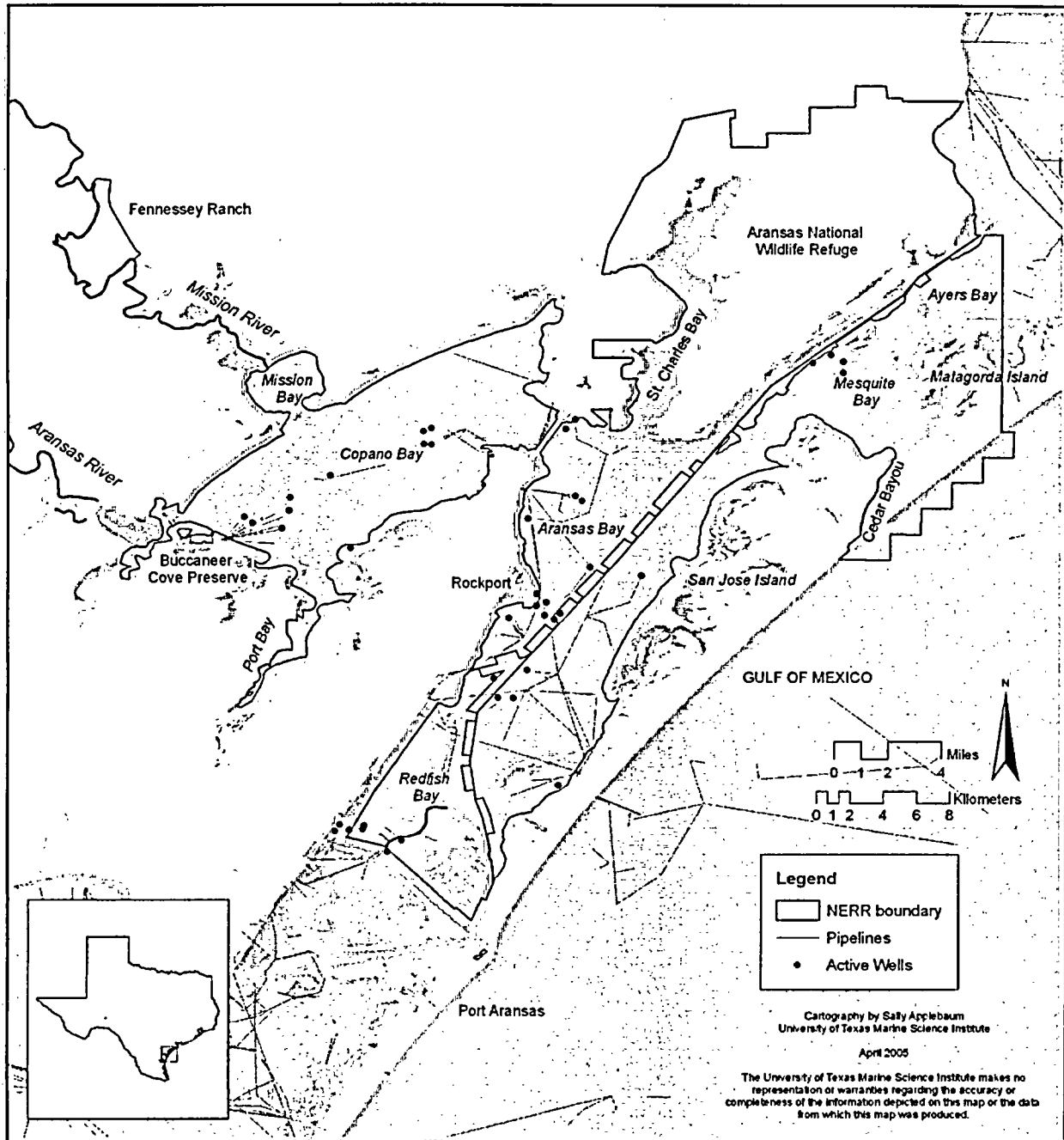


Figure 14. Pipelines and estimated active oil and gas wells in the Reserve.



### *Recreational and Commercial Fishing*

Management regulations from the Texas Parks and Wildlife Department (TPWD) have become increasingly restrictive over time in an attempt to offset the commercial and recreational fishing pressures. In an attempt to increase species abundance, several fish species were designated as a game species and then banned against sale (Red Drum, Goliath Grouper, Blue Marlin, White Marlin, Muskellunge, Northern Pike, Sailfish, Sauger, Spotted Seatrout, Snook, Longbill Spearfish, Tarpon, and Walleye).

Other restrictions, such as time, area and gear type have also been enforced within the Reserve (Table 8). Some areas of Redfish Bay are also designated as a Texas Scientific Area, which is regulated by the TPWD. Redfish Bay has three separate areas of voluntary no prop zones (Figure 15), which are set to deter high speed power boats, and facilitate seagrass recovery as well as provide enhanced fishing opportunities in areas free of high speed motor boat traffic. TPWD has proposed to change the status of the three voluntary no-prop zones in the Redfish Bay State Scientific Area from voluntary compliance to mandatory compliance.

It is important to note that although recreational and commercial fishing exert pressures on the fisheries there are sufficient rules and regulations by state agencies to maintain a sustainable yield and manage the fisheries present in the proposed site. In most cases, stocks and catches are higher today than they were prior to 1975 (Figure 1). The current bag and length limits for recreational and commercial fishing that are regulated by TPWD are listed in table 10 and 9.

Table 8. History of area and gear restrictions on commercial harvest of finfish in the Reserve. Table is adapted from Tunnell et al. (1996).

Effective Date	Regulation
11/1977	Nets and trotlines prohibited on weekends (1 pm Fridays to 1 pm Sundays)
12/1979	Fish taken incidental to shrimp harvest may be retained EXCEPT red drum and spotted seatrout caught in inside waters with a trawl between 16 Dec. and 28 Feb.
7/1980	Monofilament nets banned
9/1980	Gill nets banned in state waters of Gulf
10/1980	Trammel nets, gill nets and drag seines prohibited in waters of Port Bay, St. Charles Bay, and Aransas County portions of Copano and Redfish Bays. All remaining waters of Aransas County closed to gill nets.
5/1981	Commercial sale of red drum and spotted sea trout prohibited
9/1982	Illegal to keep red drum or spotted seatrout caught in any net except a dip net
9/1982	Illegal to retain red drum or spotted seatrout caught in trotline other than a sail line
9/1988	Gill nets, trammel nets and bag seines banned in Texas coastal waters
3/1991	Summer trotline ban is repealed

Figure 15. Voluntary no-prop zones in the Redfish Bay State Scientific Area.

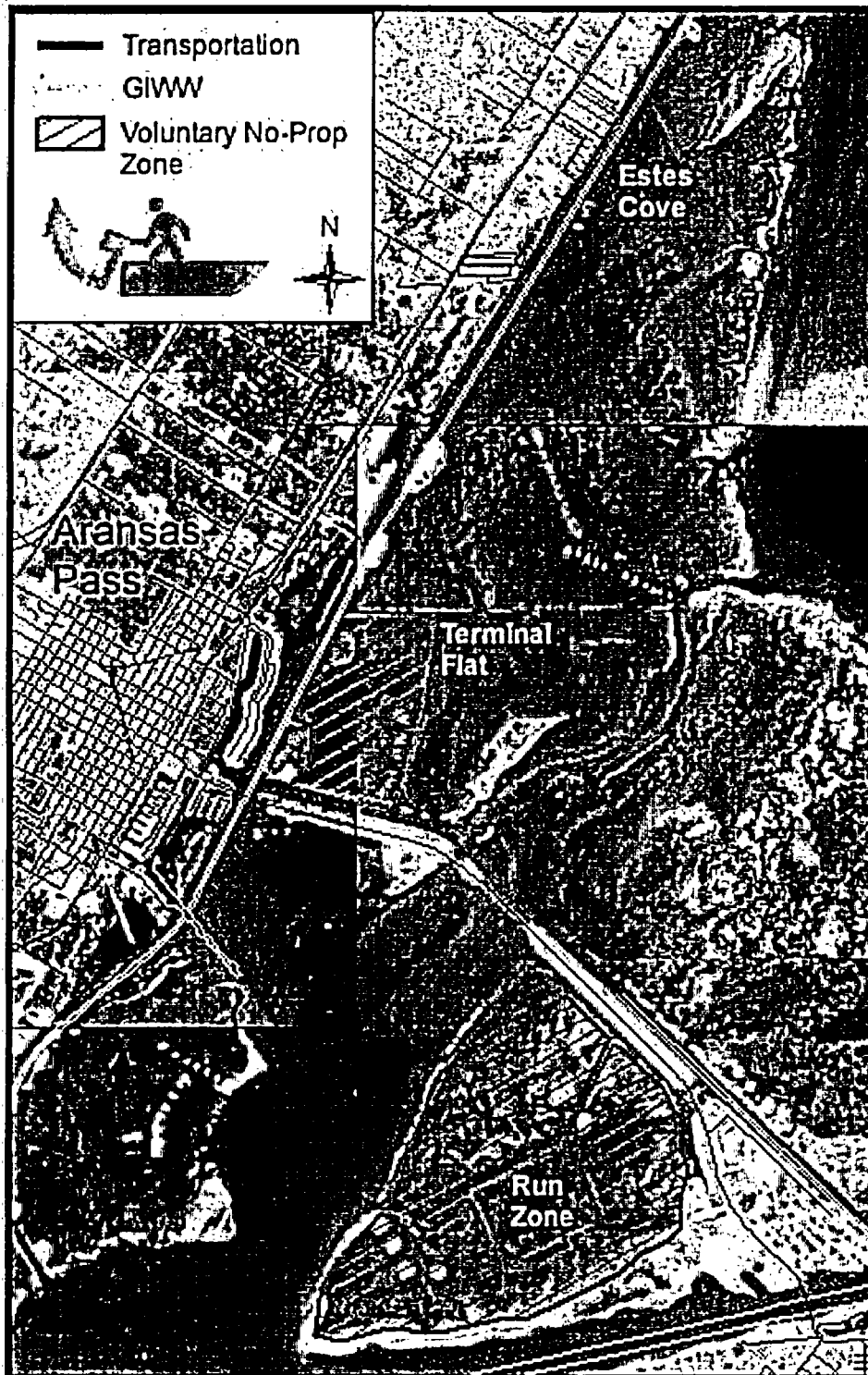




Table 9. Recreational bag and length limits for saltwater fish, crabs, and oyster from TPWD 2004-2005.

Species	Daily Bag	Length in Inches (Minimum-Maximum)
Amberjack, Greater	1	32 - No limit
Bass: striped, its hybrids and subspecies	5 (in any combination)	18 - No limit
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 - No limit
Catfish, flathead	5	18 - No limit
Catfish, gafftopsail	No limit	14 - No limit
Cobia	2	37 - No limit
Drum, black	5	14 - 30
Drum, red*	3	20 - 28*
Flounder: all species, their hybrids and subspecies	10 (in any combination)	14 - No limit
Grouper, goliath (formerly called Jewfish)	0	Catch and release only
Mackerel, king	2	27 - No limit
Mackerel, Spanish	15	14 - No limit
Marlin, blue	No limit	131 - No limit
Marlin, white	No limit	86 - No limit
Mullet: all species, their hybrids and subspecies**	No limit	No limit - 12** (during Oct., Nov., Dec. & Jan.)
Sailfish	No limit	84 - No limit
Seatrout, spotted***	10	15 - 25***
Shark: all species, their hybrids and subspecies	1	24 - No limit
Sheepshead	5	12 - No limit
Snapper, lane	No limit	8 - No limit
Snapper, red	4	15 - No limit
Snapper, vermilion	No limit	10 - No limit
Snook	1	24 - 28
Tarpon****	0	Catch and release only****
Blue Crab	none	5
Stone Crab (right claw only)	none	2.5 inch claw
Ghost shrimp	20	none
Oyster	2 bushels	3 -14

\* Red drum special regulation: One red drum over the stated maximum length limit may be retained when affixed with a properly completed Red Drum Tag and one red drum over the stated maximum length limit may be retained when affixed with a properly completed Bonus Red Drum Tag.

\*\* May not take from public waters, or possess on board a boat, mullet over 12 inches during October, November, December, and January. No limits apply during other months.

\*\*\* No more than one spotted seatrout over the stated maximum length may be retained per person per day and counts as part of the daily bag and possession limit.

\*\*\*\* Tarpon special regulation: One tarpon 80 inches or larger in length may be retained during a license year when affixed with a properly executed Tarpon Tag.

Table 10. Commercial finfish fishery bag, possession and length limits from TPWD 2004 - 2005.

Species	Bag Limit	Possession Limit	Length in Inches (Minimum- Maximum)
Amberjack, greater	1	2	32 - No limit
Drum, black*	No limit	No limit	14 - 30
Catfish: blue & channel	25*** (In any combination)	50 (In any combination)	14 - No limit
Catfish, gafftopsail	No limit	No limit	14 - No limit
Cobia	2	4	37 - No limit
Flounder <sup>o</sup>	60	60	14 - No limit
Mackerel, king	2	4	37 - No limit
Mackerel, Spanish	15	30	14 - No limit
Mullet: all species their hybrids & subspecies**	No limit	No limit	No limit - 12** (during Oct., Nov., Dec. & Jan.)
Snapper, lane	No limit	No limit	8 - No limit
Snapper, red	4	8	15 - No limit
Snapper, vermillion	No limit	No limit	10 - No limit
Shark: All species their hybrids & subspecies	1	2	24 - No limit
Sheepshead*	No limit	No limit	12 - No limit

<sup>o</sup>Special Regulation: The daily bag and possession limit for the holder of a valid commercial finfish fisherman's license is 60 flounder, except on board a licensed commercial shrimp boat the limit is 10 per person and is subject to the 50% bycatch rule.

\*Only the holder of a commercial finfish fisherman's license is exempt from recreational bag and possession limits while commercial fishing for black drum or sheepshead.

\*\*May not take from public waters or possess on board a boat mullet over 12 inches during October, November, December and January. No limits apply during other months.

### *Criminal Penalties and Civil Value Recovery*

Penalties are severe. Violation of fish and wildlife laws require civil restitution, and may also require:

- be fined (Class C - \$25-\$500; Class B - \$200-\$2000; Class A - \$500-\$4000; State Jail Felony, \$1500-\$10,000);
- be jailed (Class B and higher offenses);
- face automatic suspension or revocation of licenses for up to 5 years;
- forfeit hunting gear, including firearms, used to commit a violation.

In addition to the criminal penalty for hunting and fishing violations, the TPWD will seek the civil recovery value for the loss or damage to wildlife resources. The civil restitution cost is payable to TPWD and is in addition to the fine assessed by the court. Failure to pay the civil recovery value will result in the department's refusal to issue a license, tag, or permit. An individual who hunts or fishes after the refusal commits a class A misdemeanor which is punishable by a fine not less than \$500 or more than \$4,000; punishment in jail not to exceed one year; or both fine and confinement.

The general law states that anyone fishing in fresh water must possess a freshwater fishing stamp endorsement issued by the department. It is unlawful to take, attempt to take, or possess wildlife resources within a protected length limit, in greater numbers, by other means, or at any time or place, other than as indicated within this guide. A person who is hunting, fishing, or trapping must carry on their person and have available for inspection a valid license and any applicable stamp endorsements or permits unless the person is exempt from license, stamp, or permit requirements. A reasonable effort must be made to retrieve all wounded game birds and game animals and they must be killed immediately and become a part of the legal bag limit. It is a violation to fail to keep all edible portions of a game bird, game animal, or fish in an edible condition. For whitetail and mule deer, pronghorn antelope, and desert bighorn sheep, the violation is a Class A misdemeanor.

### *Equipment Regulations*

In fresh water, it is unlawful to fish with more than 100 hooks on all devices combined, to take game fish and nongame fish sections of rivers lying totally within boundaries of a state park with any other gear besides pole and line, to take fish with a hand operated device held underwater except that a spear or speargun may be used to take nongame fish.

A cast net may be used to take nongame fish and shrimp only, may not be greater than 14 feet in diameter, and in salt water, nongame fish may be taken for bait purposes only. A dip net may be used to take nongame fish only, may be used to aid in the landing of fish caught on other legal devices, and in salt water, nongame fish may be taken for bait purposes only. A gaff may only be used to aid in the landing of fish caught on other legal devices, means or methods. Fish landed with a gaff may not be below the minimum, above the maximum, or within a protected length limit. A gig may be used to take nongame fish only. A jugline may only be used in freshwater, and may only be used to take nongame fish, channel catfish, blue catfish and flathead catfish only. Lawful archery equipment (longbow, recurved bow, compound bow and crossbow) may be used to take nongame fish only. A minnow trap may be used to take nongame fish only. The trap may not exceed 24 inches in length or with a throat larger than one by three inches, and in salt water, gear tag valid for only 30 days must be visibly attached. A perch trap is for use in salt water only, may be used to take nongame fish only, may not exceed 18 cubic feet, must be marked with a floating visible orange buoy not less than 6 inches in height and 6 inches in width. The buoy must have a gear tag valid only for 30 days attached, and must be equipped with a degradable panel sewn or tied with untreated jute twine or untreated steel wire less than 20 ga in the sidewall of the trap. Buoys or floats may not be made of plastic bottle(s) of any color or size. It is unlawful to place any type of trap within the area in Cedar Bayou between a department sign erected where Mesquite Bay flows into Cedar Bayou and the department sign erected near the point where the pass empties into the Gulf of Mexico. It is unlawful to take or attempt to take fish with one or more hooks attached to a line or artificial lure used in a manner to foul-hook a fish (snagging or jerking). A fish is foul-hooked when caught by a hook in an area other than the fish's mouth.

A sail line is for use in salt water only. Nongame fish, red drum, spotted seatrout, and sharks may be taken with a sail line. No more than 1 sail line may be used per fisherman. The sail line must be attended at all times the line is fishing, and may not be used by the holder of a commercial fishing license. The sail line must have a valid Saltwater Trotline Tag for each 300 feet of mainline or fraction thereof being fished. A sail line may not exceed 1800 feet from reel to sail, sail and the most shoreward float must be bright orange or red color and all other floats must be yellow. No float may be more than 200 feet from the sail. A seine may be used to take nongame fish and shrimp only, may not be longer than

20 feet, may not have mesh exceeding 1/2-inch square, must be manually operated, and in salt water nongame fish may be taken by seine for bait purposes only. A shad trawl is for use in freshwater only and may be used to take nongame fish only, may not be longer than 6 feet or with a mouth larger than 36 inches in diameter, may be equipped with a funnel or throat and must be towed by boat or hand. A spear and speargun may be used to take nongame fish only. A throwline is for use in fresh water only. Components of a throwline may also include swivels, snaps, rubber and rigid support structures, may be used to take nongame fish, channel catfish, blue catfish and flathead catfish only. An individual bait-shrimp trawl is for use in salt water only and only nongame fish (except those species regulated by bag or size limits) taken incidental to legal shrimping operations may be retained. "Legal shrimping operations" means the use of a legal trawl in places, at times and in manners as authorized by the Texas Parks and Wildlife Department. A maximum of 200 nongame fish taken with an individual bait-shrimp trawl may be retained per person for bait purposes only. Only nongame fish, channel catfish, blue catfish, and flathead catfish may be taken by trotline. An umbrella net may be used to take crabs and nongame fish only, and may not have within the frame an area that exceeds 16 square feet.

#### *Water Uses and Freshwater Inflow*

There are several state agencies that regulate water use and freshwater inflow. The Texas Commission on Environmental Quality (TCEQ) sets the standards for surface water quality for bodies of water in the state (subject to approval by the U. S. Environmental Protection Agency) and implements those standards by monitoring and assessing surface water resources and by regulating sources of pollution. Restoration efforts to improve impaired water supplies attempt to bring sub-quality water up to the respective standards. In the water quantity area, TCEQ is responsible for processing and acting on applications for permits to use the state's surface water (known as "water rights"), including any applications to transfer surface water from one river basin to another (known as "interbasin transfers"). TCEQ is also responsible for developing models (known as "Water Availability Models" or "WAMs") to determine available amounts of surface water in the various river basins of the state.

The Texas Parks and Wildlife Department (TPWD) is designated as the state trustee for aquatic resources, but it has no direct regulatory authority to ensure water quality and quantity for fish, wildlife, and recreational sources. TPWD provides recommendations to TCEQ on scheduling of instream flows and freshwater inflows, as well as recommendations regarding permit conditions and mitigation requirements to protect fish and wildlife resources.

The Texas Water Development Board (TWDB) is responsible for water planning and administering water financing for the state. The mission of the Water Development Board is to provide leadership, technical services and financial assistance to support planning, conservation and development of water for Texas. The Reserve is in water planning district N, the Coastal Bend Region (TWDB 2002). There are no new reservoirs planned for this region through 2050, but several small desalination projects are planned.

The Texas State Soil and Water Conservation Board (TSSWCB) implements the Texas Soil Conservation Law, which was enacted to combat soil erosion. In the 1970s the agency was designated as the lead state agency for addressing non point source pollution from agricultural operations.

There are also regional entities although have little to no regulatory authority, play critical roles in make decisions about water sources. Groundwater Conservation Districts (GCD) provide groundwater management and conservation and are authorized by the Texas Legislature to provide for the conservation, preservation, protection, recharge, and prevention of waste of groundwater and groundwater reservoirs. They are the state's preferred method of managing groundwater resources. While no state agency has the right to regulate the production or use of groundwater, districts can provide some local controls. GCDs are required by law to develop and adopt a groundwater management plan. The goals of this plan are to provide for efficient use of groundwater, control and prevent waste and subsidence (the lowering of land elevation due to extracting too much water beneath it), and address issues such as conjunctive water use, natural resources, drought conditions, and conservation.

River Authorities are another regional entity that is designed to protect and monitor Texas' rivers for the state's inhabitants and ecosystems. There are more than 20 river authorities in Texas and, their primary function is to distribute and conserve the state's surface water. River authorities are monitored by TCEQ and are accountable to the Texas Legislature. Currently the Mission and Aransas Rivers do not have river authorities.

## *Transportation*

The U.S. Army Corps of Engineers (USACOE) is one of the regulatory agencies for waterway transportation. The primary objectives of the USACOE are:

- (1) Plan, design, and construct river and harbor, multiple purpose, and flood control works;
- (2) Operate and maintain flood control and navigation facilities and installations;
- (3) Administer laws for the protection and preservation of navigable waters and wetlands.

The NERR site is within the Galveston District of the Southwestern Division. The Galveston District, administers the federal regulatory program, governing work on structures in navigable waters of the U.S. and controlling discharge of dredged or fill material in coastal and inland waters and wetlands. The Galveston district puts every project through rigorous environmental scrutiny designed to protect and enhance the area's well-being.

The USACOE, under the authority of the Flood Control Act of 1970, has initiated various Section 216 Studies. These studies review and look at specific water resources projects that may have changed because of physical or economic reasons. TxDOT acts as the nonfederal sponsor for the studies involving the GIWW in Texas. For the Texas portion of the GIWW, the waterway was divided into five separate Section 216 study areas. The NERR site falls into the Port O'Connor to Corpus Christi Section 216 Study area, which is estimated to be completed in 2007.

The Texas Department of Transportation (TxDOT) is the state agency charged with providing the safe, effective and efficient movement of people and goods. The primary objectives TxDOT for the Gulf Intracoastal Waterway (GIWW) are:

- (1) Support the marine commerce and economy of this state by providing for the shallow draft navigation of the state's coastal waters in an environmentally sound manner;
- (2) Prevent waste of publicly and privately owned natural resources;
- (3) Prevent or minimize adverse impacts on the environment; and (4) maintain, preserve, and enhance wildlife and fisheries.

(Texas Transportation Code Title 4. Navigation Subtitle A. Waterways and Ports, Ch 51. Texas Coastal Waterway Act § 51.001. Acts 1995, 74th Leg., ch. 165, § 1, eff. Sept. 1, 1995)

The placement of dredged material is important to the Texas coast because of large abundances of seagrass beds. TxDOT advocates that dredged material is to be used beneficially when possible and that the Texas Coastal Management Program develop rules that a) reward sponsors of environmental beneficial usage of dredged material projects with mitigation credits and b) eliminate long-term maintenance requirements for sponsors of beneficial usage of dredged material projects. In 2002, 2,228,000 cubic yards were dredged and placed on spoil islands along Aransas Bay (GIWW 2002). Additional dredging and placement still needs to occur adjacent to the Aransas National Wildlife Refuge (ANWR). The ANWR team has currently completed their EIS and Dredged Material Management Plan (DMMP) and is now designing various beneficial use of dredged material projects to be built over the next several dredging cycles.

## *Emergency Response*

There are several emergency response procedures in the event of an accident from marine traffic on the GIWW. If the accident is primarily a navigation hazard, the Coast Guard and USACOE will notify the vessel owner. If the vessel owner fails to remove the hazard, then the USACOE will work with the Coast Guard to remove it.

In the event of an oil spill from a barge, the GLO handles the response and remediation through their Oil Spill Prevention and Response Program. Further details on this program are in section 3.4.1. In addition, the Coast Guard requires that certain vessels prepare approved Vessel Response Plans and/or Shipboard Oil Pollution Emergency Plans. Certain vessels carrying noxious liquid substances are required to prepare and submit Shipboard Marine Pollution Emergency Plans to the Coast Guard.

The Coast Guard is responsible for cleanup and organization of emergencies that occur during the water transport of hazardous chemicals. The Coast Guard has developed a Chemical Hazards Response Information System (CHRIS) manual to provide information needed for decision-making during emergencies that occur during the water transport of hazardous chemicals ([www.chrismanual.com](http://www.chrismanual.com)). CHRIS also provides much information that can be used by the Coast

Guard in its efforts to achieve better safety procedures and so prevent accidents.

In addition to the Coast Guard, the US National Response System is also involved in the event of an accident. In Texas, Regional Response Team (RRT) 6 is the federal component of the National Response System. The Region 6 RRT is composed of representatives from sixteen federal departments and agencies. The Region 6 RRT is responsible for preparedness activities including planning, training, and exercising to ensure an effective response to releases of hazardous substances and oil spills. The RRT also provides assistance as requested by the On-Scene Coordinator during an incident.

#### Surveillance and Enforcement within the Texas NERR

Currently, enforcement of natural resource regulations within the Mission-Aransas Estuary is conducted by TPWD through regulations regarding hunting and fishing. The USFWS provides surveillance of the ANWR. Local county sheriff patrols provide the another source of periodic policing.

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**Draft Memorandum of Understanding  
between the  
National Oceanic and Atmospheric Administration  
and  
The University of Texas at Austin  
Detailing the State-Federal Roles in the  
Texas National Estuarine Research Reserve**

This Memorandum of Understanding (MOU) serves to establish the contractual framework for coordination, cooperation, collaboration, and communication regarding the Texas National Estuarine Research Reserve (Reserve). Subject to the MOU's below-conditions, this MOU is a contractually binding contract that is entered into by the Office of Ocean and Coastal Resource Management (OCRM), National Ocean Service, National Oceanic and Atmospheric Administration (NOAA), whose address is 1305 East-West Highway N/ORM, Silver Spring, Maryland, 20910, and The University of Texas at Austin (UTA), a state institution of higher education and a component of The University of Texas System, whose address is 1 University Station (A9000), Austin, Texas 78712.

WHEREAS, the State of Texas (Texas) has determined that the waters and coastal habitats of the Mission-Aransas Estuary (MAE) provide representative opportunities to study natural estuarine and human processes occurring within an estuarine ecosystem; and

WHEREAS, Texas finds that within the MAE the resources of the MAE and its value to the citizens of Texas and the United States will benefit from the management of the MAE as part of the National Estuarine Research Reserve System (NERRS); and

WHEREAS, NOAA has concurred with the above finding of Texas, and NOAA may designate the MAE as a National Estuarine Research Reserve (NERR) in Texas, pursuant to NOAA's authority under Section 315 of the Coastal Zone Management Act of 1972, as amended, (CZMA, P.L. 92-583, 16 U.S.C. 1461) and in accordance with implementing regulations at 15 CFR 921.30; and

WHEREAS, UTA has been designated by Texas and in the Texas National Estuarine Research Reserve Management Plan (Plan) as a state educational institution that will serve as the Texas entity responsible for managing the Reserve, as defined in the Plan; and

WHEREAS, the Plan describes the goals, objectives, plans, administrative structure, and institutional arrangements for the Reserve, including this MOU and others; and

WHEREAS, UTA acknowledges the need and requirement for continuing State-Federal cooperation in the long-term management of the Reserve in a manner consistent with the purposes sought through its designation.

NOW THEREFORE, in consideration of the mutual covenants and agreements contained in this MOU, it is agreed by and between UTA and NOAA as follows:

## **ARTICLE 1: STATE-FEDERAL ROLES IN RESERVE MANAGEMENT**

This Article describes the roles and responsibilities of the UTA (on behalf of Texas) and NOAA (on behalf of the Federal Government) as the Reserve partners. The obligations described for each Reserve partner are subject to available funding.

### **A. State Role in Reserve Management**

UTA, as the principal contact for Texas in all matters concerning the Reserve, will be responsible for exerting its reasonable best efforts to ensure that the Reserve complies with management objectives of the Plan, the Texas Coastal Management Program, other applicable provisions of Texas law, Section 315 of the Federal Coastal Zone Management Act (CZMA), and the federal regulations of the NERRS. UTA will be the grant receiving office for the Reserve under Section 315 of the CZMA. Subject to available and authorized appropriations, UTA's responsibilities for Plan implementation include exerting its reasonable best efforts to perform the following activities:

1. Annually apply for, budget, and allocate funds received for Reserve operations, (e.g., education, research and monitoring programs), as well as for acquisition and facilities;
2. Conduct active research and monitoring programs that draw scientists from various institutions to work together on understanding coastal issues;
3. Conduct and maintain programs that provide materials, activities, workshops, and conferences that translate the research results to the resource users, regulators, and the public;
4. Provide staff and endeavor to secure state-funding for positions to coordinate research, education, and translate research results;
5. Secure facilities that will, among other things, include research laboratory, classroom, library, office, meeting, field equipment storage and interpretive display space;
6. Secure equipment to facilitate research and outreach activities that, among other things, will include boats, laboratory and field equipment, audiovisual, curriculum, reference materials and databases;
7. Maintain effective liaison with local, regional and state policy makers, regulators and the general public;
8. Serve as principal negotiator on issues involving proposed boundary changes and/or amendments to the Plan;
9. Respond to NOAA's requests for information and respond to evaluation findings made pursuant to Section 312 of the CZMA;

10. Expend funds in accordance with federal and state laws, the Reserve management plan, and annual appropriations; and
11. Exert reasonable best efforts to provide for enforcement of the applicable provisions of Texas law, including the rules and regulations of the Texas Coastal Management Program, to protect the Reserve.
12. NOAA understands that UTA's primary mission is education and the advancement of knowledge and research, and consequently UTA's activities under this MOU are designed to carry out that mission.
13. UTA shall have the right to use, publish, and disclose information relating to this MOU without prior reference to or approval of NOAA.

**B. Federal Role in Reserve Operation**

The Office of Ocean and Coastal Resource Management (OCRM) of NOAA will serve to administer the provisions of Section 315 of the CZMA to ensure that the Reserve operates in accordance with the goals of the NERRS and the Plan. These responsibilities are subject to the availability of appropriated funds. In carrying out its responsibilities,

OCRM will:

1. Review and process applications for financial assistance from UTA, consistent with 15 CFR Part 921 for acquisition, development, management, and operation of the Reserve;
2. This MOU does not create any obligation on the part of OCRM to award financial assistance.
3. Make periodic evaluations in accordance with Section 312 of the CZMA to measure UTA's performance in Plan implementation;
4. Advise UTA of existing and emerging national and regional issues; and
5. Establish an information exchange network cataloging all available research data and educational material developed on each NERR (including the Reserve) included within the NERRS.

**C. General Provisions**

1. Nothing in this MOU or subsequent financial assistance awards shall obligate any party in the expenditure of funds, or for future payments of money, in excess of appropriations authorized by law.
2. Both parties agree to comply with all applicable federal or state laws regulating ethical conduct of public officers and employees.

3. Each party will comply with all applicable laws, regulations, and executive orders relative to Equal Employment Opportunity.
4. Upon termination of this MOU or any subsequent financial assistance awards, any equipment purchased by a party for studies initiated in furtherance of this MOU will be retained by the party that made the initial purchase.
5. A free exchange of research and assessment data among the parties is encouraged and is necessary to insure the success of these cooperative studies.

#### **D. Other Provisions**

1. Nothing in this MOU diminishes the independent authority or coordination responsibility of either party in administering its respective statutory obligations. Nothing in this MOU is intended to conflict with current written directives or policies of either party. If the terms of this MOU are inconsistent with existing written directives or policies of either party entering into this MOU, then those portions of the MOU which are determined to be inconsistent with such written directives and policies shall be invalid; but the remaining terms not affected by the inconsistency shall remain in full force and effect. At the first opportunity for revision of this MOU, all necessary changes will be made by either an amendment to this MOU or by entering into a new superseding MOU, which ever is deemed expedient to the interest of all parties.
2. should disagreement arise on the interpretation of the provisions of this MOU, or amendments and/or revisions to the MOU, that cannot be resolved by negotiations at the operating level of each party, the area(s) of disagreement shall be stated in writing by each party and promptly presented to a mutually approved mediator for non-binding mediation. If the parties cannot agree on the choice of a mediator or if the mediation does not resolve the dispute to the mutual approval of the parties, the parties are free to pursue any other legal remedies that are available.

#### **ARTICLE II: REAL PROPERTY ACQUIRED FOR THE PURPOSE OF THE RESERVE**

As well as agreeing to adhere to the rest of the provisions set forth at 15 CFR Part 921, the UTA agrees to the conditions set forth at 15 CFR 921.21(e), which specify the legal documentation requirements concerning the use and disposition of real property acquired for Reserve purposes with Federal funds under Section 315 of the CZMA.

#### **ARTICLE III. PROGRAM EVALUATION**

OCRM of NOAA will schedule periodic evaluations of UTA's performance in meeting the terms of financial assistance awards, in implementing the Plan, and in meeting the provisions of this MOU. Where findings of deficiency occur, NOAA may initiate action in accordance with the designation withdrawal procedures established by the CZMA and applicable regulations.

#### **ARTICLE IV. EFFECTIVE DATE, REVIEW & AMENDMENT, TERMINATION, AND OTHER MISCELLANEOUS PROVISIONS**

- A. This MOU is effective (Effective Date) on the date of designation of the Reserve by NOAA, pursuant to NOAA's authority under Section 315 of the Coastal Zone Management Act of 1972, as amended, (CZMA, P.L. 92-583, 16 U.S.C. 1461) and in accordance with implementing regulations at 15 CFR 921.30. The term of this MOU shall run on an on-going basis from the Effective Date unless terminated as stated in this MOU.
- B. The MOU will be reviewed periodically by the parties. This MOU may only be amended by the mutual written consent and approval of the parties.
- C. This MOU may be terminated by mutual written consent of the parties, or by NOAA if NOAA withdraws designation of the Reserve as a NERR, pursuant to applicable provisions of the CZMA and its implementing regulations as described under 15 CFR Part 923 Subpart L. This MOU can be terminated by UTA with or without cause. Should this MOU be terminated, UTA shall be paid for its expenses up to the date of termination including non cancelable commitments (including but not limited to graduate student appointments and other appointees for the term of the appointment) and UTA shall return any unexpended or uncommitted funds as of the time of termination.
- D. This MOU is subject to availability of appropriated funds.
- E. This MOU is the entire agreement between the parties regarding the subject matter contained in this MOU.
- F. The parties are independent entities and are not legal partners or joint venture parties. Neither party's employees are to be considered employees of the other party.
- G. UTA SHALL NOT BE LIABLE TO NOAA FOR ANY INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR RELATED TO THIS MOU.
- H. UTA IS NOT MAKING ANY EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, FREEDOM OF INFRINGEMENT, OR ANY OTHER WARRANTIES OF ANY KIND OR NATURE.
- I. This MOU shall be binding on the successors and/or assigns of the parties.
- J. This MOU shall be construed and enforced in accordance with the laws of the State of Texas, exclusive of its choice of law provisions, as well as any applicable United States federal laws and regulations.
- K. If any clause, sentence or other portion of this MOU shall become illegal, null or void for any reason, the remaining portions of this MOU shall remain in full force and effect.

- L. No waiver of right by either party of any provision of this MOU shall be binding unless expressly confirmed in writing by the party giving the waiver.
- M. Neither party shall be liable to the other party for delays in performing the MOU due to factors beyond the reasonable control of such party.
- N. Those provisions of this MOU which by their nature extend beyond termination or expiration of this MOU shall survive such termination or expiration.

IN WITNESS THEREOF, the parties have caused this MOU to be executed.

UNDERSTOOD AND AGREED

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Douglas L. Brown  
Deputy Director

Office of Ocean and  
Coastal Resource Management  
National Ocean Service  
National Oceanic and  
Atmospheric Administration  
U.S. Department of Commerce

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Bobby C. McQuiston  
Director

The University of Texas at Austin  
Office of Sponsored Projects

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Date

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Date

## MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (MOU) serves to establish the contractual framework for coordination, cooperation, collaboration, and communication regarding the Mission-Aransas National Estuarine Research Reserve (Reserve) among the following seven parties (parties-in-interest): The University of Texas at Austin (The University), a state institution of higher education and a component of The University of Texas System serving as the state lead entity ; Texas General Land Office, Texas Parks and Wildlife Department, Texas Department of Transportation, U.S. Fish and Wildlife Service, The Nature Conservancy, Coastal Bend Land Trust, Coastal Bend Bays and Estuary Program, and Fennessey Ranch. Subject to the MOU's below-conditions, this MOU is a binding contract that is entered into by the parties-in-interest.

WHEREAS, the State of Texas (Texas) has received a grant (Grant) from the United States Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA) for the development and operation of certain portions of the Mission-Aransas Estuary (MAE), described below in Attachment A, as the Mission-Aransas National Estuarine Research Reserve (Reserve), and

WHEREAS, the purpose of the DOC grant is to create new opportunities for coordinated MAE coastal resource management, research, monitoring, stewardship, and public education (Program), and

WHEREAS, such Program has wide public support, as evidenced by the implementation of the Coastal Bend Bay Plan, the Mission-Aransas Watershed Wetland Conservation Plan, the Seagrass Conservation Plan, and

WHEREAS, the parties-in-interest have evidenced support for such a Program through their approval of the 2004 Site Nomination Proposal for the Reserve,

NOW THEREFORE, in consideration of the mutual covenants and agreements contained in this MOU as well as the mutual benefits to be derived from implementing this Program, the parties-in-interest agree to the following:

1. The lands described in Attachment A (attached to this MOU and incorporated into this MOU by this reference) are designated as sites participating in the Reserve.
2. There is a program management plan (Plan) for the Reserve that provides a framework for conducting a specified Program on Reserve sites (Attachment B). Revisions of the Plan shall be developed by the Reserve staff and reviewed by an advisory board (Board) composed of the parties-in-interest. The Plan shall be reviewed every five (5) years and revised in consultation with the Board and NOAA.

3. A primary purpose of the Program is to provide funding, staff, and other resources and guidance that will assist Reserve land managing entities to develop site-specific activities that are consistent with the Plan. This Program will focus on identifying and conserving sensitive ecological resources, promoting on-site research and long term monitoring, engaging local communities in stewardship activities that support the conservation of sensitive reserve resources, and acting as a regional educational resource that serves the public of the MAE region.

4. Parties-in-interest agree to exert their reasonable best efforts to support the implementation of the Plan. Nothing in this MOU diminishes the independent authority or coordination responsibility of any party-in-interest in administering its respective statutory and legal obligations. Nothing in this MOU is intended to conflict with current written directives or policies of any party-in-interest. If the terms of this MOU are inconsistent with existing written directives or policies of any party-in-interest entering into this MOU, then those portions of the MOU that are determined to be inconsistent with such written directives and policies shall be invalid; but the remaining terms not affected by the inconsistency shall remain in full force and effect. At the first opportunity for revision of this MOU, all necessary changes will be made by either an amendment to this MOU or by entering into a new superseding MOU, whichever is deemed expedient to the interest of all parties. Issues that arise that may be contrary to the terms or intent of the Plan will be brought to the Board for discussion and resolution by consensus or majority vote of its members. Should disagreement arise on decisions of the Board or in the interpretation of the provisions of this MOU, or amendments and/or revisions to the MOU, that cannot be resolved by negotiations at the operating level of each party-in-interest, the area(s) of disagreement shall be stated in writing by each party-in-interest and promptly presented to a unanimously approved mediator for non-binding mediation. If the parties-in-interest cannot agree on the choice of a mediator or if the mediation does not resolve the dispute to the unanimous approval of the parties-in-interest, the parties-in-interest are free to pursue any other legal remedies that are available or to terminate their participation in this MOU.

5. Multiple uses of Reserve lands are encouraged to the extent that such uses are compatible with the Program and its purpose as expressed in the Plan. Oil and gas activities are an existing and traditional use that will continue to occur and be regulated by State law. The parties-in-interest having jurisdiction over the Reserve site (or sites) will exert their reasonable best efforts to ensure uses or levels of use are consistent with the goals of the Plan.

#### 6. Management Structure

a. Board membership. The Board shall be comprised of members from the parties-in-interest. The General Land Office shall have one representative



from each of three divisions that have direct interest in the Reserve: Coastal Resources, Energy Resources, and Professional Services. The University, Texas Parks and Wildlife Department, Texas Department of Transportation, U.S. Fish and Wildlife Service, The Nature Conservancy, Coastal Bend Land Trust, Coastal Bend Bay and Estuary Program, and Fennessey Ranch shall each have one representative on the Board. To provides an appropriate linkage to the broader community so the Reserve reflects the concerns and ideas of this regional constituency, a local governmental representative mutually agreed upon by Aransas County and the city of Rockport shall be a member of the Board. The Board shall act on behalf of the agencies/entities having jurisdiction over sites comprising the Reserve. Members of the Board will serve without compensation from the Reserve.

b. Board role. The purpose of the Board is to advise The University regarding implementation of the Plan. The Board shall review the Plan every five (5) years and shall advise The University regarding modification of the Plan.

c. Board meetings. Board members will be provided notice ten (10) working days in advance of a meeting. Fifty percent (50%) plus one (1) members of the parties in interest present in person or by proxy shall constitute a quorum for transaction of business at all meetings of the Board. Each member of the Board will have one vote in decisions put before the Board. Decisions regarding advice to The University shall be made by an eighty percent (80%) majority vote of the Board members present at a meeting.

d. Program implementation. The University shall implement the Program by hiring and directing Reserve staff, supervising and coordinating implementation of the provisions of the Plan, and by receiving and acting upon the recommendations of the Board and participating site managers. The Reserve staff will be directly responsible for Program coordination with agency/entity representatives having jurisdiction over Reserve sites. The University's obligation to implement the Plan is contingent upon continued receipt of Grants for the purpose of operating the Program.

e. Advisory committees. The Board may create committees or subcommittees to provide technical information or linkage to the broader community pertaining to the three main missions of the Reserve Program: research, education, and stewardship. Members of committees or subcommittees will serve without compensation from the Reserve.

f. New members may be added to the Board by a majority vote.

7. No projects shall be carried out on Reserve lands without the approval of the agency/entity having jurisdiction over such lands. The requesting agency/entity shall maintain all facilities built on in furtherance of a project, and shall cooperate with Reserve staff in carrying out the approved Program.

8. The Reserve staff, Board, and appropriate advisory participants shall confer regularly to ensure coordination between the Reserve Program and the broader goals and mandates of regional coastal management programs that affect the MAE.

9. This MOU shall not be construed to preclude additional transfers of property among the parties-in-interest, or to preclude additions or subtractions of appropriate lands to Reserve sites.

10. This MOU shall continue on an on-going basis so long as the Reserve Program is funded and remains viable. Additional participants may be added to this MOU as parties-in-interest and join the Board by unanimous approval of the Board. This MOU may be amended or terminated by the parties-in-interest at any time. Nothing in this MOU shall preclude the partial or unilateral withdrawal of any of the parties-in-interest. In such an eventuality, it is understood that the lands of the withdrawing party-in-interest would be de-designated from the Reserve, and it is further understood that the federal Office of Management and Budget (OMB) or other applicable governmental agencies could take appropriate action with respect to termination of current or pending grants as may be indicated by OMB or other applicable regulations.

11. All parties-in-interest agree to exert their reasonable best efforts to cooperate with the Reserve Program so that it can achieve its mission to serve as a regionally-scaled scientific and educational resource to help promote and recover the ecological health of the MAE and to create a more sustainable regional environment for future generations.

12. The parties-in-interest understand that The University's primary mission is education and the advancement of knowledge and research, and consequently The University's activities under this MOU are designed to carry out that mission.

13. The manner of performance of The University's activities under this MOU shall be determined by The University. The University does not guarantee specific results. The University is free to continue similar research and educational activities on other projects. The University may discuss its activities under this MOU with other entities and individuals.

14. The University shall have the right to use, publish, and disclose data, information, or writings generated by University activities under the Program.

15. Nothing in this MOU or subsequent financial assistance awards shall obligate any party-in-interest in the expenditure of funds, or for future payments of money, in excess of appropriations authorized by law.

16. The parties-in-interest agree to comply with all applicable federal, state, and local laws regulating ethical conduct of public officers and employees.
17. Each party-in-interest will comply with all applicable laws, regulations, and executive orders relative to Equal Employment Opportunity.
18. Upon termination of this MOU, any equipment purchased by a party-in-interest for activities initiated in furtherance of this MOU will be retained by the respective party-in-interest that made the initial purchase.
19. A free exchange of research and assessment data among the parties-in-interest is encouraged and is necessary to insure the success of these cooperative activities.
20. This MOU may only be amended by the mutual written consent and approval of the parties-in-interest.
21. This MOU is subject to availability of appropriated funds.
22. This MOU is the entire agreement between the parties-in-interest regarding the subject matter contained in this MOU.
23. The parties-in-interest are independent entities and are not legal partners or joint venture parties. The employees of one party-in-interest are not employees of any other party-in-interest.
24. The parties-in-interest shall not be liable for any incidental, indirect, special or consequential damages arising out of or related to this MOU.
25. The parties-in-interest are not making any express or implied warranties of merchantability, fitness for a particular purpose, freedom of infringement, or any other warranties of any kind or nature.
26. This MOU shall be binding on the successors and/or assigns of the parties-in-interest.
27. This MOU shall be construed and enforced in accordance with the laws of the State of Texas, exclusive of its choice of law provisions, as well as any applicable United States federal laws and regulations.
28. If any clause, sentence or other portion of this MOU shall become illegal, null or void for any reason, the remaining portions of this MOU shall remain in full force and effect.
29. No waiver of right by any party-in-interest of any provision of this MOU shall be binding unless expressly confirmed in writing by the party-in-interest giving the waiver.

30. No party-in-interest shall be liable for delays in performing the MOU due to factors beyond the reasonable control of such party-in-interest.

31. Those provisions of this MOU which by their nature extend beyond termination or expiration of this MOU shall survive such termination or expiration.

**UNDERSTOOD AND AGREED****The University of Texas at Austin**

By: \_\_\_\_\_

Name: Dr. Larry R. FaulknerTitle: President

Date: \_\_\_\_\_

**Texas General Land Office**

By: \_\_\_\_\_

Name: Jerry PattersonTitle: Commissioner

Date: \_\_\_\_\_

**Texas Parks and Wildlife Department**

By: \_\_\_\_\_

Name: Robert L. CookTitle: Executive Director

Date: \_\_\_\_\_

**Texas Department of  
Transportation**

By: \_\_\_\_\_

Name: Michael BehrensTitle: Excecutive Director

Date: \_\_\_\_\_

**U.S. Fish and Wildlife Service**

By: \_\_\_\_\_

Name: Charles HolbrookTitle: Superintendent

Date: \_\_\_\_\_

**Coastal Bend Bay and Estuary  
Program**

By: \_\_\_\_\_

Name: Ray AllenTitle: Director

Date: \_\_\_\_\_

**The Nature Conservancy**

By: \_\_\_\_\_

Name: Carter SmithTitle: Texas State Director

Date: \_\_\_\_\_

**Coastal Bend Land Trust**

By: \_\_\_\_\_

Name: Patrick McGloinTitle: Director

Date: \_\_\_\_\_

**Fennessey Ranch**

By: \_\_\_\_\_

Name: Brien O'Connor Dunn

Title: Owner

Date: \_\_\_\_\_

**Aransas County**

By: \_\_\_\_\_

Name: Glen Guillory

Title: County Judge

Date: \_\_\_\_\_

## ATTACHMENT A

## Properties included in the Reserve:

- State Submerged lands in part of the Mission-Aransas Estuary - Texas General Land Office.
- Goose Island State Park and Seagrass Scientific Area (Lessee) -Texas Parks and Wildlife Department.
- Aransas National Wildlife Refuge and part of the Matagorda National Wildlife Refuge - U.S. Fish and Wildlife Service.
- Johnson Ranch - The Nature Conservancy.
- Buccaneer Cove - Coastal Bend Land Trust.
- Fennessey Ranch - Brien O'Connor Dunn.

## ATTACHMENT B

### The Mission-Aransas National Estuarine Research Reserve Management Plan



# The State of Texas



Austin, Texas

**DRAFT**

**Coastal Lease No. CL 20050002**

**DRAFT**

STATE OF TEXAS

§

KNOW ALL BY THESE PRESENTS:

§

COUNTIES OF ARANSAS,  
REFUGIO & SAN PATRICIO

§

This Coastal Lease No. CL 20050002 (the "Lease") is issued by virtue of the authority granted in Chapter 33, § 33.105(4) TEX. NAT. RES. CODE ANN. and Title 31, TEX. ADMIN. CODE, Chapter 155 and all amendments thereto, and all other applicable statutes and rules, as the same may be promulgated and/or amended from time to time.

## ARTICLE I. PARTIES

1.01 In consideration of the mutual covenants and agreements set forth herein, the STATE OF TEXAS, acting by and through the School Land Board and its Chairman, the Commissioner of the General Land Office (the "State"), hereby authorizes the Board of Regents of the University of Texas System, for the use and benefit of The University of Texas at Austin Marine Science Institute, whose address is 750 Channel View Drive, Port Aransas, Texas 78373, (the "Lessee"), to use the "Premises" (defined below) for the purposes identified in Article IV below.

## ARTICLE II. PREMISES

2.01. The Premises consists of portions of various bays and estuaries located in Aransas, Refugio, and San Patricio Counties, and is further described or depicted on the map of the Premises as shown on Exhibit A, and the Program Management Plan as contained in Exhibit B, both attached hereto and incorporated by reference for all purposes.

2.02. The General Land Office (GLO), representing the School Land Board (SLB) and the Permanent School Fund (PSF) has granted, and will continue to grant, various Coastal Easements, Structure Registrations, Letters of Authorization, Commercial Leases, Coastal Leases, Cabin Permits, Surface Leases, Miscellaneous Easements, and Oil and Gas exploration, production and transportation leases within the limits of the Mission-Aransas National Estuarine Research Reserve. The premises of these authorized uses of Coastal Public Land are excluded from the Premises of this Lease. Lessee's use of these authorized sites outside the Premises is prohibited without the prior written consent of the authorized user.

2.03. LESSEE ACCEPTS THE PHYSICAL AND TOPOGRAPHIC CONDITION OF THE PREMISES IN ITS EXISTING PHYSICAL AND TOPOGRAPHIC CONDITION. LESSEE IS NOT RELYING ON ANY REPRESENTATION OR WARRANTY OF THE STATE REGARDING ANY ASPECT OF THE

PREMISES, BUT IS RELYING ON LESSEE'S OWN INSPECTION OF THE PREMISES. THE STATE DISCLAIMS ANY AND ALL WARRANTIES OF HABITABILITY, MERCHANTABILITY, SUITABILITY, FITNESS FOR ANY PURPOSE, AND ANY OTHER WARRANTY WHATSOEVER NOT EXPRESSLY SET FORTH IN THIS LEASE. THE STATE AND LESSEE HEREBY AGREE AND ACKNOWLEDGE THAT THE USE OF THE TERMS "GRANT" AND/OR "CONVEY" IN NO WAY IMPLIES THAT THIS LEASE OR THE PREMISES ARE FREE OF LIENS, ENCUMBRANCES AND/OR PRIOR RIGHTS. LESSEE IS HEREBY PUT ON NOTICE THAT ANY PRIOR GRANT AND/OR ENCUMBRANCES MAY BE OF RECORD AND LESSEE IS ADVISED TO EXAMINE ALL RECORDS OF THE STATE AND COUNTY IN WHICH THE PREMISES IS LOCATED. THE PROVISIONS OF THIS SECTION SHALL SURVIVE THE TERMINATION OF THIS LEASE.

### ARTICLE III. TERM

3.01 Beginning January 1, 2006, the use allowed by this Lease may continue for a period of five (5) years, or until such time as the State or Lessee terminates this Lease upon 30-day written notice to the other party, to its address set forth in Article I. Provided that the School Land Board, in its sole discretion, has approved any changes to the Program Management Plan, and further provided that the Lease has not been previously terminated as provided for herein, this Lease shall be automatically renewed at the end of each five-year term for an additional five years.

### ARTICLE IV. USE OF THE PREMISES

4.02. The Premises may be used solely for research and education conducted as activities and programs of the Mission-Aransas National Estuarine Research Reserve ("Reserve") and for no other purpose. The Premises are to remain in their current topographical and hydrologic condition. Lessee is specifically prohibited from modifying the Premises in any manner not authorized herein, and from using, or allowing the use by others of the Premises for any other purpose.

4.02. The State reserves the exclusive right to grant easements, rights-of way and/or other grants of interest authorizing use of the Premises.

4.03. Continued use of the Premises is subject to the following conditions (the "Conditions"):

1. Use of the Premises is subject to and shall conform to the requirements of the Memorandum of Understanding between the General Land Office and Lessee regarding management and operation of the Reserve, attached hereto and incorporated by reference.
2. Research and education activities shall be consistent with the Program Management Plan of the Reserve.
3. Use of the Premises as described in the Program Management Plan of the Reserve may not be changed without the concurrence of the School Land Board.
4. Structures or facilities may be built on state-owned submerged lands in furtherance of the research and education activities and programs of the Reserve only with the written consent of the General Land Office.
5. Structures or facilities built by Lessee on state-owned submerged lands shall be maintained by Lessee unless otherwise provided by written agreement between the General Land Office and Lessee.
6. Use of the Premises is exclusive to Lessee only with respect to structures or facilities built or installed by Lessee.
7. Use of the Premises is subject to and shall conform to the requirements of the Texas Coastal Management Plan.

### ARTICLE V. ASSIGNMENTS

5.01. This Lease and the uses allowed hereunder are not assignable by the Lessee.

#### ARTICLE VI. PROTECTION OF NATURAL and HISTORICAL RESOURCES

6.01. Lessee shall comply with all applicable rules and regulations of the General Land Office and other governmental agencies responsible for the protection and preservation of public lands and waters, including those relating to pollution. In the event of pollution or an incident that may result in pollution of the Premises or adjacent property which is the result of Lessee's (or Lessee's employees, contractors, invitees and agents) acts or omissions, Lessee shall immediately notify the State, use all means reasonably available to recapture any pollutants which have escaped or may escape, and mitigate for any and all natural resources damages caused thereby.

6.02. LESSEE IS EXPRESSLY PLACED ON NOTICE OF THE NATIONAL HISTORICAL PRESERVATION ACT OF 1966, (PB-89-66, 80 STATUTE 915; §470) AND THE ANTIQUITIES CODE OF TEXAS, CHAPTER 191, TEX. NAT. RES. CODE ANN. (VERNON 2000 SUPP.). IN THE EVENT THAT ANY SITE, OBJECT, LOCATION, ARTIFACT OR OTHER FEATURE OF ARCHEOLOGICAL, SCIENTIFIC, EDUCATIONAL, CULTURAL OR HISTORIC INTEREST IS ENCOUNTERED DURING ANY ACTIVITY ON THE PREMISES, LESSEE WILL IMMEDIATELY CEASE SUCH ACTIVITIES AND WILL IMMEDIATELY NOTIFY STATE AND THE TEXAS HISTORICAL COMMISSION, P.O. BOX 12276, AUSTIN, TEXAS 78711, SO THAT ADEQUATE MEASURES MAY BE UNDERTAKEN TO PROTECT OR RECOVER SUCH DISCOVERIES OR FINDINGS, AS APPROPRIATE.

#### ARTICLE VII. INDEMNITY

7.01. TO THE EXTENT AUTHORIZED BY LAW, LESSEE SHALL BE FULLY LIABLE AND RESPONSIBLE FOR ANY DAMAGE, OF ANY NATURE, ARISING OR RESULTING FROM ITS OWN ACTS OR OMISSIONS RELATED TO ITS EXERCISE OF THE RIGHTS GRANTED HEREIN, AND LESSEE AGREES TO AND SHALL INDEMNIFY AND HOLD THE STATE, THE STATE'S OFFICERS, AGENTS, AND EMPLOYEES, HARMLESS FROM AND AGAINST CLAIMS, SUIT, COSTS, LIABILITY OR DAMAGES OF ANY KIND, INCLUDING STRICT LIABILITY CLAIMS, WITHOUT LIMIT AND WITHOUT REGARD TO CAUSE OF THE DAMAGES OR THE NEGLIGENCE OF ANY PARTY, EXCEPT FOR THE CONSEQUENCES OF THE NEGLIGENT ACTS OR WILLFUL MISCONDUCT OF THE STATE, THE STATE'S OFFICERS, AGENTS, EMPLOYEES, OR INVITEES, ARISING DIRECTLY OR INDIRECTLY FROM LESSEE'S USE OF THE PREMISES (OR ANY ADJACENT OR CONTIGUOUS PSF LAND) OR FROM ANY BREACH BY LESSEE OF THE TERMS CONTAINED HEREIN. THE PROVISIONS OF THIS SECTION SHALL SURVIVE EXPIRATION OR EARLIER TERMINATION OF THIS LEASE.

#### ARTICLE VIII. PROPERTY REMOVAL AND TAXES

8.01. Upon termination of this Lease, Lessee shall remove its personal property from the Premises within 30 days thereafter. THE TERMS OF THIS SECTION SHALL SURVIVE EXPIRATION OR EARLIER TERMINATION OF THIS LEASE.

8.02. TO THE EXTENT AUTHORIZED BY LAW, LESSEE AGREES TO AND SHALL PROTECT AND HOLD THE STATE HARMLESS FROM LIABILITY FOR ANY AND ALL TAXES, CHARGES, AND ASSESSMENTS, TOGETHER WITH ANY PENALTIES AND INTEREST THEREON, AND FROM ANY SALE OR OTHER PROCEEDING TO ENFORCE PAYMENT THEREOF.

#### ARTICLE IX. MISCELLANEOUS PROVISIONS

9.01. In the event any provision of this Lease is more restrictive than any administrative rule promulgated by the General Land Office and/or the School Land Board, this Lease shall control.

IN TESTIMONY WHEREOF witness our hand and Seal of Office.

**LESSOR:**  
**THE STATE OF TEXAS**

**LESSEE:**  
**Board of Regents of the University of Texas**  
**System, for the use and benefit of The University**  
**of Texas at Austin Marine Science Institute**

By: \_\_\_\_\_  
Jerry E. Patterson, Commissioner,  
Texas General Land Office and  
Chairman of the School Land Board

By: \_\_\_\_\_  
\_\_\_\_\_  
(Printed Name)

Date: \_\_\_\_\_

Date: \_\_\_\_\_

**APPROVED**

Content \_\_\_\_\_  
Legal \_\_\_\_\_  
Deputy \_\_\_\_\_  
Exec. \_\_\_\_\_

## **Key Reserve Partners**

### **Texas General Land Office (GLO)**

The GLO is the primary landholder for water habitats within the Reserve. In Texas, bay and estuary bottoms covered by water to mean high tide line are state owned submerged land, of which the GLO is the trustee. The GLO is also the landholder for a 58 acre state parcel of land adjacent to Mission Bay. Land holdings (129,567 ac) of the GLO total 65% of the Reserve.

The GLO organizational structure is divided into the following program areas: executive, administration, asset management, professional services, budget division, coastal resources, energy resources, funds management, governmental relations, human resources, information system, legal services, office of communications, oil spill prevention and response, veterans land board. The Reserve initiative has works closely with the executive office, asset management, coastal resources, and energy resources. Further detailed information on the GLO can be found on their website (<http://www.glo.state.tx.us>).

The executive office is run by an elected land commissioner and an appointed deputy land commissioner. The land commissioner also chairs the School Land Board (SLB). The SLB is the trustee of the state's Permanent School Fund (PSF). The proceeds of energy and mineral leasing activities on GLO land are deposited into the PSF and are used to help finance public primary and secondary education in Texas. Authorization from the land commissioner or the SLB is required for any project on GLO land, and this is why the Reserve coastal lease is designed as a perpetual lease with a 20-year renewable term dependent on the SLB approval.

Leasing of non-mineral activities is handled by Professional Services. The Reserve's coastal lease for scientific purposes will be managed by Professional Services through the Asset Inspection Program. The Asset Inspection Program manages the state's surface interests on an estimated four million acres of state-owned coastal public land along the Texas Gulf Coast. Energy Resources handles all energy and mineral development. Revenue generated from development is deposited in the PSF. The other GLO program area that the Reserve works closely with is Coastal Resources.

Coastal Resources is charged with the protection and preservation of the natural resources of this state. Coastal Resources has three main divisions: coastal coordination division, coastal stewardship division, and the financial and technical services division. The Coastal Coordination Division manages and administers the Texas Coastal Management Program (CMP) for the Coastal Coordination Council. The Coastal Stewardship Division manages the state's erosion program authorized by the Coastal Erosion Planning and Response Act (CEPRA) to fund projects such as beach nourishment, dune restoration, shoreline protection, and marsh restoration. The Financial and Technical Services Division represents the customer service component of the Coastal Resources program, providing assistance and support to both internal and external customers.

### **United State Fish and Wildlife Service (USFWS)**

The USFWS is the primary landholder for terrestrial habitats within the Reserve. Approximately 33% of the reserve acreage (66,216 ac) is located in the Aransas National Wildlife Refuge.

The Aransas National Wildlife Refuge was established on December 31, 1937. Since its establishment there have been four additional units added on the primary Aransas Unit on Blackjack Peninsula. The Tatton Unit was added by donation in 1967 and is a contiguous 7,568 acre stretch of coastal grassland between highway 35 and the western shore of St. Charles Bay. In 1991, the Lamar Unit was added as a disjunct 734 acre area of live oak motte and salt marsh on the western shore of St. Charles Bay (McAlister and McAlister 1985). The 245 wetland parcel of the Johnson Ranch that was recently donated to the ANWR will supplement the Lamar Unit. An additional Myrtle Foester Whitmire Unit 22 miles north of the primary Aransas Unit is also included in the refuge system, but it is not within the NERR boundary.

The Matagorda Island Unit of 26,000 acres was added to the refuge in 1982, and in 1988 the Nature Conservancy donated an additional 56,500 acres to include the entire island in the refuge system. The northern two thirds of Matagorda Island (44,000 acres) is under management by the TPWD for public access. Within the TPWD management area is Matagorda Island State Park (7,300 acres), which is open year-round to visitors (McAlister and McAlister 1985).

The rest of the TPWD management section is open for limited recreational use. Matagorda Island State Park is not within the Reserve boundaries. The portion of Matagorda Island within the Reserve boundaries is the southern end, which includes the old Wynne Ranch. USFWS is in the process of rehabilitating some buildings of the Wynne Ranch and converting them into environmental education facilities. Further information on these facilities can be found in section 7.2.

Current management activities on the Blackjack, Lamar and Tatton Unit of the refuge include: brush control, rotational grazing, restoration and enhancement of grasslands (roller chopping), water flow manipulation, controlled burns, treatment and removal of invasive species (hunts, mechanical, and spraying), restoration of wetlands (inundation and disking), and controlled hunts of deer. Current management activities on the Matagorda Unit of the refuge include: water flow manipulation, controlled burns, and the treatment and removal of invasive species (hunts, mechanical, and spraying).

#### Texas Parks and Wildlife Department (TPWD)

The TPWD is a landholder of the Goose Island State Park (271 ac) and maintains the State Scientific Area in Redfish Bay. The park also has a coastal lease of submerged land adjacent to the park that includes seagrass beds and oyster reefs. The TPWD manages 0.1% of acreage within the Reserve. The TPWD is Texas's primary marine resource management agency. The mission of TPWD is to manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing, and outdoor recreation opportunities for the use and enjoyment of present and future generations. TPWD seeks to minimize impacts to fish and wildlife resources (including their habitats) through the federal process, by providing comments to regulatory agencies, such as the Corps of Engineers, that seek to minimize impacts from proposed developments to fish and wildlife resources. TPWD's role in managing the state's fish and wildlife resources are authorized under the U.S. Fish and Wildlife Coordination Act. Further information on the role of TPWD carries in regulations is listed in Appendix 2.

The agency currently has 10 internal divisions: Wildlife, Coastal Fisheries, Inland Fisheries, Law Enforcement, State Parks, Infrastructure, Legal, Communications, Administrative Resources, and Human Resources. Three senior division directors provide special counsel to the Executive Director in the areas of water policy, land policy and administrative matters. Intergovernmental affairs and internal audit and investigations are administered through the Executive Office. Further detailed information on the TPWD can be found on their website (<http://www.tpwd.state.tx.us/>).

The Wildlife Division's mission is to manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing, and outdoor recreation opportunities for the use and enjoyment of present and future generations. To accomplish this mission, Division personnel annually conduct wildlife population surveys, provide recommendations concerning the management of vertebrate wildlife species, conduct wildlife research studies, manage 51 wildlife management areas, hold public hunts, provide landowner incentives to manage for rare species, inform the public about wildlife, provide technical guidance to private landowners, and develop wildlife management plans for private lands.

The Coastal Fisheries Division manages the marine fishery resources of Texas' four million acres of saltwater, including the bays and estuaries and out to nine nautical miles in the Gulf of Mexico. Coastal Fisheries management strategies are directed toward optimizing the long-term utilization of the marine resources of Texas. This management is designed to sustain fisheries harvest at levels that are necessary to ensure replenishable stocks of commercially and recreationally important species and to provide for balanced food webs within Texas marine ecosystems. Technical data to assess population levels and develop appropriate fishing regulations are collected through coastwide, year-round standardized monitoring programs. In addition, life history studies and genetic research provide state-of-the-art knowledge for enhancing fishery stocks. Three world-class hatchery facilities directly enhance populations of several game fish to increase abundance and help offset impacts of natural catastrophes. The Coastal Fisheries staff work closely with other department divisions as well as federal and international fishery management agencies to provide optimum opportunities from and conservation for the rich biological diversity inherent in Texas' marine waters.

The Inland Fisheries Division is responsible for managing the state's diverse freshwater fisheries resources. The goal of this management is to provide the best possible angling while protecting and enhancing freshwater aquatic resources. The resources include approximately 800 public impoundments covering 1.7 million acres and 80,000 miles of rivers and streams. These resources are used by about 2 million anglers 16 years of age and older whose fishing activities provide great benefit to the Texas economy through an estimated \$1.9 billion per year in direct angler spending on food,

lodging, transportation and equipment. The division's activities include fisheries management and research, fish production, angler education and information, fishing access projects and aquatic habitat management.

The Law Enforcement Division provides a comprehensive statewide law enforcement program to protect Texas' wildlife, other natural resources, and the environment. The Division also provides safe boating and recreational water safety on public waters by ensuring compliance with applicable state laws and regulations. Texas Game Wardens are responsible for enforcement of the Parks and Wildlife Code, all TPWD regulations, the Texas Penal Code and selected statutes and regulations applicable to clean air and water, hazardous materials and human health. Wardens fulfill these responsibilities through educating the public about various laws and regulations, preventing violations by conducting high visibility patrols, and apprehending and arresting violators. Operation Game Thief provides citizens with a toll-free number to report poaching and other violations. The Law Enforcement Division employs about 500 wardens throughout the state and operates 27 field offices that sell licenses, register boats, and provide the public with local information across the state.

The divisions of Coastal Fisheries, Inland Fisheries and Law Enforcement also respond to fish and wildlife kills and pollution events to assess the impacts to fish and wildlife resources. These divisions determine the responsible party if any, and to seek restitution from responsible parties. The restitution funds are then invested in habitat restoration/enhancement projects.

The State Parks Division is responsible for protecting, interpreting and managing cultural and natural resources of statewide significance and providing outdoor recreation opportunities and opportunities to learn about Texas history and natural science. The division oversees more than 600,000 acres of land owned or leased by the department, including 123 state parks, historic sites and natural areas. The division is aggressively pursuing enhanced marketing and more innovative management of state parks.

#### Coastal Bend Land Trust (CBLT)

The CBLT is a landholder of the Buccaneer Cove Preserve (728 ac) with ownership of 0.4% of acreage within the Reserve. Buccaneer Cove Preserve is located at the mouth of the Aransas River and contains 856 acres of wetlands such as estuarine tidal flats and brackish marshes. The CBLT was founded in 1998 by the Coastal Bend Bays Foundation. The primary goal of the CBLT is the preservation and enhancement of native wildlife habitat in the Coastal Bend. The Reserve is almost entirely encompassed within the operating region of the CBLT. The principal protection methods include donation of land, conservation easements, bargain sale of land, and site specific management plans. Further detailed information on the CBLT can be found on their website ([www.coastalbendlandtrust.org/](http://www.coastalbendlandtrust.org/)).

#### Fennessey Ranch

The Fennessey Ranch is the Reserve's only access to a river source, and contains the only riparian habitat, and fresh water wetlands. The Fennessey Ranch (3,324 ac) owns 1.7% of the acreage within the Reserve. It is anticipated that upon designation the Fennessey Ranch will be the Reserve's first acquisition with a conservation easement. The Fennessey Ranch is currently designed to be environmentally sound as well as an economically viable business. The current economic base incorporates hunting, wildlife tours, photography, and cattle enterprises (Croft and Smith 1997). It is composed of native tree/brush, prairie, freshwater wetlands, and Mission River riparian corridor. Wetlands at the Fennessey ranch cover about 500 acres, of which are temporarily, seasonally and semipermanently flooded (White et al. 1998). Current management activities on Fennessey Ranch include: brush control, rotational grazing, enhancement and restoration of wetlands, a nine mile riparian recovery zone with no grazing, restoration of prairie and grasslands, controlled burns, controlled hunting program with no top predator hunts, and an electrical fencing system that does not impede wildlife. Further detailed information on Fennessey Ranch can be found on their website ([www.fennesseyranch.com/](http://www.fennesseyranch.com/)).

#### The Nature Conservancy (TNC)

The Nature Conservancy is a member of the reserve advisory board, because it is likely that in the future TNC will act as the primary acquisition agent of the NERR. The Conservancy was founded in 1951, with the mission to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters

they need to survive. The Conservancy has approximately 1 million members uses the following methods for acquiring and conserving land:

- Land Acquisition, fee simple
- Conservation Easements
- Conservation Buyer Projects

The Conservancy has developed a strategic, science-based planning process, called Conservation by Design, which identifies the highest-priority places that, if conserved, promise to ensure biodiversity over the long term. It is anticipated that upon designation, the Reserve will work with TNC and use their Conservation by Design Method to identify the high priority areas within the Reserve for future acquisition. Further detailed information on TNC can be found on their website ([www.tnc.org](http://www.tnc.org)).

#### Texas Department of Transportation (TxDOT)

The Texas Department of Transportation (TxDOT) was established in 1917 as the Texas Highway Department to administer federal highway funds. TxDOT maintains the Copano Causeway that intersects the Reserve, as well as state highways that are adjacent to the Reserve. TxDOT, acting through the Texas Transportation Commission, is also the nonfederal sponsor for the Gulf Intracoastal Waterway (GIWW). As the nonfederal sponsor, the TxDOT coordinates local management efforts with the US Army Corps of Engineers. Coordination by TxDOT is run out of the Gulf Intracoastal Waterway Office in the Transportation Planning & Programming Division.

#### Coastal Bend Bays and Estuaries Program (CBBEP)

The majority of Reserve is encompassed within the CBBEP project area, which extends from Mesquite to Baffin Bay. The CBBEP will be an ex-officio member of the reserve advisory board. The mission and goals of the CBBEP are similar to NERRS and a representative of CBBEP on the reserve advisory board is an ideal forum for collaboration between the two programs. The CBBEP supports research and develops management solutions with a specific focus on:

- Public Health Issues
- Altered Freshwater Inflow into Bays and Estuaries
- Condition of Living Resources
- Loss of Wetlands and Estuarine Habitats
- Degradation of Water Quality
- Altered Estuarine Circulation
- Bay Debris

The CBBEP evolved from the Corpus Christi Bay National Estuary Program (CCBNP). In 1998, the CCBNEP developed the Coastal Bend Bays Plan (CBBEP 1998a). This plan is a long-term, comprehensive management tool designed to complement and coordinate existing resource management programs and plans. Fifty specific actions were developed in the plan to address human uses, maritime commerce and dredging, habitat and living resources, water and sediment quality, public education and outreach, and freshwater resources. The CCBNEP was restructured with implementation of the Coastal Bend Bay Plan under the auspices of the CBBEP. Implementation of the plan structured the CBBEP into four basic functions of administration, planning, governance, and funding (CBBEP 1998b). Further detailed information on the CBBEP can be found on their website ([www.cbbep.org/](http://www.cbbep.org/)).

#### Local Government Representative

A local government representative will be a part of the reserve advisory board to ensure public input to Reserve management. The Reserve surrounds live oak peninsula, which contains the biggest population center, the city of Rockport. The majority of the Reserve (152,556 acres, 76 %) is within Aransas county. A local governmental representative will be mutually agreed upon by Aransas County and the city of Rockport.

#### University of Texas Marine Science Institute (UTMSI)

The University of Texas at Austin Marine Science Institute's owns 0.02% of the Reserve (31 acres, with 28 acres on land and 3 acres of wetland). UTMSI has 119,150 square feet of laboratory and visitor facilities, 9,500 square feet of dormitories, and fleet of 12 research vessels. Detailed information on the facilities present at UTMSI can be found in section 7.2.



The UTMSI is an organized research unit of the University of Texas at Austin. UTMSI's director reports to the dean of the college of natural sciences, who then reports to the executive vice president and provost, and who then reports to the president of the university. The UTMSI is the state's lead agency for developing and managing the Reserve.

The UTMSI will implement the Reserve program by hiring and directing Reserve staff, supervising and coordinating implementation of the provisions of the management plan, and by receiving and acting upon the recommendations of the reserve advisory board (RAB) and participating site managers. The reserve staff will be directly responsible for Program coordination with agency/entity representatives having jurisdiction over the Reserve. The University of Texas at Austin will also hold the scientific lease from the GLO for the state submerged bays and estuaries.

Any activity for the Reserve program that requires legal assistance will be handled by the University of Texas Financial Affairs (Office of the Vice President and Chief Financial Officer), and the Office of the Vice President for Institutional Relations and Legal Affairs. The financial Affairs office provides administrative support to the Vice President and Chief Financial Officer for the review, approval and execution of business contracts required for the procurement of services for the University, and provision of services by the University. The Office of Legal Affairs provides advice and support on University related legal issues and activities; assists in the development and implementation of related policies, guidelines, and training; and assists in the coordination of litigation and other activities with the UT System Office of General Counsel. This office reviews and interprets UT System and UT Austin policies and rules, state and federal laws, and other guidelines.

## REFERENCES

CBBEP. *Coastal Bend Bays Plan*. Texas Natural Resource Conservation Commission, Austin, TX. SFR-59/CBBEP-1, 1998a.

CBBEP. *Implementation Strategy for the Coastal Bend Bays Plan*. Texas Natural Resource Conservation Commission, Austin, TX. SFR-60/CBBEP-2, 1998b.

Crofutt, S. and Smith, E. H. *Fennessey Ranch mitigation bank proposal*. Mitigation Banking Review Team 1997.  
McAlister, W. H. and McAlister, M. K. *A naturalist's guide: Matagorda Island*. Austin, Texas, Univ. Tex. Press. 1993.

White, W. A., Tremblay, T. A., Hinson, J., Moulton, D. W., Pulich, Jr. W. J., Smith, E. H., and Jenkins, K. V. *Current status and historical trends of selected estuarine and coastal habitats in the Corpus Christi Bay national estuary program study area*. Corpus Christi, Texas, CCBNEP. 29, 1998.

Letters from property owners requesting removal of the 1000' boundary set back

I grant permission for the boundary of the Texas National Estuarine Research Reserve to be at mean high tide line on my personal property, or property belonging to entities that I legally represent. I understand that research will be conducted in the waters adjacent to my property, but that TXNERR personnel will not come on my property. As a property owner of land adjacent to the Texas NERR boundary, I support creation of a National Estuarine Research Reserve (NERR) site for Texas and think this project will be a good neighbor.

*REDFISH POINT JOINT VENTURE*  
Signed *John Warner, partner*

Signed \_\_\_\_\_

Date *10/15/04*

Please mail this signed document to:

Dr. Paul Montagna  
University of Texas Marine Science Institute  
750 Channel View Drive  
Port Aransas, Texas 78373



## SHERWIN ALUMINA COMPANY

P.O. Box 9911, Corpus Christi, TX 78469-9911

Direct Dial 361-777-2352

October 1, 2004

Dr. Paul Montagna  
UT Marine Science Institute  
750 Channel View Drive  
Port Aransas, Texas 78373

Dear Dr. Montagna,

I grant permission for the boundary of the Texas National Estuarine Research Reserve to be at mean high tide line on property belonging to Sherwin Alumina, which I legally represent. I understand that research will be conducted in the waters adjacent to Sherwin property, however, in the event it becomes necessary or expedient for TXNERR personnel to work on the shore or on adjacent uplands, permission for those activities is also granted. We do request that Sherwin Security at 361-777-2311 be notified whenever TXNERR personnel will be on the property. We can also provide overland access to either the bay shoreline or to the marsh areas by prior arrangement. As a property owner of land adjacent to the Texas NERR boundary, I support creation of a National Estuarine Research Reserve (NERR) site for Texas and think this project will be a good neighbor.

Signed Francis N. Aureliano

I, Charles C. Butt, grant permission for the boundary of the Texas National Estuarine Research Reserve (TxNERR) to be at mean high tide line on State property that is adjacent to my personal property, and ~~property belonging to entities that I represent~~. This permission is granted for the period of one year from the time of designation of TxNERR. If in my opinion, the boundary at mean high tide line has been satisfactory to me, I may renew the boundary at the end of the first year in writing to the administrator of TxNERR. I understand that research may be conducted in the waters adjacent to my property, but that TxNERR personnel will not come on my property. As a property owner of land adjacent to the TxNERR boundary, I support creation of a National Estuarine Research Reserve site for Texas and think this project will be a good neighbor.

(Aransas  
Pass Light  
Station)

Printed Name

Charles C. Butt

Signature

Charles C. Butt

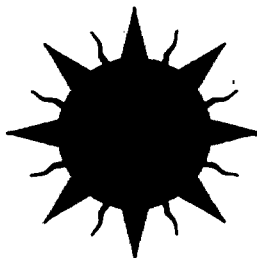
Date

Nov 3, 04

Please mail this signed document to:

Dr. Paul Montagna  
University of Texas Marine Science Institute  
750 Channel View Drive  
Port Aransas, Texas 78373  
Phone: (361) 749-6779

Any comments, concerns, or questions may be directed to Dean Mary Ann Rankin (512) 471-3285, Dr. Paul Montagna (361) 749-6779, or Mary Abell (512) 232-1071



## ARANSAS COUNTY NAVIGATION DISTRICT NO.1

November 12, 2004

Dr. Paul Montagna  
University of Texas at Austin  
Marine Science Institute  
750 Channel View Drive  
Port Aransas, Texas 78373

Dear Dr. Montagna:

As property owners of land adjacent to the Texas NERR boundary, the Aransas County Navigation District No.1 elected board of Commissioners met in an open public meeting and unanimously voted their support for allowing the proposed Texas NERR Boundary in Aransas Bay to adjoin ACND submerged land and/or shoreline boundaries.

The Mission-Aransas Estuary site is a relatively pristine ecosystem with diverse waters and coastal habitats. The ACND recognizes the value of the data to be collected within the reserve. In light of the great potential for benefiting the citizens of this area, the State, and the entire region, the ACND commissioners have publicly expressed their willingness to assist the program in any way possible. Specifically, the ACND wishes to promote this NERR site in an effort to enhance interagency partnerships, bring new federal funds to the State, increase our capacity for education and research, increase our knowledge of the coastal zone, increase our ability to distinguish between anthropogenic and natural changes, and to increase Texas' participation in this type of national network.

The ACND reiterates its belief that The University of Texas Marine Science Institute (UTMSI) is an appropriate and well prepared agency to host/manage the NERR site. The Aransas County Navigation District No. 1 wishes to express its strong endorsement of locating the management and operational staff of the proposed NERR site within Aransas County. The district has a wide selection of properties located directly in or adjacent to the proposed site. Areas superbly suited for required facilities needed to conduct the proposed education and research activities are readily available. The NERR program activities will be synergistic with existing research and education activities conducted by multiple agencies and educational institutions located both in and surrounding the proposed site.

The Aransas County Navigation District No. 1 looks forward to working with UTMSI in the future to make the NERR site a successful program. We wish you good luck in navigating the final steps of the designation process and hope the project is operating as soon as possible. If I, the Board of Commissioners, or ACND staff can be of any additional assistance, please do not hesitate to contact our District Office at 361/729-6661.

Sincerely,

Ronald J. Roe  
ACND No.1, Superintendent/Harbor Master

0\Commissioners Meetings\Letters of Support\Letter of Support for extending boundary.doc

911 Navigation Circle • Rockport, Texas 78382

361/729-6661 • FAX: 361/729-8037 • Email: ron6985@yahoo.com • www.acnd.org



**COUNTY OF ARANSAS**

Office of the County Judge  
301 North Live Oak  
Rockport, Texas 78382

Glenn D. Guillory  
County Judge

(361) 790-0100  
FAX (361) 727-2043

February 8, 2005

Dr. Paul Montagna  
University of Texas Marine Science Institute  
750 Channel View Drive  
Port Aransas, TX 78373

Dear Dr. Montagna,

The Aransas County Commissioners Court has approved and granted permission for the boundary of the Texas National Estuarine Research Reserve (TxNERR) to be at mean high tide on County property.

We understand that research may be conducted in the waters adjacent to County property, but that TxNERR personnel will not come on County property.

The Aransas County Commissioners Court supports the creation of a Texas National Estuarine Research Reserve and think that this project will be a good neighbor, beneficial to all residents of the County.

  
Glenn D. Guillory  
Aransas County Judge

**GEMELOS INVESTMENTS, LP**  
1919 MOSSBACK CIRCLE  
FRESNO, TEXAS 77545

LARRY R. FORNEY  
713.705.3205

TOM L. FORNEY  
713.829.3490

Dr. Paul Montagna  
University of Texas Marine Science Institute  
750 Channel View Drive  
Port Aransas, Texas 78373

Re: TxNERR Boundary Letter

Dear Dr. Montagna,

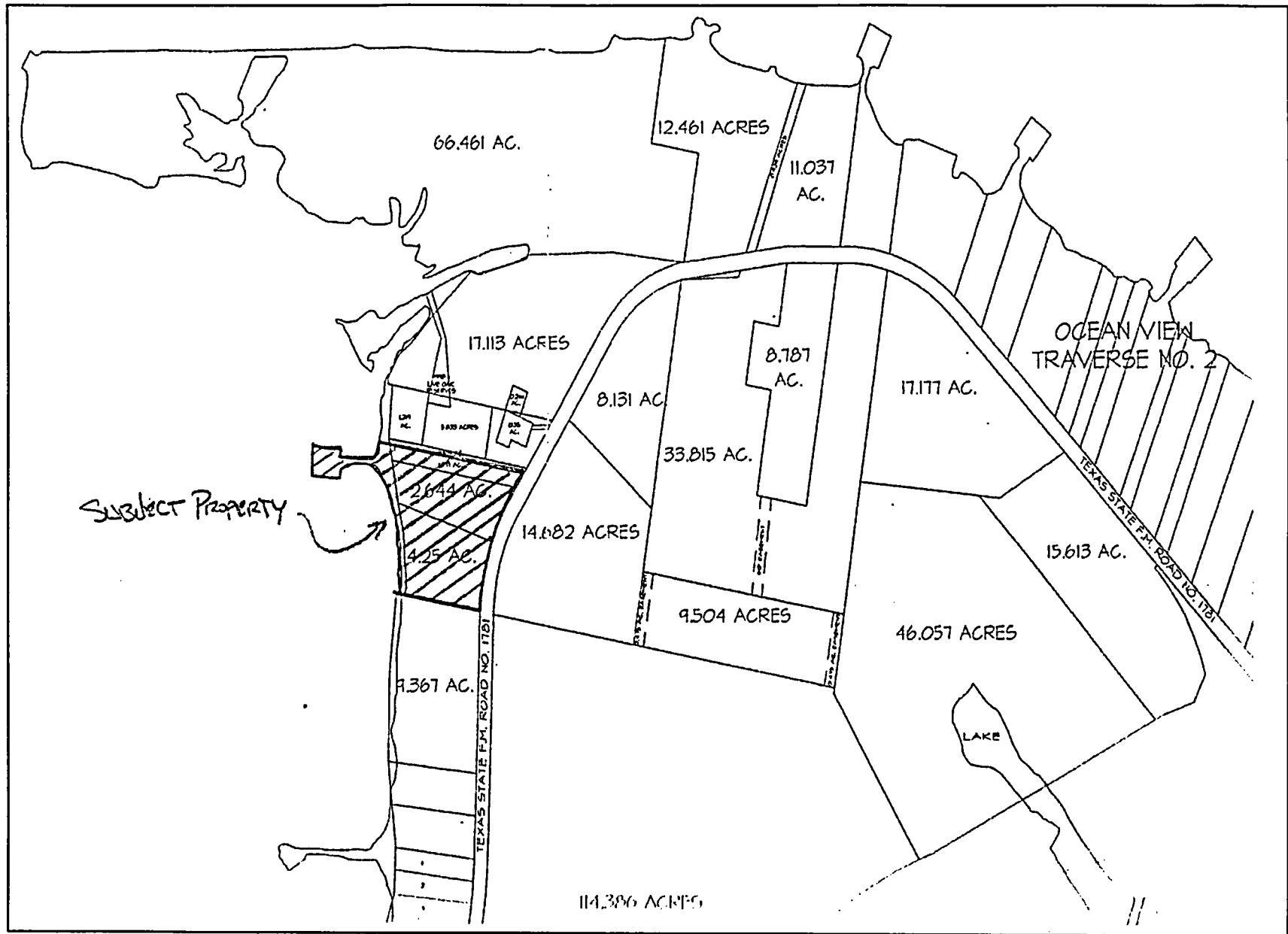
I grant permission for the boundary of the Texas National Estuarine Research Reserve (TxNERR) to be at mean high tide line on State property that is adjacent to my personal property, or property belonging to entities that I legally represent. I understand that research may be conducted in the waters adjacent to my property, but that TxNERR personnel will not come on my property. As a property owner of land adjacent to the TxNERR boundary, I support creation of a National Estuarine Research Reserve site for Texas and think this project will be a good neighbor.

Please contact me if any further information is required.

Sincerely,



Tom L. Forney  
President of TLF Management, LLC  
the General Partner of Gemelos Investments, LP







5420 FM1781 • Rockport, TX • [www.camparanzazu.org](http://www.camparanzazu.org) • 4321 Directors Row • Suite 200 • Houston, TX 77092 • 715.546.0981 • Fax 715.546.0935

Dr. Paul Montagna  
University of Texas Marine Science Institute  
750 Channel View Drive  
Port Aransas, Texas 78373

Re: TxNERR Boundary Letter

Dear Dr. Montagna,

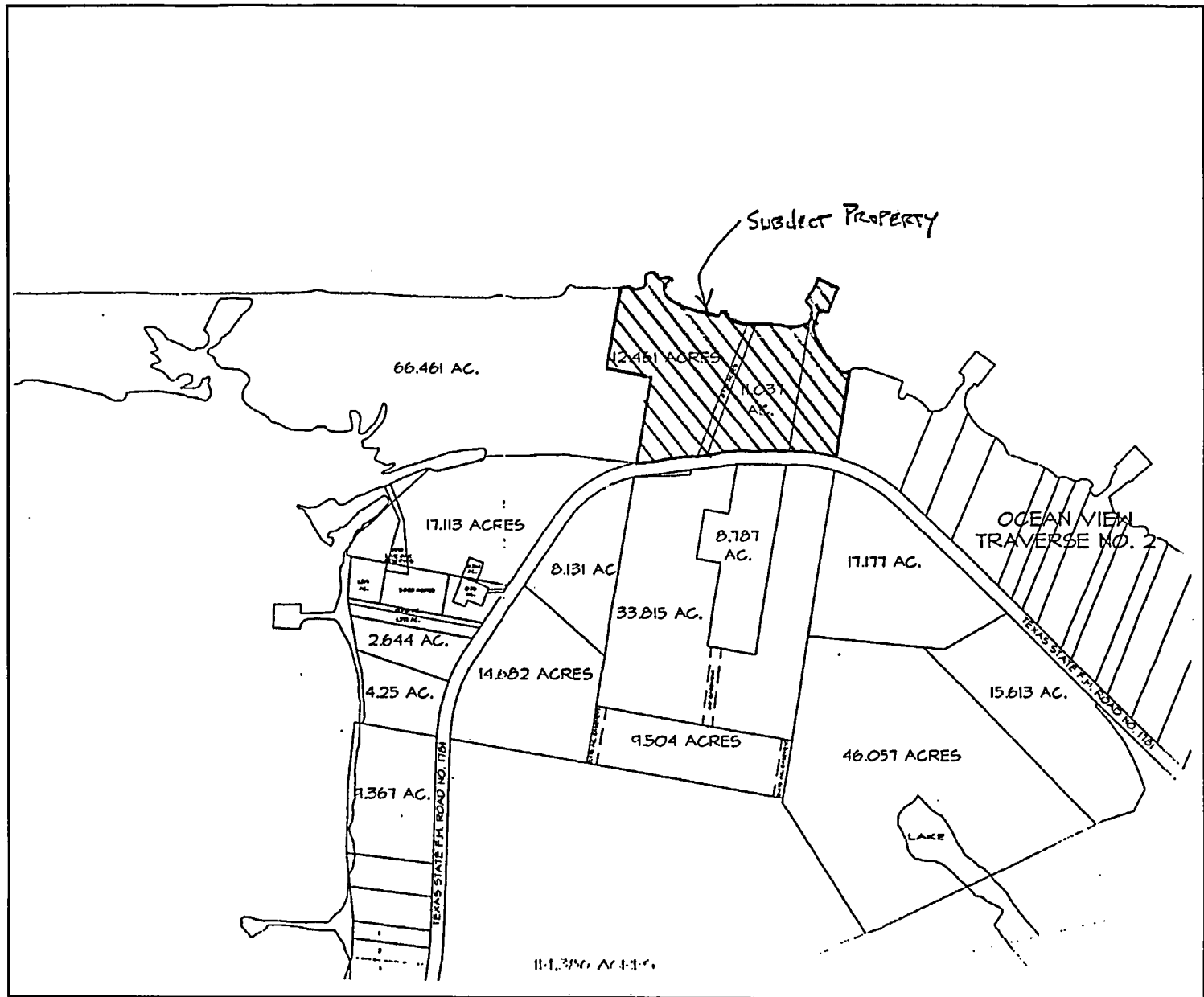
I grant permission for the boundary of the Texas National Estuarine Research Reserve (TxNERR) to be at mean high tide line on State property that is adjacent to my personal property, or property belonging to entities that I legally represent. I understand that research may be conducted in the waters adjacent to my property, but that TxNERR personnel will not come on my property. As a property owner of land adjacent to the TxNERR boundary, I support creation of a National Estuarine Research Reserve site for Texas and think this project will be a good neighbor.

Please contact me if any further information is required.

Sincerely,

A handwritten signature in dark ink, appearing to be "Tom L. Forney", written over a horizontal line.

Tom L. Forney  
President & Chairman of the Board  
Camp Aranzazu, Inc.



Dr. Paul Montagna  
University of Texas Marine Science Institute  
750 Channel View Drive  
Port Aransas, Texas 78373

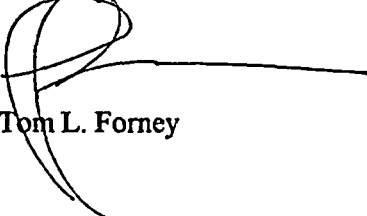
Re: TxNERR Boundary Letter

Dear Dr. Montagna,

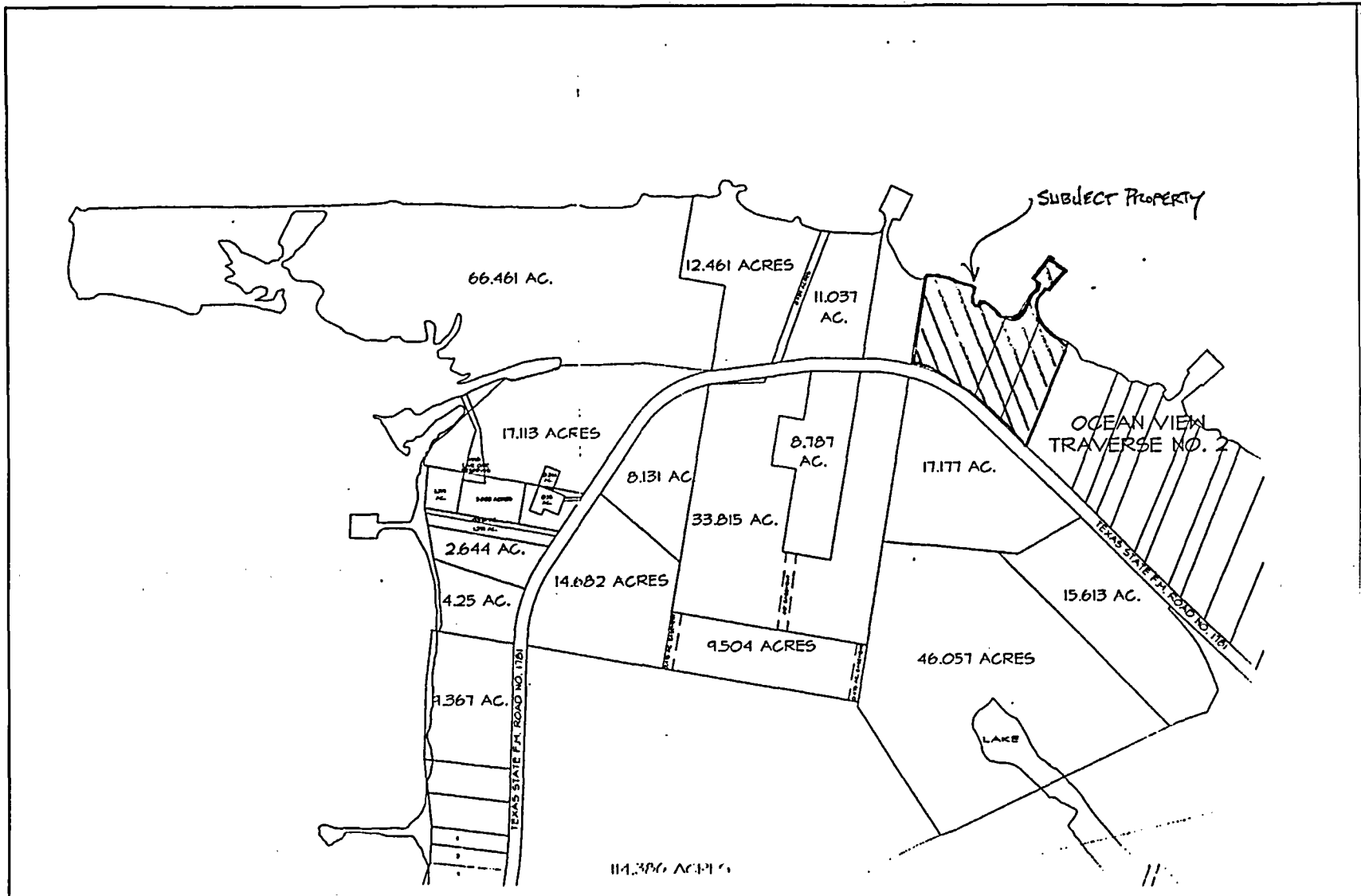
I grant permission for the boundary of the Texas National Estuarine Research Reserve (TxNERR) to be at mean high tide line on State property that is adjacent to my personal property, or property belonging to entities that I legally represent. I understand that research may be conducted in the waters adjacent to my property, but that TxNERR personnel will not come on my property. As a property owner of land adjacent to the TxNERR boundary, I support creation of a National Estuarine Research Reserve site for Texas and think this project will be a good neighbor.

Please contact me if any further information is required.

Sincerely,

A handwritten signature in black ink, consisting of a large, stylized 'F' followed by a horizontal line extending to the right.

Tom L. Forney



PROPOSED TEXAS NATIONAL ESTUARINE RESEARCH RESERVE (TxNERR)  
PUBLIC SCOPING MEETING TESTIMONY

Hearing Room E2.014 Capitol Extension

Texas State Capitol, Austin, Texas

Tuesday, November 16, 2004

My name is Carolyn Murphy. I represent the U.S. Army Corps of Engineers, Galveston District.

The Galveston District, Corps of Engineers supports the research, stewardship, and educational outreach goals of the National Estuarine Research Reserve System program, and the proposed Texas Reserve in the Mission-Aransas estuary that is the subject of this public scoping meeting. The Corps of Engineers and our sponsors in Texas have been instrumental in developing and maintaining navigation channels along the Texas coast for over 150 years. The modern navigation system that has resulted from these partnerships is strategically important to both the economic vitality of Texas and the nation, and to our nation's defense. Our work along the Texas coast has resulted in a substantial body of data and research that we will willingly share with this program.

Federal navigation channels that exist within the proposed Reserve boundary include: the Gulf Intracoastal Waterway (GIWW) that extends through the entire length of the Reserve, the Lydia Ann Channel, Channel to Rockport, and Channel to Little Bay. I have provided a written description and maps of these navigation projects to you today.

Each of these navigation projects includes not only a navigation channel, but also a system of placement areas for disposal of dredged material for channel maintenance. The placement areas consist of a combination of upland confined placement areas, beneficial use sites for marsh creation, and open-bay unconfined placement sites. Through the Aransas National Wildlife Refuge, the operation and maintenance of the GIWW has been extensively coordinated under the Endangered Species Act and operates under a number of restrictions dictated by a Biological Opinion from U.S. Fish & Wildlife Service to protect the endangered whooping crane.

It is our concern that the Management Plan that is under development for the proposed TxNERR result in no new management or regulatory controls or coordination requirements over our existing navigation systems, channels, and placement areas within the Reserve boundaries. Changes or restrictions that might be imposed by the proposed Management Plan could result in the need for additional coordination by the Corps, and increased cost to the Federal government at a time when maintenance funding is severely restricted. As such, we request that the existing federal navigation features within the Reserve boundaries be categorically excluded from management under NERRS regulations, and that this exclusion be formally incorporated into the Management Plan and DEIS currently under preparation.

Thank you for this opportunity to comment.

National Estuarine Research Reserve (NERR)  
Mission-Aransas Estuary

U.S. Army Corps of Engineers (USACE) Projects

The proposed TxNERR extends from the Aransas National Wildlife Refuge to Northern Redfish Bay (Figure 1) with a satellite site in the Nueces Delta. Several navigation channel projects maintained by the USACE are situated within this proposed NERR. Below is a brief description of these projects. All maintenance dredging operations are generally conducted using hydraulic cutterhead dredges. The placement area limits represent the limits of discharge point location. Dredged material will not be retained within these limits in the open-water areas; rather, the material will continue to flow away from the pipe discharge to distances up to about 1,500 feet.

Gulf Intracoastal Waterway (GIWW) San Antonio Bay to Aransas Bay

Segment: Stations 773+000 to 830+000 (Figure 2)

Authorized Dimensions: 12 ft. X 125 ft.

Dredging Frequency: Approximately 2.3 years

Shoaling Rate: 374,063 cubic yards (CY) per year

Placement Areas (PAs). Coordinates are State Plane, NAD 83 South Central Zone:

PA 127 - Upland Confined, 103 ac. Centered in the vicinity of 13,273,873 Northing, 2,680,138 Easting.

PA 127A - Beneficial Use Site (BUS), 23 ac. Centered in the vicinity of 13,273,722 N, 2,681,364 E.

PA 128 - BUS, 42 ac. Centered in the vicinity of 13,267,143 N, 2,672,198 E.

PA BUS D - 90 ac. (partially constructed) Centered in the vicinity of 13,266,050 N, 2,672,417 E.

PA 129 - Upland Confined, 65 ac. Centered in the vicinity of 13,262,304 N, 2,667,934 E.

PA 130A - Upland Confined, 39 ac. Centered in the vicinity of 13,252,943 N, 2,656,492 E.

PA 130B - Upland Confined, 78 ac. Centered in the vicinity of 13,242,631 N, 2,645,253 E.

PA 131 - Upland Confined, 101 ac. Centered in the vicinity of 13,233,586 N, 2,639,190 E.

## USACE Projects in the TxNERR

PA BUS B Proposed in San Antonio Bay, 407 ac. Centered in the vicinity of 13,272,174 N, 2,680,480 E.

PA BUS E Proposed in Ayers Bay, 147 ac. Centered in the vicinity of 13,260,150 N, 2,667,627 E.

PA BUS F Proposed in Mesquite Bay, 96 ac. Centered in the vicinity of 13,251,132 N, 2,655,785 E.

PA BUS I Proposed in Carlos Bay, 222 ac. Centered in the vicinity of 13,241,768 N, 2,646,345 E.

PA BUS J Proposed in Dunham Bay, 148 ac. Centered in the vicinity of 13,231,733 N, 2,639,909 E.

## GIWW Across Aransas Bay

Segment: Stations 830+000 to 903+000 (Figure 3)

Authorized Dimensions: 12 ft. X 125 ft.

Dredging Frequency: Approximately 2.6 years

Shoaling Rate: 307,760 CY/year

Placement Areas. Coordinates are State Plane, NAD 83 South Central Zone::

PA 132 – Open water, 32 ac. Vertices at 13,230,205 N, 2,633,878 E; 13,229,781 N, 2,634,447 E; 13,228,189 N, 2,633,271 E; 13,228,611 N, 2,632,700 E.

PA 133 – Open water, 190 ac. Vertices at 13,227,615 N, 2,630,985 E; 13,227,029 N, 2,631,785 E; 13,220,324 N, 2,626,871 E; 13,220,911 N, 2,626,071 E.

PA 134 – Open water with small island, 114 ac. Vertices at 13,219,347 N, 2,625,524 E; 13,218,749 N, 2,626,339 E; 13,214,725 N, 2,623,388 E; 13,215,323 N, 2,622,573 E.

PA 135 – Open water, 149 ac. Vertices at 13,214,036 N, 2,621,635 E; 13,213,455 N, 2,622,436 E; 13,208,221 N, 2,618,557 E; 13,208,831 N, 2,617,778 E.

PA 136 – Open water, 133 ac. Vertices at 13,207,588 N, 2,616,802 E; 13,206,994 N, 2,617,565 E; 13,202,404 N, 2,613,992 E; 13,202,998 N, 2,613,229 E.

PA 137 – Open water, 119 ac. Vertices at 13,201,731 N, 2,612,233 E; 13,201,144 N, 2,612,987 E; 13,197,057 N, 2,609,806 E; 13,197,644 N, 2,609,052 E.

PA 138 – Open water, 135 ac. Vertices at 13,196,343 N, 2,608,064 E; 13,195,729 N, 2,608,855 E; 13,191,088 N, 2,605,252 E; 13,191,701 N, 2,604,461 E.

## **USACE Projects in the TxNERR**

PA 139 – Open water, 69 ac. Vertices at 13,190,860 N, 2,603,191 E; 13,189,839 N, 2,603,484 E; 13,189,012 N, 2,600,604 E; 13,190,034 N, 2,600,311 E.

PA 140 – Open water, 112 ac. Vertices at 13,188,208 N, 2,601,259 E; 13,187,255 N, 2,601,537 E; 13,185,887 N, 2,596,845 E; 13,186,840 N, 2,596,567 E.

### **GIWW Lydia Ann Channel**

Segment: Stations 890+000 to 945+000 (Figure 4)

Authorized Dimensions: 12 ft. X 125 ft.

Dredging Frequency: Approximately 12.0 years

Shoaling Rate: 23,644 CY/year

Placement Areas. Coordinates are State Plane, NAD 83 South Zone:

PA 141 – Open water, 253 ac. Vertices at 17,253,600 N, 1,455,725 E; 17,252,964 N, 1,456,515 E; 17,244,708 N, 1,450,104 E; 17,244,418 N, 1,450,069 E; 17,244,538 N, 1,449,054 E; 17,245,208 N, 1,449,154 E.

PA 142 – Open water, 161 ac. Vertices at 17,242,608 N, 1,448,859 E; 17,242,478 N, 1,449,834 E; 17,235,479 N, 1,448,854 E; 17,235,609 N, 1,447,904 E.

PA 143 – Open water, 115 ac. Vertices at 17,233,229 N, 1,447,854 E; 17,233,369 N, 1,448,834 E; 17,228,409 N, 1,449,484 E; 17,228,274 N, 1,448,474 E.

PA 144 – Open water, 161 ac. Vertices at 17,226,639 N, 1,450,724 E; 17,226,959 N, 1,451,684 E; 17,223,129 N, 1,452,984 E; 17,220,079 N, 1,453,624 E; 17,219,879 N, 1,452,644 E; 17,222,839 N, 1,452,014 E.

### **GIWW Across Redfish Bay**

Segment: Stations 903+000 to 943+000 (Figure 4). Only small parts of this segment are within the proposed NERR.

Authorized Dimensions: 12 ft. X 125 ft.

Dredging Frequency: Little of no shoaling generally requires no maintenance dredging.

Shoaling Rate: Undetermined

Placement Area. Coordinates are State Plane, NAD 83 South Zone:

PA 155 – Upland confined, 54 ac. Centered in the vicinity of 17,218,611 N, 1,426,939 E.

### **Channel to Rockport**

Authorized Dimensions: 9 ft. X 200 ft.

Dredging Frequency: Little of no shoaling generally requires no maintenance dredging.

Shoaling Rate: Undetermined

Placement Area (Figure 5). Coordinates are State Plane, NAD 83 South Central Zone:



## **USACE Projects in the TxNERR**

PA 1 – Open water, 15 ac. Vertices at 13,197,065 N, 2,599,497 E; 13,196,006 N, 2,600,202 E; 13,195,660 N, 2,599,833 E; 13,196,767 N, 2,599,087 E.

### **Channel to Little Bay**

Authorized Dimensions: 8 ft. X 100 ft.

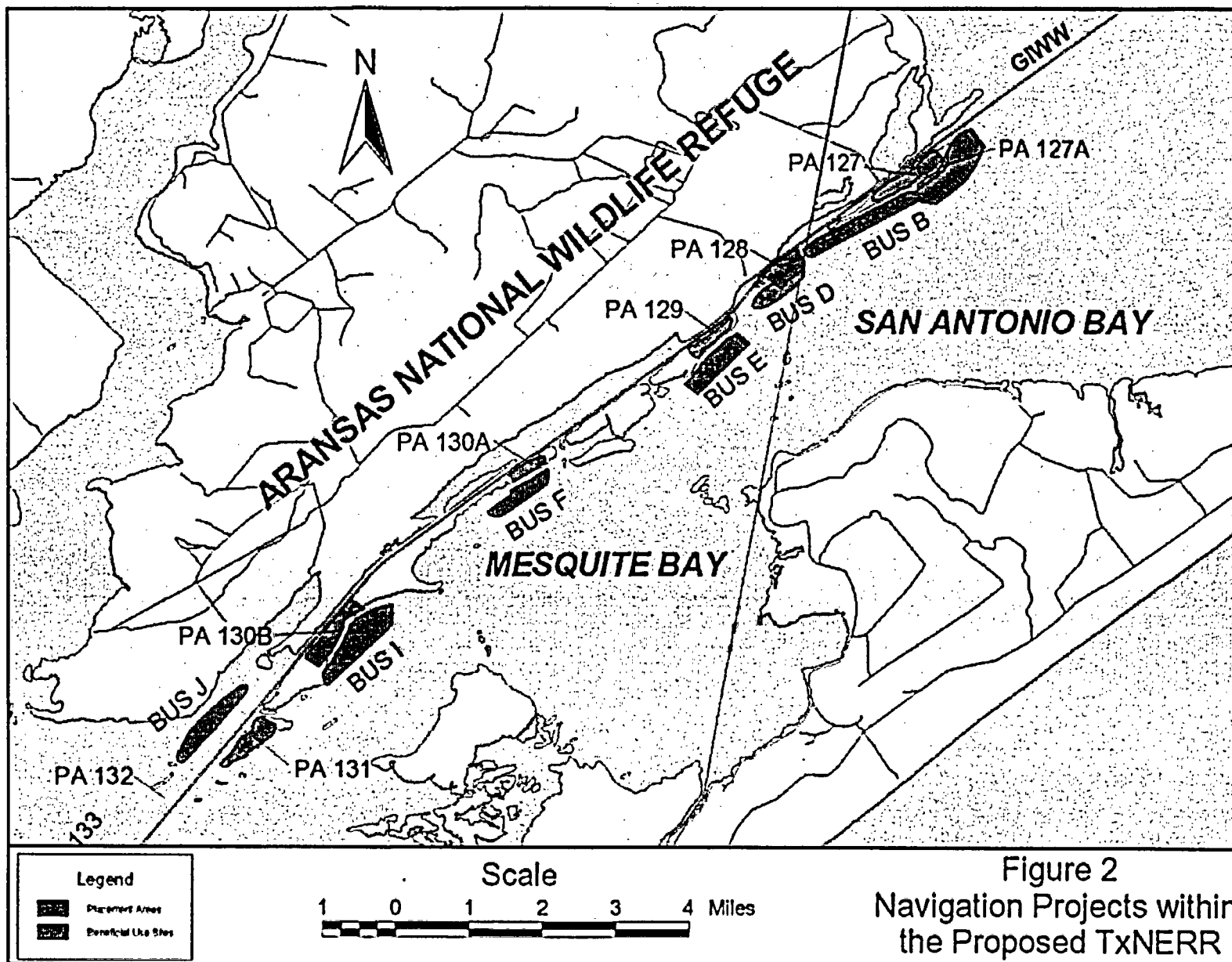
Dredging Frequency: Little of no shoaling generally requires no maintenance dredging.

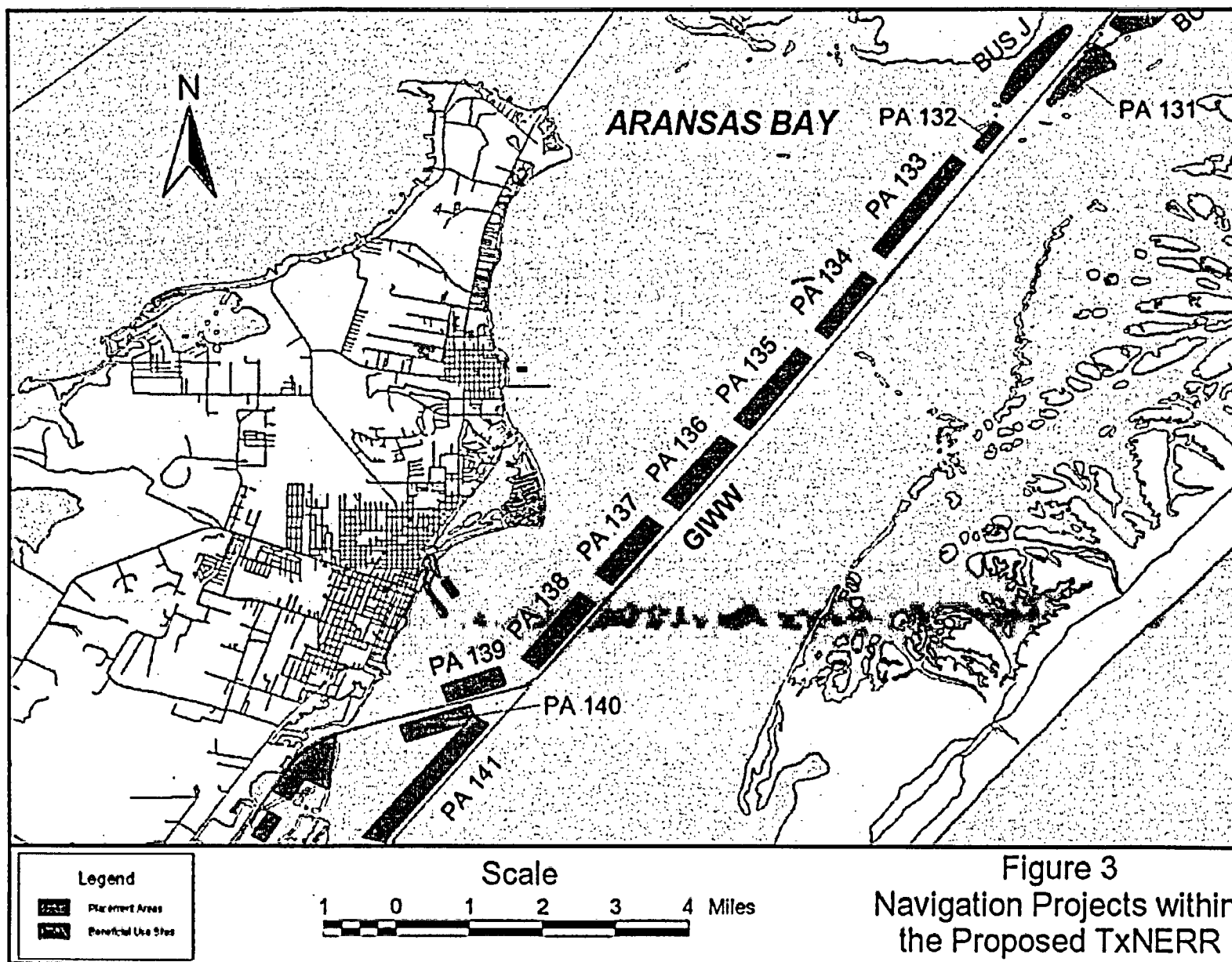
Shoaling Rate: Undetermined

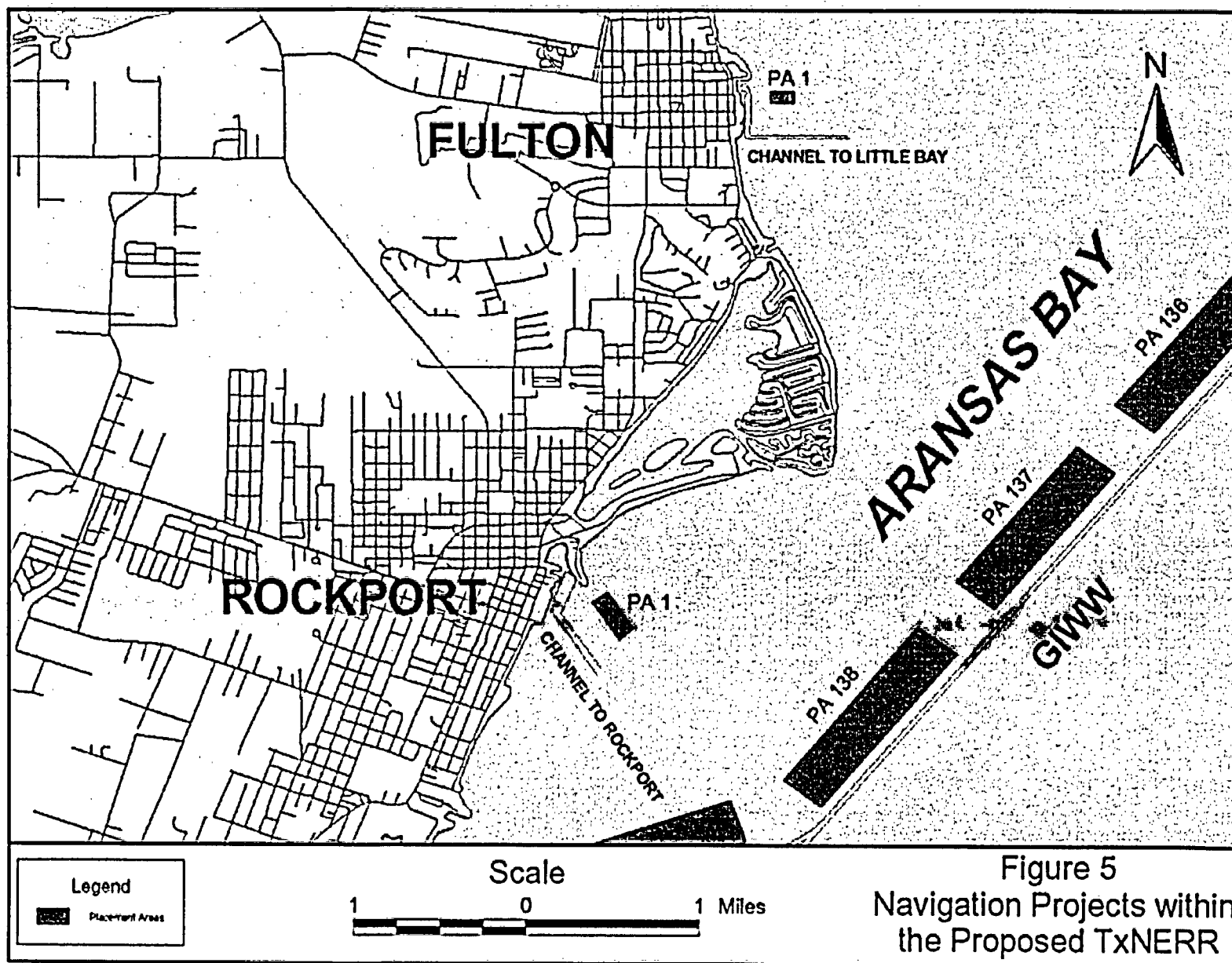
Placement Area (Figure 5). Coordinates are State Plane, NAD 83 South Central Zone:

PA 1 – Open water, 5 ac. Vertices at 13,212,219 N, 2,603,633 E; 13,212,230 N, 2,604,283 E; 13,211,901 N, 2,604,289 E; 13,211,890 N, 2,603,638 E.

[illegible]







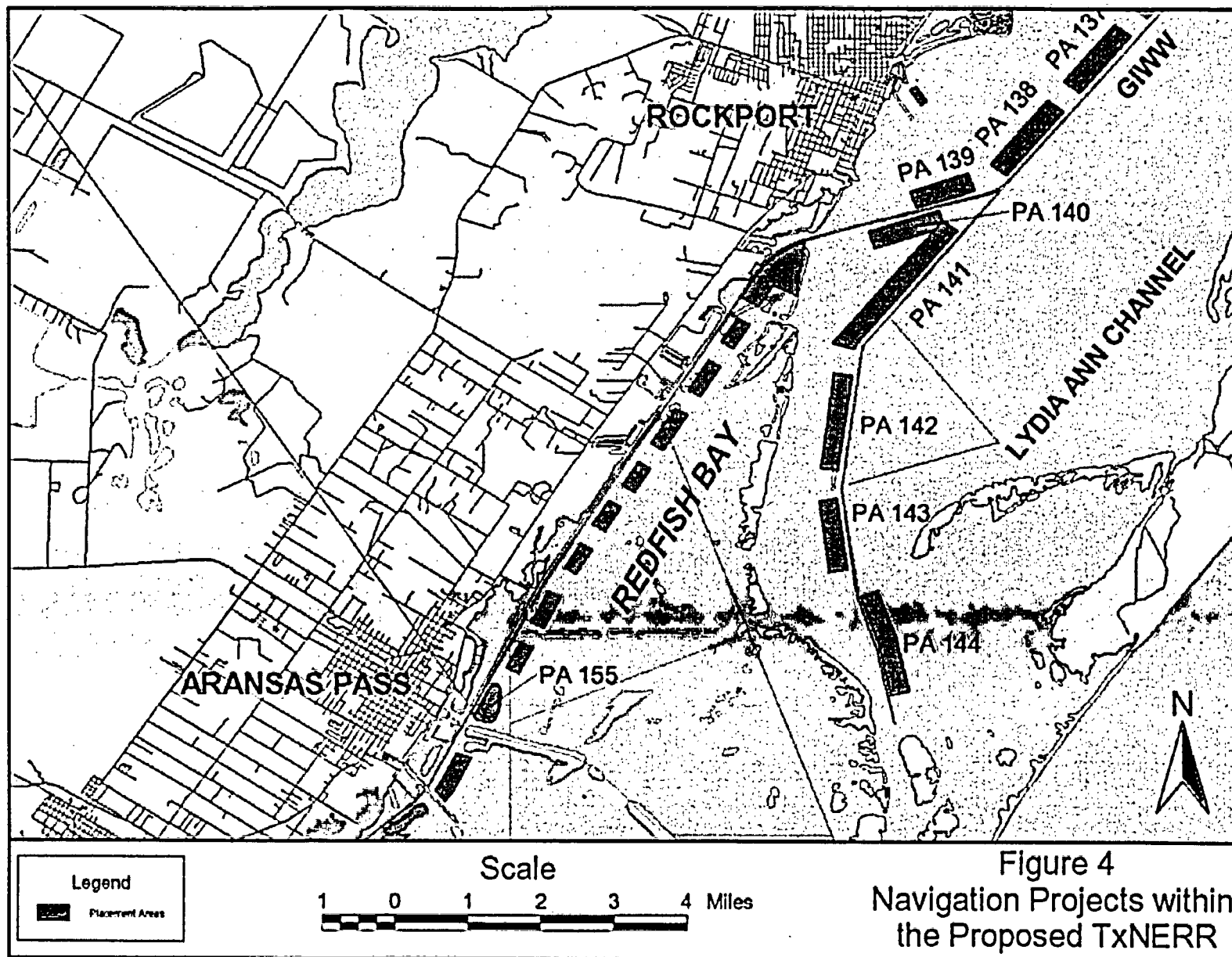


Figure 4  
Navigation Projects within  
the Proposed TxNERR



## **Texas Department of Transportation**

DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

November 24, 2004

Dr. Paul Montagna  
Texas NERR Project Coordinator  
University of Texas at Austin  
Marine Science Institute  
750 Channel View Drive  
Port Aransas, Texas 78373

Dear Dr. Montagna:

The Texas Department of Transportation is pleased to learn that the Mission-Aransas Estuary has been approved as a Texas National Estuarine Research Reserve (TX-NERR) by the National Oceanic and Atmospheric Administration (NOAA). We understand the purpose of TX-NERR is to protect areas for long term research, education and stewardship. We anticipate that TX-NERR will become a valuable addition to Texas in the near future and are very interested in the upcoming development of the TX-NERR EIS/Management Plan.

As the state transportation agency, we have identified some areas of concern regarding transportation facilities and activities located within the proposed NERR boundary. In response to your letter dated November 1, 2004, to Commissioner Johnson regarding the public scoping meeting for the proposed TX-NERR, we offer the following formal transportation related comments for inclusion in the TX-NERR EIS/Management Plan.

- a) Inclusion of our Executive Director or his designee on the TX-NERR Advisory Board to represent transportation facilities and activities.
- b) Transportation projects and activities within the boundary of TX-NERR should be exempted from the management plan requirements
- c) The development or implementation of policies or actions relating to state transportation facilities and activities within the NERR boundaries should be deferred to our agency. We will work within the framework of the TX-NERR Advisory Board to evaluate proposed actions, but final decision authority should rest with our agency.
- d) The TX-NERR Advisory Board should recognize and accept existing agreements or plans within the reserve's boundaries that have been adopted by duly constituted entities including, but not limited to, governmental and regional planning organizations.

*An Equal Opportunity Employer*

Dr. Paul Montagna

-2-

November 24, 2004

We realize that the above items will impact the proposed reserve. However, we are willing to work with the TX-NERR management to develop alternatives which satisfy both parties' interests. We request a meeting as soon as possible with your organization to discuss our request and any concerns you may have regarding transportation and TX-NERR.

Please contact James L. Randall, P.E., Director, Transportation Planning and Programming Division, at (512) 486-5000 to set up a meeting at your earliest convenience to discuss this matter further.

Sincerely,

A handwritten signature in black ink, appearing to read "M.W. Behrens".

Michael W. Behrens, P.E  
Executive Director

cc: Texas Transportation Commission  
James L. Randall, P.E., Director, Transportation Planning and Programming  
Division, TxDOT  
Kris Heckman, Office of the Governor  
Wendy Wyman, Office of the Governor  
Laurie McGilvray, NOAA



## Fennessey Ranch Acquisition Plan

Acquisition of a conservation easement for Fennessey Ranch is imperative to adequately research fresh water inflow effects on estuarine processes and will be key in maintaining long-term biodiversity in the Mission-Aransas Estuary.

### *Unique Habitats and Species*

Fennessey Ranch is 3,324 acres and is on one of the two rivers that flow into Mission-Aransas Estuary. Fennessey is composed of diverse habitats including natural lakes, meadows, native tree/brush, prairie, freshwater wetlands, and Mission River riparian corridor. Wetlands at the Fennessey Ranch cover about 500 acres, of which are temporarily, seasonally, and semipermanently flooded (White et al. 1998). Fennessey Ranch also contains a 200 acre permanent natural lake known as McGuill Lake. The abundance of lakes and wetlands make Fennessey host to one of the largest concentrations of waterfowl in Texas. In addition, Fennessey is bordered on three sides by the Mission River (9 linear miles). The Mission River is a major bird migratory route. The abundance of birds at Fennessey allowed the ranch to be part of the Texas Parks and Wildlife's Great Texas Coastal Birding Trail. Fennessey Ranch is host to more than 400 species of birds (Table 1), 16 plant communities, 50 kinds of amphibians and reptiles, 70 types of moths and butterflies, alligators, armadillo, deer, wild boar, coyotes, bobcats, and a resident cougar.

### *Threats*

Freshwater inflow is required to keep our estuaries healthy. One of the primary threats to Texas bays is the increase in water demands by municipalities and subsequent diversion of surface fresh water from estuarine systems. In south Texas, fresh water is at a premium and there is significant pressure to reduce fresh water inflow to the estuaries through diversions and dams. The San Antonio Bay system is already under stress with the addition of the Lower Guadalupe Water Supply Diversion Project, which will decrease fresh water inflow to San Antonio Bay and divert freshwater back to the city of San Antonio. The Mission-Aransas Estuary is one of the few estuaries on the Texas coast that still has enough surface fresh water inflow to maintain a healthy estuary. The National Wildlife Federation recently published a report that described the health of Texas estuaries based on full use of existing freshwater permits (Johns 2004). Existing water-use permits for the Mission and Aransas Rivers authorize 1,900 acre-feet of surface water diversions. Although surface waters in the Mission and Aransas Rivers are not currently at risk, the future growth of south Texas cities pose a significant threat to these valuable surface waters.

Groundwater pumping is another major threat in the Mission and Aransas watersheds because of the sale of reserves from private land owners. Currently, Texas law employs the "rule of capture" that allows the surface land owner to pump an unlimited amount of groundwater. Groundwater supplies 60% of Texas water and these supplies are predicted to decrease 20% by 2050 (Sierra Club 2003). Excessive pumping of groundwater can lead to salt water intrusion, subsidence, and the reduction or elimination of surface wetlands at the aquifer's points of discharge. Most of the Refugio County water demands for are met through ground water pumping. Proposals for large groundwater exports pose a serious threat to Refugio County groundwater reserves. The Gulf Coast Aquifer Withdrawal Project is a \$38 million water proposal that may move 9 billion gallons of groundwater each year from Refugio County to Corpus Christi. Excessive pumping of the Gulf Coast Aquifer has caused subsidence of up to 9 feet in Harris County and 0.5 feet in Kleberg County (Coastal Bend Regional Water Plan 2001). Saltwater intrusion is also occurring in the southeastern portion of the aquifer along the coastline. In addition to the Gulf Coast Aquifer Withdrawal Project, the Lower Guadalupe Water Supply Project also has a proposal to pump 20,000 ac-ft per year ground water from a local landowner in Refugio County. Refugio County's large supply of groundwater is threaten by these current and future groundwater projects. These projects could have a drastic impact on valuable wetland habitats.

Conservation of both surface and ground water sources, however, can be achieved in part through the acquisition of a conservation easement for Fennessey Ranch. The most unique landscape features of Fennessey Ranch are the wetland and natural lake habitats. Fennessey Ranch has 9 miles of river front property, 500 acres of wetlands, natural lakes, and 14 artesian wells located on the property. Acquisition of a conservation easement for Fennessey Ranch is vital to ensuring adequate sources of groundwater and freshwater inflow to the Mission-Aransas Estuary.

Fragmentation by subdivision is an additional threat to the Mission River watershed. Fragmentation of habitats can cause drastic declines in the quantity and quality of habitats and species. Fennessey Ranch contains 9 miles of pristine riparian habitats that is also highly valued river front property. In addition, acquisition of a conservation easement for Fennessey Ranch is ideal now because this area has a low population density and price per acre is relatively inexpensive. Fennessey

Ranch is located in Refugio County, which has one of the lowest population density in Texas (4.8 housing units per mi<sup>2</sup>) (2000 Census). However, plans to create retirement, hunting, and ranchettes for city dwellers are great.

#### *Current Uses*

Fennessey Ranch is currently designed to be an environmentally sound as well as economically viable business. The current economic base incorporates hunting, wildlife tours, photography tours, remnant oil and gas development, and cattle enterprises (Croft and Smith 1997). Current management activities on Fennessey Ranch include: brush control, rotational grazing, enhancement and restoration of wetlands, a nine mile riparian recovery zone with no grazing, restoration of prairie and grasslands, controlled burns, controlled hunting program with no top predator hunts, and an electrical fencing system that does not impede wildlife.

#### *Acquisition Strategy*

Methods of acquisition to establish long-term control include a management agreement, conservation easement, and fee simple property acquisition. A management agreement is not an option with Fennessey Ranch, therefore the minimum level of control required is a conservation easement. Estimates indicate that a conservation easement will cost \$1,953,600 for 3,256 acres at \$600 per acre for fair market value. A conservation easement is the preferred alternative of acquisition and has a lower cost than fee simple property acquisition. There are no anticipated problems with acquisition of a conservation easement for Fennessey Ranch, but should problems occur, they will be addressed by the Reserve manager and advised by the reserve advisory board. Acquisition of a conservation easement for Fennessey Ranch is key in maintaining long-term protection of the Mission River watershed and will result protection of valuable freshwater resources and essential habitats.

Additionally, acquisition of a conservation easement on Fennessey Ranch has a high likelihood of abating threats and improving the biodiversity and ecological health of the area. Acquisition of a conservation easement will ensure protection of the Mission River watershed. As oil and gas reserves run low, many landowners along the Mission River are looking for other sources of revenue. Several of these large parcels of land are owned by relations of Brien O'Connor of Fennessey Ranch and there exists a high probability of future conservation and acquisition along the Mission River corridor.

Management of Fennessey Ranch will be continued by the Fennessey Ranch manager. The amount of funding from the reserve operation budget that will go to Fennessey Ranch for continued land management is yet to be determined. Consistency of land management with Reserve objectives will be achieved by annual assessments conducted by reserve staff.

Table 1. Birds of Fennessey Ranch. Italics indicate an endangered or threatened species.

<b>LOONS</b>	Ring-necked Duck	Mountain Plover
Common Loon	Canvasback	Killdeer
<b>GREBES</b>	Greater Scaup	Golden Plover
Eared Grebe	Lesser Scaup	Black-bellied Plover
Pied-billed Grebe	Bufflehead Ruddy Duck	<b>SANDPIPERS</b>
Least Grebe	Red-breasted Merganser	Ruddy Turnstone
Horned Grebe	Hooded Merganser	Common Snipe
<b>PELICANS</b>	Masked Duck	Long-billed Curlew
White Pelican	Common Goldeneye	Whimbrel
<i>Brown Pelican</i>	<b>VULTURES</b>	Upland Sandpiper
<b>CORMORANTS</b>	Turkey Vulture	Spotted Sandpiper
Double-crested Cormorant	Black Vulture	Solitary Sandpiper
Neotropic Cormorant	<b>KITES, HAWKS, AND EAGLES</b>	Willet
<b>ANHINGAS</b>	White-tailed Kite	Wilson's Phalarope
American Anhinga	Mississippi Kite	Greater Yellowlegs
<b>HERONS</b>	Sharp-shinned Hawk	Lesser Yellowlegs
Great Blue Heron	Cooper's Hawk	Red Knot
Green-backed Heron	Red-tailed Hawk	Pectoral Sandpiper
Little Blue Heron	Red-shouldered Hawk	White-rumped Sandpiper
Cattle Egret	Broad-winged Hawk	Baird's Sandpiper
Reddish Egret	Swainson's Hawk	Least Sandpiper
Great Egret	White-tailed Hawk	Northern Jacana
Snowy Egret	Harris' Hawk	Dunlin
Tri-colored Heron	<i>Bald Eagle</i>	Short-billed Dowitcher
Black-crowned Night Heron	Golden Eagle	Long-billed Dowitcher
Yellow-crowned Night Heron	Northern Harrier	Stilt Sandpiper
Least Bittern	Osprey	Semipalmated Sandpiper
American Bittern	<b>FALCONS AND CARACARA</b>	Western Sandpiper
<b>STORKS</b>	Crested Caracara	Buff-breasted Sandpiper
<i>Wood Stork</i>	Peregrine Falcon	Marbled Godwit
<b>IBISES AND SPOONBILLS</b>	Merlin Kestrel	Hudsonian Godwit
White-faced Ibis	<b>GROUSE, ETC.</b>	Sanderling
White Ibis	Common Bobwhite	American Avocet
Roseate Spoonbill	Wild Turkey	Black-necked Stilt
<b>GEESE</b>	Ringed-neck Pheasant	American Woodcock
Canada Goose	<i>Greater Prairie Chicken</i>	<b>GULLS AND TERNS</b>
White-fronted Goose	<b>CRANES</b>	Herring Gull
Snow Goose	<i>Whooping Crane</i>	Ring-billed Gull
<b>DUCKS</b>	Sandhill Crane	Laughing Gull
Black-bellied	<b>RAILS, COOTS, GALLINULES</b>	Bonaparte's Gull
Whistling Duck	King Rail	Franklin's Gull
Fulvous Whistling Duck	Sora Rail	Gull-billed Tern
Mallard	Virginia Rail	Forster's Tern
Mottled Duck	Purple Gallinule	Common Tern
Gadwall	Common Moorhen	<i>Least Tern</i>
Common Pintail	American Coot	Caspian Tern
Green-winged Teal	<b>OYSTERCATCHER</b>	Black Tern
Blue-winged Teal	American Oystercatcher	<b>DOVES</b>
Cinnamon Teal	<b>PLOVERS</b>	White-winged Dove
American Widgeon	Semipalmated Plover	Mourning Dove
Northern Shoveler	<i>Piping Plover</i>	Common Ground Dove
Wood Duck	<i>Snowy Plover</i>	Inca Dove
Redhead	Wilson's Plover	

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<b>CUCKOOS, ETC.</b>	Willow Flycatcher	Golden-crowned Kinglet
Yellow-billed Cuckoo	Least Flycatcher	Ruby-crowned Kinglet
Black-billed Cuckoo	Eastern Wood-Pewee	<b>PIPITS</b>
Greater Roadrunner	Olive-sided Flycatcher	American Pipit
Groove-billed Ani	Vermilion Flycatcher	Sprague's Pipit
<b>OWLS</b>	<b>LARKS</b>	<b>WAXWINGS</b>
Barn Owl	Horned Lark	Cedar Waxwing
Common Screech Owl	<b>SWALLOWS</b>	<b>SHRIKES</b>
Great Horned Owl	Tree Swallow	Loggerhead Shrike
Barred Owl	Bank Swallow	<b>STARLINGS</b>
Long-eared Owl	Cave	European Starling
Short-eared Owl	Rough-winged Swallow	<b>VIREOS</b>
Burrowing	Barn Swallow	White-eyed Vireo
<b>GOATSUCKERS</b>	Cliff Swallow	Bell's Vireo
Chuck-will's-widow	Purple Martin	Yellow-throated Vireo
Common Nighthawk	<b>CROWS AND JAYS</b>	Solitary Vireo
Lesser Nighthawk	Blue Jay	Red-eyed Vireo
Common Paroque	Green Jay	Philadelphia Vireo
Common Poorwill	Common Crow	Warbling Vireo
<b>MOSQUITO</b>	Chihuahuan Raven	<b>NEW WORLD WARBLERS</b>
Greater Skeeter	<b>CHICKADEES AND TITMICE</b>	Black-and-white Warbler
Lesser Skeeter	Carolina Chickadee	Prothonotary Warbler
<b>S W I F T S            A N D</b>	Tufted Titmouse	Worm-eating Warbler
<b>HUMMINGBIRDS</b>	<b>VERDIN</b>	Golden-winged Warbler
Chimney Swift	Verdin	Blue-winged Warbler
Ruby Throated Hummingbird	<b>NUTHATCHES</b>	Tennessee Warbler
Rufous Hummingbird	Brown-headed Nuthatch	Orange-crowned Warbler
Buff-bellied Hummingbird	White-breasted Nuthatch	Nashville Warbler
Black-chinned Hummingbird	<b>CREEPERS</b>	Northern Parula Warbler
<b>KINGFISHERS</b>	Brown Creeper	Yellow Warbler
Belted Kingfisher	<b>WRENS</b>	Magnolia Warbler
Green Kingfisher	House Wren	Yellow-rumped Warbler
<b>WOODPECKERS</b>	Carolina Wren	Black-throated Green Warbler
Common Flicker	Marsh Wren	Cerulean Warbler
Pileated Woodpecker	Winter Wren	Blackburnian Warbler
Red-bellied Woodpecker	Sedge Wren	Yellow-throated Warbler
Red-headed Woodpecker	Bewick's Wren	Chestnut-sided Warbler
Golden-fronted Woodpecker	<b>THRASHERS</b>	Bay-breasted Warbler
Yellow-bellied Sapsucker	Mockingbird	Pine Warbler
Downy Woodpecker	Gray Catbird	Prairie Warbler
Ladder-backed Woodpecker	Brown Thrasher	Ovenbird
Hairy Woodpecker	Long-billed Thrasher	Northern Waterthrush
<b>FLYCATCHERS</b>	Curved-billed Thrasher	Louisiana Waterthrush
Eastern Kingbird	<b>THRUSHES</b>	Kentucky Warbler
Western Kingbird	American Robin	Mourning Warbler
Couch's Kingbird	Wood Thrush	Common Yellowthroat
Scissor-tailed Flycatcher	Hermit Thrush	Yellow-breasted Chat
Great Crested Flycatcher	Swainson's Thrush	Hooded Warbler
Brown-Crested Flycatcher	Gray-checked Thrush	Wilson's Warbler
Eastern Phoebe	Veery	Canada Warbler
Alder Flycatcher	Eastern Bluebird	American Redstart
Yellow-bellied Flycatcher	<b>OLD WORLD WARBLERS</b>	<b>WEAVER FINCHES</b>
Acadian Flycatcher	Blue-gray Gnatcatcher	House Sparrow

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Birds of Fennessey Ranch continued...

<b>BLACKBIRDS</b>	Western Tanager	Henslow's Sparrow
Eastern Meadowlark	<b>GROSBEAKS, BUNTINGS,</b>	Sharp-tailed Sparrow
Western Meadowlark	<b>FINCHES&amp; SPARROWS</b>	Seaside Sparrow
Rusty Blackbird	Cardinal Pyrrhuloxia	Vesper Sparrow
Red-winged Blackbird	Rose-breasted Grosbeak	Lark Sparrow
Yellow-headed Blackbird	Blue Grosbeak	Dark-eyed Junco
Orchard Oriole	Indigo Bunting	Chipping Sparrow
Baltimore Oriole	Painted Bunting	Field Sparrow
Brewer's Blackbird	Lark Bunting	Harris' Sparrow
Boat-tailed Crackle	Dickcissel	White-crowned Sparrow
Great-tailed Crackle	Spotted Towhee	White-throated Sparrow
Common Crackle	Eastern Towhee	Fox Sparrow
Brown-headed Cowbird	Purple Finch	Lincoln's Sparrow
Bronzed Cowbird	Pine Siskin	Swamp Sparrow
Bobolink	American Goldfinch	Song Sparrow
<b>TANAGERS</b>	Savannah Sparrow	
Scarlet Tanager	Grasshopper Sparrow	
Summer Tanager	Le Conte's Sparrow	

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Youth environmental training area facilities at Aransas National Wildlife Refuge

