

PADRE ISLAND NATIONAL SEASHORE OILSPILL IMPACT PROPOSAL
Submitted by: John Miller, Chief
Resources Management Division

INTRODUCTION:

Padre Island is the longest undeveloped barrier island in the United States and is situated off of the southeast coast of Texas. The National Seashore encompasses 130,000 acres of the island and is approximately 70 miles-in-length and from 1/2 to 3 miles-in-width. The park is bordered on the east by the Gulf of Mexico and is separated from the Texas mainland to the west by the Laguna Madre, a shallow, hypersaline body of water. Approximately 10 miles of the northern end of the park is developed, with the remaining 60 miles can be accessed by 4-wheel drive vehicles. Except for the beach access, this area is virtually inaccessible wilderness.

The park encompasses tens-of-thousands of acres of pristine wetlands that are critically important habitat for 322 bird species. Included in these bird species are 3 listed threatened or endangered (T&E) species and 7 State protected species. The southern portion of the park is also unique in that it is the migration route "staging area" for most of the North American Peregrine falcon population. This particular area is considered as critical habitat by the Peregrine Fund. Between 800 to 1000 peregrine falcons utilize this area annually during their migrations. This is the only area in the United States where these falcons can be found during their spring migration.

The subsurface oil and natural gas deposits that are located in the park are privately owned, while the adjacent mineral resources within the Laguna Madre are State controlled. The park's enabling legislation allows for oil and gas exploration and well development. The park currently has 7 active wells within its' boundary and several well platforms located in close proximity to the park boundary in the Laguna Madre.

In previous years, oil and gas exploration and development has been limited to the northern portion of the park. However, Fina Oil Company recently discovered the largest natural gas deposit to date in the Laguna Madre. Subsequently, other petroleum companies have expressed interest in initiating exploration and associated well development activities, in the previously unexplored areas in the southern portion of the park. When this proposed development becomes a reality, it has the potential of severely impacting the park's bird species and sensitive habitats because of oil and hazardous materials spills.

Because of the isolation of this part of the park (encompassing approximately 50 miles); the excessive logistical problems associated with attempting to access this roadless wilderness; and, the extreme harshness of the environment, park staff have

previously been unable to obtain basic resource inventory data within this area.

Over 24,000 oil tankers regularly travel within the Gulf of Mexico to the Port of Corpus Christi, Texas. Additionally, there are currently 3,500 petroleum platforms in the Gulf of Mexico, many offshore and in close proximity to the park. The Gulf of Mexico (GOM) currents converge off of Padre Island and influence deposition of materials onto park beaches. Because of these currents, a tremendous amount of debris that is discarded into the Gulf of Mexico later washes ashore on park beaches.

The currents change directions bi-annually with debris and oil from Mexico being swept northward during the summer and, similarly, from the northern Gulf coast swept southward during the winter. As with marine debris, current transport processes concentrate spilled oil from numerous locations and sources in the GOM area onto park beaches.

Inshore park waters (Laguna Madre, Gulf Intracoastal Waterway, Mansfield Channel) and their shorelines have the potential to be impacted from hazardous materials spills. Many hundreds of barges carrying hazardous materials regularly enter these waters and instances of collisions, resulting in spilled fuel, have been documented.

The most recent documented spill of a petroleum product occurred on September 8, 1991, when a tug boat collided with a barge and was sunk in the Gulf Intracoastal Waterway, only a few hundred yards from the northern boundary of PAIS. The barge released 13,000 gallons of diesel fuel into the Laguna Madre. Had the fuel washed into the park, it would have irreversibly damaged an area regularly inhabited by threatened Piping plovers.

Tar and oil is present on park Gulf beaches during most of the year. Periodically, the influx of tar and oil increases, sometimes as a result of passing tankers deliberately flushing their bilges and, on other occasions, from accidental spills of petroleum products. Unfortunately, because these occurrences usually happen at night and because tar and oil are typically present on the beach, these events usually go unreported and the dumping vessel is not identified.

The number of spills that has occurred within the last 10 years is somewhat difficult to quantify because of lack of documentation on small spills (described above). Additionally, it is nearly impossible to delineate an exact geographic area of consideration for spill impact to the park because of the numerous interacting factors influence whether spilled petroleum products will enter PAIS waters/beaches (ie. season, current patterns, wind speed and direction, volume spilled, containment procedures, etc.). However, there is little doubt that at least three spills have occurred within the last 10 years.

Another spill occurred on June 8, 1990, about 60 miles southeast of Galveston, Texas, in the Gulf of Mexico. The oil tanker Mega Borg spilled over four million gallons of crude oil while 39 million gallons remained on board. Fearing that the tanker would sink/leak and that the oil would wash ashore on local beaches, the park prepared an emergency contingency plan. However, prevailing winds and currents distributed the oil away from the park. Additionally, approximately 50 hazardous material or oil spills occurred in the Houston and in the Corpus Christi port areas during the last 10 years.

The oil spill that most severely impacted the park occurred in August, 1979. This was the Ixtoc I oil well, located within the Bay of Campeche in the southwestern Gulf of Mexico. For several months, tens-of-thousands of gallons of oil leaked from this well and were subsequently deposited on park beaches. During this highly publicized event, thick mats of oil were found floating within park waters and were deposited on the Mansfield Channel jetties, nearshore benthic areas and beaches.

OBJECTIVES:

The park's concern is that, without a comprehensive resource base inventory a future oil or hazardous materials spill could result in irreversible impacts to sensitive habitats and/or species. In particular, the park lacks data regarding abundance and diversity of the protected and T&E species. However, not only could the resources become impacted, but without the base inventory there would be no data to support a natural resource damage assessment.

To obtain the required data that would be useful in trying to make a natural resource damage assessment, previously obtained resource base data was analyzed and deficiencies identified. I contacted researchers and explained the objectives of the required research. All research results will be included as data sets for our GIS computer system.

The criteria that I utilized to determine a qualified researcher included: (1) an awareness of the park and associated natural resources; (2) an understanding of the park and the associated logistical inaccessibility of particular areas; (3) researcher(s) that are considered as "expert" by their peers in the researchers' field of study; (4) ability to determine associated essential or sensitive habitats; (5) ability to access this area to complete the surveys at specific time periods (to obtain the abundance and distribution data during spring and fall migrations); and, (6) ability to begin immediate and sustained research until the required data was obtained.

After several weeks of discussions, I received 17 research proposals. The following is a listing of research proposals that were considered to augment current data:

1. **Toxicant Concentrations in the Tissue of Animals Living in the Padre Island National Seashore**, Dr. Randall Davis, Dept. of Marine Biology, Texas A&M University. Proposed cost: \$19,500.
2. **Hydrocarbon Baseline Determination in Soils/Sediments at Padre Island National Seashore**, Dr. Stephen Barnes, Director, National Spill Control School. Proposal cost: \$13,000.
3. **Identification of Marine Plant Material in Samples of Digestive Tract Content from Sea Turtles**, Dr. William Wardel, Texas A&M University. Proposed cost: \$5,700.
4. **Qualitative and Quantitative Survey of the Algal Flora of the Port Mansfield Channel**, Dr. William Wardel, Texas A&M University. Proposed cost: \$17,000.
5. **Real-Time Environmental Data for the Laguna Madre**, Dr. Gary Jeffress, Conrad Blucher Institute for Science. Proposal cost: \$28,000.
6. **Real-Time Environmental Data for the Gulf of Mexico**, Dr. Gary Jeffress, Conrad Blucher Institute for Science. Proposal cost: \$68,000.
7. **Near Real-Time Surface Current Data for the Gulf of Mexico**, Dr. Gary Jeffress, Conrad Blucher Institute for Science. Proposal cost: \$1,518,000.
8. **A Faunal Inventory of the Tidal Flats Within Padre Island National Seashore**, Ms. Kim Withers, Texas A&M University. Proposal cost: \$11,400.
9. **Spill Response Plan for Padre Island National Seashore**, Dr. Steve Barnes, Director, National Spill Control School. Proposal cost: \$10,000.
10. **Development of a Comprehensive Base Data File**, Dr. Quenton Dokken, Director, Center for Coastal Studies. Proposal cost: \$7,000.
11. **Use of GIS to Evaluate Oil Spill Damage to Padre Island National Seashore Habitats**, Dr. James Webb, Texas A&M University. Proposal cost: \$19,800.
12. **A Survey of the Avifauna along the Gulf Beach of the Padre Island National Seashore**, Dr. Allan Chaney, Ecoservices Incorporated. Proposed cost: \$ 9,950.
13. **Assist in Research on Impact Analysis from Oil Spills at Padre Island National Seashore**, Dr. John Herbich, Texas A&M University. Proposal cost: \$15,000.

14. A Quantitative Survey of Benthic Invertebrates along the Gulf Beach of Padre Island National Seashore, Dr. Wes Tunnel, Corpus Christi State University. Proposed cost: \$9,900.

15. The Hydrogeological Resources of Padre Island National Seashore, Dr. Alan Berkebille, Corpus Christi State University. Proposed cost: \$9,500.

16. Resource Damage Assessment, Dr. John Richards, Conrad Blucher Institute for Science. Proposed cost: \$40,000.

17. Marine Flora Survey of Port Mansfield Channel, Dr. Ken Dunton, University of Texas. Proposed cost: \$6,000.

After analysis of the proposals, several were determined to be either not cost efficient or were not beneficial for obtaining the required baseline data necessary for the resource damage assessment.

I discussed the project to obtain various tissue mediums with Dr. Randall Davis (ie. proposal #1). Dr. Davis conducted the contaminants research on Alaskan sea otters for the Dept. of the Interior after the Exxon Valdez oil spill. Dr. Davis informed me that he was, because of several variables, unable to obtain contaminants data from the sea otter tissue samples and that, in his professional opinion, we would be "wasting" our monies in an attempt to identify contaminants in fauna tissue samples. For this reason, I did not further pursue this particular project.

Since financial resources are limited and we are seeking multi-year comparative data, the following proposals were deemed to be most useful:

1. Hydrocarbon Baseline in Soils

Padre Island National Seashore not only has a significant amount of oil and gas production activity ongoing within and adjacent to its boundaries, but was impacted by one of the largest oil spills in the world, Ixtoc I in 1979-80. Residues in soil and sediment strata are currently not quantitatively known. This proposed research project would fill in this gap in knowledge by providing total organic carbon and hydrocarbon profiles of selected soil/sediment samples.

Analysis would include total organic carbon and liquid extraction followed by gas chromatography/flame ionization detector and capillary column analysis. Samples would be taken to represent the differing sediment types on both the Gulf of Mexico beach and the Laguna Madre shoreline. Sufficient numbers of samples of each sediment type will be collected to make the results statistically valid.

2. Literature Search

Since the creation of the park, many research projects, from a variety of universities, have been initiated. However, the park did not obtain copies of many of these projects and now lacks the data obtained by them. This proposed project would analyze the existing literature and data files concerning the natural resources of the park and would search other sources for additional research and data. This project would assist us in augmenting base line data.

3. Survey Benthic Invertebrates (Gulf Beach Area)

The Gulf of Mexico (GOM) currents converge off of Padre Island and influence deposition of materials onto park beaches. Because of these currents, petroleum products that are dispersed into the Gulf of Mexico may wash ashore on park beaches.

The Gulf of Mexico fronts approximately 68 miles of park beach. This beach area is currently utilized by several hundred species of wading birds. Portions of the beach front are also utilized by several listed threatened or endangered bird species. Many of these species utilize the benthic invertebrates as their primary food source.

We propose to survey the beach front to identify the benthic invertebrates that live in the sand from the dune line to the second sand bar (approximately 6 feet into the Gulf of Mexico). This base line data as to the distribution and abundance of these organisms would prove invaluable in determining changes resulting from oil spills.

4. Survey Avifauna

Padre Island National Seashore is recognized as essential habitat for over 322 bird species. The southern portion of the park is the historic staging area for Peregrine falcon, with over 1300 individuals counted in the 1991 fall migration. Also, It was estimated that this year between 60-65% of all Piping plovers will winter in South Texas. A total of 247 have been previously surveyed within the limits of the park. Wilson's Plover, Snowy Plover and Least Tern's have been reported to breed and nest in the park. Also, 325 pair of Reddish Egrets nest on islands in or near the boundaries of PAIS. All of these birds utilize or feed within the park.

The Resources Management Division is currently involved in a research project to identify all protected bird species and associated habitats on the western (Laguna Madre) portion of the park. However, bird species data from the eastern (Gulf of Mexico) portion of the park is unknown.

This proposed study would involve initiating a comprehensive survey of the eastern (Gulf of Mexico) portion of the park for

identification of all bird species. Data to be obtained would include: species diversity and abundance; attempt to determine the physical factors that are influencing the birds in their occupancy of certain portions of the study area; and record any observations that might pertain to the life history of each species.

5. Hydrogeologic Resources Survey

A comprehensive descriptive survey of the fresh water resources in the park has never been initiated. Because of data obtained from minerals development, we know that the groundwater system is a lens of freshwater, approximately 30 feet thick, that overlies saltwater. Data indicates that this lens of freshwater is at least 2 miles in width. There are a number of seeps and freshwater ponds in the park that are utilized as a freshwater drinking source by many wildlife species.

The aquifer is recharged by precipitation events and saltwater wave surges, and the groundwater discharges into the Gulf of Mexico, Laguna Madre, and the freshwater ponds. The groundwater flows from the fore-island dune system (Gulf of Mexico) towards the back-island dune system (Laguna Madre) during the spring and fall.

The park's concern is that the groundwater might become contaminated by oil spill. That is, if the park experienced a petroleum spill, would the product residues leach into the water table, thereby, impacting on all species that utilize the water from the freshwater lens?

The proposed research project would identify the exact location of the freshwater lens in relationship to the beach front; would identify water quality, levels, and seasonal variations; and, would qualify tidal influences on the position of the freshwater/saltwater interface. This information would be invaluable in assessing post-spill impacts to the groundwater.

6. Marine Flora Survey of Port Mansfield Channel

The Port Mansfield Channel is located at the farthest southern end of the park and connects the Gulf of Mexico to the Laguna Madre. The channel is important habitat for several listed threatened or endangered species to include three species of sea turtles and brown pelicans. The first documented mating by Kemp's ridley sea turtles in U.S. waters occurred in the Mansfield Channel and this same location has one of the largest concentrations of green sea turtles in Texas inshore waters.

Because of the mixing of water between the Gulf of Mexico and hypersaline Laguna Madre, the channel is important habitat for several species of algae. These algae are the primary food source for several of the turtle species. However, there has never been a survey of the types, abundance, or distribution of

the marine plants growing in the Mansfield Channel. An oil spill in this particular area could result in irreversible impacts to the marine organisms living in the Channel.

This proposed research project would involve surveying the types of algal flora and associated marine plants to obtain abundance and distribution data. This data would become invaluable when assessing changes due to oil spill contamination.

7. Survey of Benthic Invertebrates (Laguna Madre)

The park has many miles of mud/algal tidal flats located on the western (Laguna Madre) portion of the park. These tidal flats are essential for a numerous bird species. These birds include 23 species of Colonial nesting waterbirds; 10 listed T&E or State protected bird species to include: Peregrine falcon, Piping plover, Snowy plover, Wilson's plover, Least tern and Reddish egrets; and, over a hundred species of wading birds. The tidal flats are extensively used by adult Reddish egrets during the breeding season. At times, the Reddish egrets occur in the thousands, making it unique in the world to adapt to this type of habitat. The algal tidal flats are important habitat for these numerous bird species because of the benthic organisms that live in the algal flats. These benthic organisms serve as the primary food source for the birds.

Because of the ever increasing possibility of oil and hazardous materials spills due to increased minerals activities in the Laguna Madre and the numerous barge traffic in association with the Laguna Madre, we are highly concerned that oil and/or hazardous materials spills could irreversible impact on the benthic organisms that live in the tidal flats and wetlands. An oil or hazardous materials spill to the tidal flats could cause irreversible impacts to the bird species by inadvertently destroying the benthic organisms.

We propose to survey the algal tidal flats to identify the bird species that utilize the algal flats; identify the benthic organisms that live in the tidal flats; and, distribution and abundance of both bird species and benthic organisms. This base line data would prove invaluable in determining changes resulting from either oil or hazardous materials spills.

Yearly Funding/Project Proposal:

The following is a proposed multi-year funding/research proposal:

<u>Research Topic:</u>	<u>Project Cost:</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>
Hydrocarbon Analysis in Soils	\$9,500	\$6,000	6,000	
Literature Search	7,000			
Survey Benthic Invertebrates (Gulf)	9,500	9,500	9,500	
Avifauna Survey	9,500	9,500	9,500	
Groundwater Survey		9,500	9,500	
Marine Flora Survey		5,000	5,000	
Survey Benthic Invertebrates (L.Madre)	5,000	5,500	5,500	
<u>Equipment:</u> 1.2 Gigabyte GIS	4,500			
Optical Disk Reader	Total: \$45,000	\$45,000	\$45,000	

Several of the other proposed research projects would have been excellent additions, for obtaining resource baseline data, to support a natural resource damage assessment, but funding limitations would currently prevent their inclusion. However, if supplementary funding in the future should become available, these additional research projects could be implemented.