EIS SHELVES

PAIS
FES 00-08

FINAL
OIL AND GAS MANAGEMENT PLAN
ENVIRONMENTAL IMPACT STATEMENT

February 2000

PADRE ISLAND
National Seashore
Texas

In 1916, Congress created the NATIONAL PARK SERVICE in the Department of the Interior to

> ...promote and regulate the use of the Federal areas known as national parks, monuments, and reservations. . . by such means and measures as conform to the fundamental purpose of said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. (NPS Organic Act, 16 USC 1)

Printed on Recycled Paper

Final
OIL AND GAS MANAGEMENT PLAN
ENVIRONMENTAL IMPACT STATEMENT
February 2000

PADRE ISLAND
National Seashore
Kleberg, Kenedy, and Willacy Counties
Texas

Prepared by
United States Department of the Interior • National Park Service

United States Department of the Interior

NATIONAL PARK SERVICE
Padre Island National Seashore
P. O. Box 181300
Corpus Christi, Texas 78480-1300

IN REPLY REFER TO:
D18(PAIS)
XL3025

February 23, 2000

Dear Reader:

Enclosed is the Final Oil and Gas Management Plan (O&GMP) and Environmental Impact Statement (EIS) for Padre Island National Seashore, Texas. This document describes and analyzes the impacts of three alternatives, including the No-Action alternative, for managing oil and gas exploration and development of nonfederal oil and gas underlying Padre Island National Seashore.

The Draft O&GMP/EIS was released in February 1999. The National Park Service received 15 comment letters on the Draft O&GMP/EIS, containing 62 substantive comments on the adequacy of the Draft O&GMP/EIS and the merits of the alternatives presented. The Final O&GMP/EIS includes responses to the substantive comments received on the Draft O&GMP/EIS (Chapter 5). This document contains the Preferred Alternative (Alternative A), which is a slightly modified version of the Preferred Alternative published in the Draft O&GMP/EIS in February 1999.

The Final O&GMP/EIS will have a thirty-day "no action" period as required by the National Environmental Policy Act regulations, which will begin when the EPA Notice of Availability is published in the Federal Register. Following the 30-day "no action" period, a Record of Decision will be published.

All questions or inquiries should be directed to the Superintendent, Padre Island National Seashore, Attention: Linda Dansby, EIS Team Leader, P.O. Box 181300, Corpus Christi, Texas 78480-1300.

Sincerely,

Jock F. Whitworth
Superintendent

Enclosure

Department of the Interior
National Park Service

Final
Oil and Gas Management Plan/ Environmental Impact Statement for Padre Island National Seashore

Kleberg, Kenedy, and Willacy Counties, Texas

Abstract: This Final Oil and Gas Management Plan and Environmental Impact Statement (EIS) describes and analyzes three alternatives for managing the exploration, development, and transportation of nonfederal oil and gas underlying Padre Island National Seashore:

- Proposed Action (Preferred Alternative)
- No-Action Alternative/Current Management
- Maximum Resource Protection in All Sensitive Resource Areas

Current Legal and Policy Requirements consisting of the NPS's Nonfederal Oil and Gas Rights Regulations and a variety of natural, cultural, and recreational use protection measures based primarily on laws, regulations, policies, and existing land use plans would apply to any selected alternative. These requirements are described in Chapter 2.

Lead Agency: National Park Service

Type of Action: (X) Administrative ( ) Legislative

For further information contact:

Superintendent, Padre Island National Seashore
Attention: Linda Dansby, EIS Team Leader
P.O. Box 181300
Corpus Christi, Texas 78480-1300
EIS Team Leader Telephone: (505) 988-6095

The 30-day No-Action period will end on: **April 3, 2000**

Recommended:		**Approved:**	
Jock F. Whitworth	2000	Karen Wade	1/8/2000
Jock F. Whitworth	**Date**	**Karen Wade**	**Date**
Superintendent, Padre Island National Seashore		**Director, Intermountain Region**	

TABLE OF CONTENTS

CHAPTER 2 – PART I, PLAN ALTERNATIVES

CHAPTER 2 – PART II, CURRENT LEGAL AND POLICY REQUIREMENTS

CHAPTER 3 – AFFECTED ENVIRONMENT

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

CHAPTER 5 – CONSULTATION AND COORDINATION

CHAPTER 6 – PREPARERS AND CONSULTANTS

LIST OF FIGURES

LIST OF TABLES

CH 2, PLAN ALTERNATIVES

CH 3, AFFECTED ENVIRONMENT

APPENDIXES

THIS PAGE INTENTIONALLY LEFT BLANK

ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ARPA	Archeological Resources Protection Act
ASMIS	NPS Archeological Sites Management Information System
BCF	billion cubic feet (of gas)
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLI	Cultural Landscape Inventory
CLPR	Current Legal and Policy Requirements
CNRAs	Coastal Natural Resource Areas
CO	Carbon Monoxide
COAs	Conditions of Approval
COE	U.S. Army Corps of Engineers
CWA	Clean Water Act
CZMA	Coastal Zone Management Act of 1972
dBA	Decibels (A-weighted sound pressure level measurement)
DCP	Development Concept Plan
DEIS	Draft Environmental Impact Statement
DM	Departmental Manual
DO-2	Director's Order 2, NPS Planning Process Guidelines
DO-12	Director's Order 12, NPS NEPA Guidelines
DO-28	Director's Order 28, NPS Cultural Resources Management Guidelines
DO-66	Director's Order 66, NPS Minerals Management Guidelines
DO-77	Director's Order 77, NPS Natural Resources Management Guidelines
DO-77-1	Director's Order 77-1, Protection of Wetlands Guidelines
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act of 1973
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FWS	U.S. Fish and Wildlife Service
GIWW	Gulf Intracoastal Waterway
GLO	Texas General Land Office
GMP	General Management Plan
GPS	Global Positioning System
H_2S	Hydrogen Sulfide
IDT	Interdisciplinary Team
mg/Kg	milligram per Kilogram
mg/L	milligram per Liter
NAD	North American Datum
NEPA	National Environmental Policy Act of 1969
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrogen Oxides
NPS	National Park Service
NRHP	National Register of Historic Places
NSO	No Surface Occupancy
O.D.	Outside Diameter

PA	NPS Servicewide Programmatic Agreement Between NPS, SHPO, and ACHP
PCB	Polychlorinated Biphenyls
pers. comm.	personal communication
ppt	parts per thousand
PSD	Prevention of Significant Deterioration
RFD	Reasonably Foreseeable Development
ROD	Record of Decision
ROW	Right-of-Way
RV	Recreational Vehicle
SFM	Statement for Management
SHPO	State Historic Preservation Officer
SO_2	Sulfur Dioxide
SOF	Statement of Findings
SPCC	Spill Prevention, Control, and Countermeasure Plan
SRA	Sensitive Resource Area
TCMP	Texas Coastal
TED	Turtle Exclusion Device
T&E	Threatened and Endangered (plants and animals)
TNRCC	Texas Natural Resource Conservation Commission
TPH	Total Petroleum Hydrocarbons
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound
USGS	U.S. Geological Survey
4WD	Four-Wheel Drive

SUMMARY

SUMMARY

PURPOSE OF THIS PLAN

The purpose of this Final Oil and Gas Management Plan/EIS (Plan/FEIS) is to manage existing and anticipated oil and gas operations on Padre Island National Seashore in a manner that provides for hydrocarbon development, while protecting park resources. The plan presents a reasonable range of alternatives for managing the exploration, development, and transportation of the nonfederal oil and gas underlying Padre Island National Seashore, while protecting natural and cultural resources, human health and safety, and allowing for public use and enjoyment of those resources. The Plan/FEIS then analyzes the effects of implementing each alternative. The plan covers the next 15-20 years, and possibly longer, if there are no major changes in technology, and impacts do not significantly change from those described.

The Plan/FEIS meets the requirements of the National Environmental Policy Act of 1969 and the Council on Environmental Quality regulations. It is also consistent with the direction established in the lead planning document for the park, the General Management Plan/Development Concept Plan (1983). A team of National Park Service (NPS) resource specialists, in consultation with other experts, has prepared this document.

This Plan/FEIS does not address rights-of-ways for oil and gas pipelines. Rights-of-way are permitted under the NPS regulations at 36 CFR Part 14. Pipeline rights-of-way in any park unit may be granted only under specific legislative authority granted by Congress. Such pipelines are for the purpose of transporting oil and gas products through an NPS unit and may or may not be associated with nonfederal oil and gas rights within the park. At present, no statutory authority exists for granting transpark oil and gas pipelines at Padre Island National Seashore. The circumstances for granting such rights-of-way under language in the Padre Island enabling statute at 16 U.S.C. §459d-3(b) no longer exist.

PADRE ISLAND NATIONAL SEASHORE ENABLING ACT

Padre Island National Seashore (hereafter referred to as "the park") was established by Congress on September 28, 1962 (16 U.S.C. §459d, *et seq.*),

> "In order to save and preserve, for purposes of public recreation, benefit, and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped...".

At the time of the park's establishment, surface ownership was held by the State of Texas or by private landowners. In 1973, the surface estate owned by the State of Texas was conveyed to the U.S. Government, while those surface rights held by private landowners were acquired by the federal government through condemnation. All subsurface mineral interests underlying the park were retained by private owners. Those underlying the submerged lands under the Laguna Madre and Gulf of Mexico were retained by the State of Texas and are administered by the Texas General Land Office. Thus, the federal government does not own any of the subsurface oil and gas rights in the park. However, Congress directed that nonfederal oil and gas development be regulated in the park's enabling act.

Nonfederal oil and gas development has occurred at Padre Island National Seashore since the early 1950's, prior to the establishment of the park. Out of 52 wells drilled, 23 (44 percent) were placed in production. Currently, there are 6 oil and gas well operations, 1 salt water disposal well, and 7 pipelines in the park.

NONFEDERAL OIL AND GAS RIGHTS REGULATIONS, 36 CFR 9B

Under the NPS Organic Act (16 U.S.C. §3) and Section 4(a) of the Padre Island National Seashore enabling legislation (16 U.S.C. §459d-3(a)), Congress authorized the Secretary of the Interior to promulgate regulations to control nonfederal oil and gas development in the park. These regulations, the NPS's Nonfederal Oil and Gas Rights Regulations, are published at Title 36 of the Code of Federal Regulations, Part 9, Subpart B (36 CFR 9B).

> "These regulations control all activities within any unit of the National Park System in the exercise of rights to oil and gas not owned by the United States where access is on, across or through federally owned or controlled lands or waters....These regulations are designed to insure that activities undertaken pursuant to these rights are conducted in a manner consistent with the purposes for which the National Park System and each unit thereof were created, to prevent or minimize damage to the environment and other resource values, and to insure to the extent feasible that all units of the National Park System are left unimpaired for the enjoyment of future generations. These regulations are not intended to result in the taking of a property interest, but rather to impose reasonable regulations on activities which involve and affect federally-owned lands (36 CFR §9.30(a))."

The final rulemaking on the regulations was published in the *Federal Register*, Volume 43, Number 237, page 57822 (43 FR 578822) on December 8, 1978, with an effective date of January 8, 1979.

OIL AND GAS MANAGEMENT PLANNING OBJECTIVES

The planning objectives used by the NPS in developing this Plan/FEIS were:

- Identify which park resources and values are most sensitive to oil and gas exploration and development disturbance, and define impact mitigation requirements to protect such resources and values.

- Establish reasonable oil and gas exploration and development performance standards to protect park resources and values.

- Provide pertinent information to oil and gas owners and operators that will facilitate operations planning and compliance with all applicable regulations.

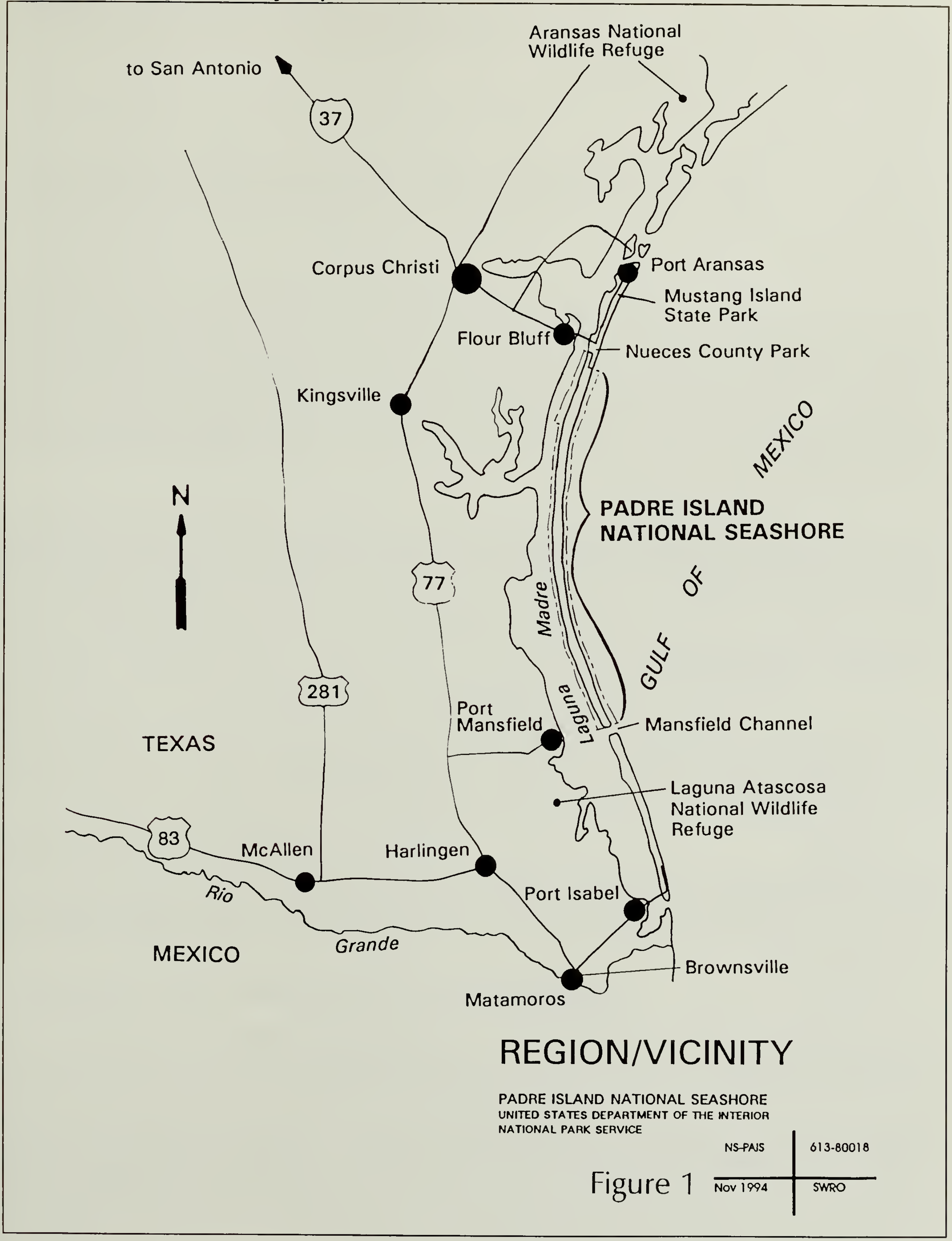
OVERVIEW OF PADRE ISLAND NATIONAL SEASHORE'S NATURAL AND CULTURAL ENVIRONMENT

Padre Island National Seashore preserves the longest undeveloped barrier island in the United States. It encompasses 69 miles of the 113-mile-long barrier island.

The cultural environment of Padre Island National Seashore includes numerous identified archeological sites, and several cultural landscapes and historic structures.

The natural environment of Padre Island National Seashore has changed dramatically since the park was established in 1962. In place of vast expanses of sand dunes, the park today is a mixture of upland grasslands, extensive wetlands environments, and vegetated dunes. More than 60 percent of the park consists of wetlands comprising marshes, inland waters, wind-tidal flats, and seagrass beds. Figure S.1 is a Region/Vicinity Map.

Figure S.1. Region/Vicinity Map



Factors contributing to a tremendous increase in vegetated areas include the phasing out of livestock grazing by 1974, and increasing rain levels since the Texas droughts of the 1930's. The increased vegetative cover is providing for a higher diversity and abundance of wildlife. Fifteen (15) species of state and federally-listed threatened and endangered birds, sea turtles, and marine mammals are known to occur at the park.

Padre Island National Seashore is a dynamic system. It was formed and is continually being re-shaped by the action of wind, currents, waves, and tides. Waves and currents move sand and shell along the Gulf shore in shifting patterns that shape the character of different beaches. Where vegetation is successful, it produces a stabilizing effect, binding the blowing sand and building the elevations of the dunes. However, this stabilizing force is constantly interrupted by the large storms that sweep across the island, destroying vegetation, leveling the dunes, and eroding deposits of sand and shell.

The most recent hurricane to hit the park was Hurricane Bret in August 1999. Hurricane Bret struck the island in the area from the 32.5 mile marker south to the 56.8 mile marker. Tidal surges pushed ashore onto the island, eroded the beach, and cut into the foredunes. The foredune ridge served to block the tidal surges, thereby dissipating tidal surge energy and providing a major defense for the mainland. Where foredunes were not well developed, the tidal surges opened 21 washover channels across the island. In the storm's aftermath, water drained from the mainland and the laguna back across the island to the Gulf through the same channels. Similar effects were seen from Hurricane Allen in August 1980. With Hurricane Allen, storm tides rose to 10-20 feet in elevation, and the flood level was up to 20-30 feet above mean sea level.

The park's relatively natural setting provides a rare opportunity for beach driving and walking, camping, boating, sailboarding, fishing, nature study and viewing, swimming, shelling, bird watching, and contemplation of past and present uses of the coastline. The park draws an estimated 600,000 to 800,000 visitors annually.

ISSUES CONSIDERED

Through the public scoping process, the following issues were identified:

- Air Quality
- Cultural Resources
- Fish and Wildlife
- Floodplains
- Foredunes
- Freshwater Ponds
- Local and Regional Economies
- Natural Quiet
- Night Sky
- Oil and Gas Exploration and Development
- Park Operations
- Relict Live Oaks
- Rookery Islands
- Seagrass Beds
- Soils
- Threatened and Endangered Wildlife Species and their Habitats
- Vegetation
- Visitor Experience, and Human Health and Safety
- Visitor Use Areas
- Visual Quality
- Washover Channels
- Water Resources
- Wetlands

These issues were analyzed, and criteria were developed to identify certain sites as Sensitive Resource Areas (SRAs) (see below). Those issues that were identified by the EIS team as being particularly important and/or potentially having major impacts, based on the team's initial evaluation and input from the public, were retained for more detailed analysis in Chapters 3 and 4. The remaining issues, which were of lesser importance, or were expected to have only negligible or minor impacts, were identified for limited discussion in Chapter 1.

SENSITIVE RESOURCE AREAS

SRAs identified through the scoping and initial evaluation process were plotted on park maps and were used in developing alternatives. Under the Proposed Action (Alternative A) and Maximum Resource Protection in all SRAs (Alternative C), buffers were identified necessary to define different levels of protection from the various types of oil and gas activities. How each SRA is protected under each of the three alternative management strategies is described on Table S.1.

REASONABLY FORESEEABLE DEVELOPMENT SCENARIO

Reasonably foreseeable development (RFD) scenarios for oil and gas development at Padre Island National Seashore have been developed by the NPS for use in analyzing the Proposed Action (Alternative A) and reasonable alternatives (Alternatives B and C), so that impacts on the environment could be evaluated. The scenarios are based on estimates of remaining hydrocarbon resource potential and the likely level of development needed to produce those resources. A U.S. Geological Survey (USGS) Assessment of "Remaining Oil and Gas Resources beneath Padre Island National Seashore" identified the geology, target formations, and remaining hydrocarbon potential within Padre Island National Seashore. From the USGS assessment, the NPS formulated a hypothetical Reasonably Foreseeable Development (RFD) scenario. The RFD scenario provides a means for estimating potential acres of surface disturbance and analyzing site specific impacts for the various environments.

The Reasonably Foreseeable Development Scenario is:

Following a 3-D seismic survey over the entire park, 6 exploratory wells would be drilled inside Padre Island National Seashore at separate sites. Of these 6 wells, 2 would be dry-holes and would be immediately plugged and the sites reclaimed. Each of the remaining 4 wells would produce a given field. Of the 4 wells, 3 would be further developed by adding 2 more wells to each exploratory well in order to fully develop each of 3 fields. The remaining 4th well would be the only well to develop the 4th field. Therefore, of the 12 wells drilled, 10 would be placed in production to produce an estimated 80 billion cubic feet of gas (BCF) and condensates over the next 30 years.

To simplify describing potential impacts associated with each of the alternatives, the interdisciplinary team decided to evaluate full field development for each of the hypothetical 6 development fields. While this would increase the number of wells proposed to be drilled as described in the RFD scenario from 12 to 18 (3 wells per 6 development fields = 18), the slight increase in number of wells was thought to not appreciably change the scope of potential impacts.

Exploration wells, with associated access roads, drill pads, and pipeline corridors, were estimated to result in an estimated 250 acres of direct surface impacts. Operations were assumed to occur in all land classification types. For seismic exploration, it was estimated that 748 acres of the terrestrial land base would be subject to relatively short-term surface disturbance.

CURRENT LEGAL AND POLICY REQUIREMENTS

The NPS permits nonfederal oil and gas exploration and development through application of its Nonfederal Oil and Gas Rights Regulations at 36 CFR 9B. Via these regulations, a prospective operator must submit a proposed Plan of Operations to the NPS for review and approval. Other management provisions are applied to the 36 CFR 9B permitting process. These "Current Legal and Policy Requirements" include laws, regulations, policies, land use management planning decisions, and other basic policy applicable to the various resource management programs for which the National Park Service is responsible.

PLAN ALTERNATIVES

The three alternatives considered in this Plan/FEIS describe a reasonable range of options available to the NPS for managing the exploration, development, and transportation of nonfederal oil and gas underlying the park. In addition to the No-Action alternative, two additional alternatives were developed based on sensitivity of park resources, especially those resources identified as SRAs. Each alternative differs in the degree to which oil and gas development can affect the surface of the SRAs. Current Legal and Policy Requirements, which are the operating requirements and restrictions that have been imposed on a case-by-case basis in the past, would be applied to each alternative, with specific limitations for various SRAs applied in the two additional alternatives. Each of the alternatives forms a separate management plan. The three alternatives identified for this Plan/FEIS are summarized below.

Alternative A, Proposed Action (Preferred Alternative):

- **No Surface Occupancy in Some Sensitive Resource Areas**
- **Restricted Access in Other Sensitive Resource Areas**
- **Seismic Operations Permitted Under Current Legal and Policy Requirements**
- **All Other Areas of the Park Could be Developed Under Current Legal and Policy Requirements**

Alternative A provides an analysis of the effects of formally designating specific areas within the park as Sensitive Resource Areas. In these SRAs, NPS would apply its mandates, laws, and requirements for resource protection, specific to the characteristics, qualities and values associated with those areas. Activities associated with oil and gas extraction in the designated SRAs would be tailored and defined according to the resources present in those areas. Some SRAs would be precluded from oil and gas activities due to the extreme sensitivity and value of the area to the overall legislated purpose of the park and park objectives. Other SRAs would be managed to protect sensitive resources, while allowing for certain degrees of oil and gas development. Seismic operations would be permitted, following all Current Legal and Policy Requirements. In all other areas of the park not designated as SRAs, oil and gas operations would be permitted, again following Current Legal and Policy Requirements.

Under this alternative, specific operating restrictions would be applied to specific types of oil and gas activities for each SRA. Therefore, the total SRA acreage would not be totally off-limits to all types of oil and gas activities. The total SRA acreage (with buffers) is 68,731 acres, or 53 percent of the park. The non-SRA acreage (61,703 acres or 47 percent of the park) would be available for road development, drilling, and production, under Current Legal and Policy Requirements. All of the park (130,434 acres) would be open to seismic operations, also following Current Legal and Policy Requirements.

Surface disturbance associated with seismic surveys could occur on an estimated 748 acres, or 0.88 percent of the terrestrial land base of the park. With adequate precipitation to support regrowth, the disturbance is expected to be short term in nature. Surface disturbance associated with developing the RFD wells could occur on an estimated 250 acres, to construct access roads, well pads, production facilities, and pipeline corridors necessary to produce 80 BCF over the next 30 years; however, the surface locations for some of the 18 RFD wells might be moved away from SRAs, but bottomhole locations could still be reached via directional drilling. Successful reclamation of well pads and pipeline corridors would reduce the amount of long-term surface disturbance.

Alternative B, No-Action (Current Management):

- **All Areas of the Park Could be Developed under Current Legal and Policy Requirements**

Alternative B provides an analysis of the current program of oil and gas management. Oil and gas proposals would be reviewed on a case-by-case basis, and mitigation measures would be implemented as needed to comply with all applicable laws, regulations, and policies. There would be no SRAs formally designated. Operators would not know in advance what type of mitigation would be required or what activities might be precluded in certain sensitive areas that NPS is mandated by law to protect. This uncertainty would continue under this alternative. Conflicts between NPS mandates to protect certain SRAs and operators' expectations for development of oil and gas reserves would continue throughout the park over the long term.

A total of 130,434 acres exist within the administered boundaries of Padre Island National Seashore. Under this alternative, all 130,434 acres of the surface of Padre Island National Seashore could be available for development under Current Legal and Policy Requirements.

Surface disturbance associated with seismic surveys could occur on in estimated 748 acres, or 0.88 percent of the terrestrial land base of the park. With adequate precipitation to support regrowth, the disturbance is expected to be short term in nature.

The RFD scenario projects the development of up to 18 wells to produce 80 BCF over the next 30 years. Surface disturbance associated with developing these wells would occur on approximately 250 acres for access roads, well pads, production facilities, and pipeline corridors. Successful rehabilitation of well pads and pipeline corridors would reduce the amount of long-term surface disturbance.

Alternative C, Maximum Resource Protection in All Sensitive Resource Areas:

- **No Surface Access in Sensitive Resource Areas**
- **All Other Areas of the Park Could be Developed Under Current Legal and Policy Requirements**

Alternative C provides an analysis of the effects of formally designating SRAs within the park; however, the management of those areas differ in the degree to which oil and gas development can affect the surface of those areas. As in Alternative A, this alternative (C) identifies areas within the park that are most sensitive to resource impacts and have values, qualities and characteristics which NPS is mandated to protect. However, in Alternative C, the degree to which oil and gas activities could occur without impacting the surface of those areas varies from that defined in Alternative A.

The primary emphasis of this alternative is to focus on the maximum protection of all SRAs. All SRAs would be closed to surface access associated with nonfederal oil and gas operations. However, areas closed to surface occupancy could be reached via directional drilling technology.

Under this scenario, approximately 68,731 acres identified as SRAs (with buffers) would be essentially off limits to any oil and gas surface uses. Where the SRAs are small (such as cultural sites) or linear (such as foredunes), operators could plan geophysical operations around them, and directionally drill underneath them, if desired. However, the Laguna Madre and wind-tidal flats cover an extensive 58,790 acres, which would be unavailable for geophysical exploration. Lack of current or site-specific 3-D seismic data may deter operators from drilling extended-reach directional wells underneath the Laguna Madre and wind-tidal flats. In this scenario, a portion of this acreage may be effectively unavailable for oil and gas development.

Table S.1 provides a comparison of the different operating restrictions in SRAs under the three alternatives.

Table S.1. Sensitive Resource Area Acreages (with Buffers) and Operating Restrictions that would be Applied under the Proposed Action (Alternative A), and Alternatives B and C[1]

Alternative A Proposed Action (Preferred Alternative)	Acres	Alternative B No-Action/Current Management	Acres	Alternative C Maximum Resource Protection in All SRAs	Acres
Sensitive Resource Areas would be provided specific protection by applying No Surface Occupancy, No Surface Disturbance, No Surface Access, and/or Seasonal/Time Restrictions to specific types of oil and gas activities within designated buffer areas. In all other areas of Padre Island National Seashore, oil and gas activities may be permitted under CLPR.	68,731 acres or 53% of National Seashore 61,703 acres or 47% of National Seashore	No specific protection would be provided to Sensitive Resource Areas. All areas of Padre Island National Seashore, including Sensitive Resource Areas, may be protected from adverse impacts of oil and gas activities by applying CLPR on a case-by-case basis.	130,434 acres or 100% of National Seashore	Sensitive Resource Areas would be provided the most protection by applying "No Surface Access" to all types of oil and gas activities within the maximum buffer areas of all SRAs. Directional drilling from surface locations outside SRAs to access bottomhole locations under SRAs, and for placement of pipelines, would be permitted. In all other areas of Padre Island National Seashore, oil and gas activities may be permitted under CLPR.	68,731 acres or 53% of National Seashore 61,703 acres or 47% of National Seashore
Cultural Sites - To protect the integrity of physical remains and the context therein of significant cultural sites: -No surface occupancy for drilling or production within 1,500 feet of Novillo Line Camp, Green Hill Line Camp, and Black Hill Line Camp; -No surface disturbance for pipeline operations within 500 feet of Novillo Line Camp, Green Hill Line Camp, or Black Hill Line Camp; -No surface disturbance within the Mansfield Archeological District; -Geophysical exploration may be permitted within Novillo Line Camp, Green Hill Line Camp, and Black Hill Line Camps under CLPR.	 377 acres 311 acres 313 acres 115 acres 70 acres 77 acres 2,702 acres 32 acres 20 acres 18 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR. Novillo Line Camp Green Hill Line Camp Black Hill Line Camp Mansfield Archeological District	 377 acres 311 acres 313 acres 2,702 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations in: Novillo Line Camp Green Hill Line Camp Black Hill Line Camp Mansfield Archeological District	 377 acres 311 acres 313 acres 2,702 acres
Freshwater Ponds - To preserve water sources for invertebrates, fish, birds, and wildlife; to preserve groundwater discharge areas; and to protect wildlife viewing areas: -No vehicular access and no surface disturbance within 500 feet of Pond A, Pond B, and Pond C.	 33 acres 33 acres 42 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR. Pond A Pond B Pond C	 33 acres 33 acres 42 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations. Pond A Pond B Pond C	 33 acres 33 acres 42 acres

Alternative A Proposed Action (Preferred Alternative)	Acres	Alternative B No-Action/Current Management	Acres	Alternative C Maximum Resource Protection in All SRAs	Acres
Laguna Madre - To preserve essential habitat for all sensitive marine biota in the Laguna Madre, including, but not limited to, submerged vegetation, invertebrates, fin-fish, colonial waterbirds, migratory bird species, marine turtles, and dolphins: -Geophysical exploration may be permitted under CLPR. Dredging of new channels required for drilling operations may be permitted if they meet the least damaging method, but production operations must be located on Padre Island on uplands locations, or outside the National Seashore.	30,503 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.	30,503 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	30,503 acres
Wind-Tidal Flats - To protect hydrogeologic conditions that allow for inundation by wind-driven Laguna Madre waters, the Gulf of Mexico waters through washovers, or rain events that support algal growth and macroinvertebrates, and provide important feeding, resting, and loafing areas for shorebirds and threatened/endangered species, including Piping and Mountain Plovers: -No placement of fill, or compaction and rutting more than 1 inch deep; except geophysical exploration and construction of roads, drilling pads, and pipelines may be permitted if they meet the least damaging method. Production operations must be located outside wind-tidal flats on uplands locations.	28,287 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.	28,287 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	28,287 acres
Visitor Use Areas - To protect the visitor experience by preserving natural darkness, ambient noise levels and visual quality; and protecting human health and safety: -No surface occupancy for access roads, drilling, production, and pipeline operations within 1,500 feet of: Malaquite Visitor Center/RV Campground; Bird Island Basin; and Grasslands Nature Trail. -Geophysical exploration may be permitted under CLPR within Malaquite Visitor Center/RV Campground; Bird Island Basin; and Grasslands Nature Trail.	 470 acres 380 acres 318 acres 470 acres 380 acres 318 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR: Malaquite Visitor Center and Malaquite RV Campground; Bird Island Basin; Grasslands Nature Trail	 470 acres 380 acres 318 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations: Malaquite Visitor Center and Campground; Bird Island Basin; Grasslands Nature Trail	 470 acres 380 acres 318 acres

Alternative A Proposed Action (Preferred Alternative)	Acres	Alternative B No-Action/Current Management	Acres	Alternative C Maximum Resource Protection in All SRAs	Acres
Foredunes - To preserve dune integrity for protection of back-island environment and provide a major defense for the mainland to block storm tidal surge and dissipate wave energy: -No surface disturbance, except roads may be permitted if they meet the least damaging method of access. Drilling of shotholes is not permitted in the primary dune line, but placement of receiver lines, on foot, may be permitted.	3,200 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.	3,200 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	3,200 acres
Washover Channels - To preserve resting, loafing, feeding, and nesting habitat for raptors, shorebirds, and wading birds, including threatened and endangered species; and to recognize these areas as being highly dynamic in that washover channels provide intermittent hydrologic connections between the Laguna Madre and Gulf of Mexico during hurricanes: -No surface occupancy for drilling, production, or pipeline operations, except roads may be permitted if they meet the least damaging method of access. -Geophysical exploration may be permitted under CLPR.	1,192 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.	1,192 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	1,192 acres
Rookery Islands - To preserve islands for waterbird nesting and reproduction: -No surface access within 1,000 feet of island edge from February 15 through September 30. -No surface occupancy for drilling, production, or pipeline operations within 1,000 feet of island edge year-round. -Geophysical exploration may be permitted between October 1 through February 14, under CLPR.	530 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.	530 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	530 acres
Relict Live Oak Mottes - To preserve two unique vegetative communities of live oak mottes: -No surface disturbance within 500 feet around Live Oak Motte A, and Live Oak Motte B	 22 acres 18 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR: Live Oak Motte A Live Oak Motte B	 22 acres 18 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations: Live Oak Motte A Live Oak Motte B	 22 acres 18 acres
Totals:	**68,731 acres**	**Total Acres:**	**68,731 acres**	**Total Acres:**	**68,731 acres**

[1] Under Alternative B, SRAs are not formally designated but would be identified on a case-by-case basis.

NOTE: CLPR = Current Legal and Policy Requirements.

SUMMARY OF IMPACTS

As previously described, certain issues were identified by the EIS interdisciplinary team, using input from scoping and public comment, as being particularly important or having potentially major impacts. These issues are addressed in detail in the EIS and include the following:

Activity that may be affected by resource protection measures under the various alternatives:

- Oil and Gas Exploration and Development

Important resources and values for Padre Island that may be affected by oil and gas operations:

- Air Quality
- Soil and Water Resources
- Floodplains
- Vegetation
- Wetlands
- Fish and Wildlife
- Threatened and Endangered Species and Their Habitats
- Cultural Resources
- Visitor Experience

The impacts anticipated from the proposed action and alternatives for these issues are summarized in Table S.2.

The remaining issues from the original list of issues considered were eliminated from further detailed study and are described briefly at the end of Chapter 1.

Table S.2. Summary of Impacts, Padre Island National Seashore Oil and Gas Management Plan/EIS

IMPACTS TO OIL AND GAS EXPLORATION AND DEVELOPMENT			
Impacts Common to All Alternatives	**Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas**	**Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis**	**Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas**
• Nonfederal oil and gas exploration and development costs would be higher inside the National Seashore than for similar properties outside its boundaries. Operators would experience additional costs to prepare Plans of Operations, to secure a performance bond, to implement resource protection measures, and to reclaim sites. The immediate and long-term effects could include lost production opportunities, increased costs of exploration and production, and a loss in royalties which could have a minor to moderate adverse impact on mineral owners, lessees, and operators. • Operators would need to plan for the increased processing time to prepare and approve a NPS Plan of Operations. The increased processing time is not expected to cause lengthy delays for the operator. • Mineral owners may find it more difficult to lease (or may receive a lower price for) properties with unproven or marginal oil and gas reserves, or properties burdened with extra environmental constraints. • If the requirement to prepare a Plan of Operations is waived for directionally drilling from a surface location outside the park to a bottomhole target inside the park, operations could commence sooner than if they were conducted within the boundaries of the National Seashore. Drilling costs and operating time would increase for directionally drilled wells. These increased costs could result in a minor, adverse, financial impact on mineral owners and/or lessees but could be offset by reduced compliance and mitigation measures that are required inside the National Seashore.	• NPS anticipates that costs and time associated with preparing and approving Plans of Operations under Alternative A would be less than Alternative B, No-Action/Current Management, because the O&GMP would allow operators to know in advance specific locations in the park where access would likely be denied or severely restricted. • Current Legal and Policy Requirements would allow for almost full geophysical characterization of the oil and gas prospects of the park. In some SRAs, resource protection and timing restrictions would limit some or all surface uses for geophysical exploration activities. • All oil and gas reserves beneath the park would be accessible for extraction, although costs could be higher due to surface restrictions applied to Sensitive Resource Areas. This could have a minor to moderate adverse impact on mineral owners, operators, or lessees. • Under Alternative A, all oil and gas reserves would be accessible for exploration and development; the level of oil and gas activity is not expected to change appreciably from past and current levels. As new	• The NPS anticipates that time requirements would be greater than for Alternative A or C, because the lack of a plan would not allow operators to know in advance the specific locations in the park where access would likely be denied or severely restricted. Inconsistencies are possible without a plan and this could cause frustration, longer negotiations, and unanticipated denials, resulting in a minor to moderate adverse impact to the owner/operators or lessees. • Full geophysical characterization of the oil and gas prospects of the park would be allowed. • All oil and gas reserves beneath the park would be accessible for extraction. • Under Alternative B, all oil and gas reserves would be accessible for exploration and development; the level of oil and gas activity would not be expected to change appreciably from past and current levels. As new discoveries are made and developed, older operations would move from production to reclamation. Thus, there are no anticipated cumulative impacts on oil and gas exploration and development under Alternative B.	• NPS anticipates that, similar to Alternative A, costs and time associated with preparing and approving Plans of Operations under Alternative C would be less than Alternative B, No-Action/Current Management, because the O&GMP would allow operators to know in advance specific locations in the park where access would likely be denied. • No Surface Access to the 68,731 acres of SRAs would preclude these areas from geophysical exploration. While operators could use existing well and geophysical data available at the time this plan is implemented, the inability to conduct newer 3-D seismic surveys is likely to interfere with full characterization of the oil and gas prospects underlying these areas of the park and could result in moderate to major adverse impacts. • Some oil and gas reserves beneath the park may not be accessible for extraction because a small portion of the Laguna Madre and wind-tidal flats may not be accessible by directional drilling. If commercial quantities of oil and gas occur within this area, these oil and gas reserves beneath the park would not be accessible for extraction, resulting in a moderate to major adverse

IMPACTS TO OIL AND GAS EXPLORATION AND DEVELOPMENT

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
	discoveries are made and developed, older operations would move from production to reclamation. Thus, there are no anticipated cumulative impacts on oil and gas exploration and development under Alternative A, the Proposed Action.		impact to owner/operators or lessees. • Under Alternative C, there would be a potential reduction in the acreage available for oil and gas exploration and development, primarily in seagrass beds and wind-tidal flats. A potential reduction in available acreage for exploration and production may lower the estimate of recoverable oil and gas reserves in the park. Because the presence or absence of commercial quantities of oil or gas in any specific area is highly speculative, any estimates of final impact to the oil and gas owners and operators would be largely conjectural.

IMPACTS TO AIR QUALITY

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Impacts to the Class II air quality of Padre Island National Seashore are expected to be negligible to moderate and localized where oil and gas operations exist or may occur in the future. The duration of impacts would depend on the type of operation proposed. • Emissions of particulate matter (PM) would increase as a result of earthmoving activities from site construction, vehicle exhaust from use of vehicles during all types of operations, dust from traffic on unpaved roads, combustion of diesel-powered equipment, and the oil and gas itself. Increased particulate matter would cause slight	• Padre Island National Seashore has good natural wind dispersion. The prevailing southeasterly winds would carry contaminants away from the park, minimizing the potential for developing concentrations in excess of any applicable standards (Ambient and PSD standards and increments). Therefore, no major impacts to air quality would be expected from any oil and gas operations.	• Impacts would be the same as described for Alternative A, but with more opportunities for impacts to occur within SRAs. • Cumulative impacts to air quality would be the same as described for Alternative A.	• Impacts would be the same as described for Alternative A, but with fewer opportunities for even minor impacts to occur within SRAs. • Cumulative impacts to air quality would be the same as described for Alternative A.

IMPACTS TO AIR QUALITY

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
impairment of visibility within localized areas of activity. Mitigation measures including road watering could prevent or minimize release of dust and suspended particulates from vehicle traffic and construction activities. Burning of vegetation, construction debris or site-produced wastes would not be allowed, and fire prevention and suppression equipment would be provided by the operator on site. • Exploratory drilling activities would introduce emissions of nitrogen oxides (NO_x), carbon oxides (CO_x), and sulfur oxides (SO_x) during the continuous drilling activities of a 30 to 90-day period as a result of operating large diesel engines which power the drill rigs, pumps and auxiliary equipment. Precautions such as use of blow-out preventers should preclude the occurrence of major impacts resulting from well drilling. • Emissions from production operations would be considerably less than during drilling activities, however, over the long life associated with production operations, emissions form production could exceed drilling operations. Emissions from production operations include release of gaseous pollutants such as carbon monoxide (CO), hydrocarbons, nitrogen oxides (NOx), and sulfur oxides (SOx) as a result of operating separation facilities, disposal of liquid waste and unwanted gas, burning of waste petroleum products, routine emission of objectionable odors, and venting of noxious vapors from storage tanks. • Odor annoyance would be an effect of drilling and production activities, particularly if visitor uses or wildlife are affected. • Emission of hydrocarbons from routine operations or leaks and spills could react with nitrogen oxide to produce ozone. Ozone, nitrogen dioxide, and	• Cumulative impacts to air quality are expected to be negligible and within federal standards.		

IMPACTS TO AIR QUALITY

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
sulfur dioxide are toxic to plants. Impacts are expected to be limited to areas in close proximity to each well. No significant impact to human health and vegetation are expected. • In the future, impacts to air quality would be evaluated in project-specific plans of operations. Depending on the location and type of operations, mitigation could be required to meet NPS standards or PSD permitting under the State Implementation Plan.			

IMPACTS TO SOILS AND WATER RESOURCES

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• A parkwide 3-D seismic survey would impact soils on 748 acres. Effects to soils include erosion, compaction, rutting and contamination. Impacts would be short-term and negligible if mitigation techniques under Current Legal and Policy Requirements are used. Primary measures include avoiding vehicle use on saturated soils, or using light weight vehicles to minimize rutting and damage to vegetative cover. • Water quality could experience short-term impacts from 3-D seismic activities. These effects are expected to be minor with the application of equipment requirements, access restrictions, and monitoring of compliance with the plan of operations, and particularly the standard 500-foot offset from waterways (36 CFR 9.41(a)). If exemptions are given to permit access for seismic activities in waterways, turbidity could increase as a result of foot and/or vehicle/boat traffic, vibrations from detonation of explosives in shotholes, and use of airguns. Seismic activities are expected to have minor	• Formal designation of SRAs, and application of specific protection would provide consistent protection of soils and water resources in Sensitive Resource Areas from future nonfederal oil and gas operations. • As a result of the specific protection provided to SRAs, direct and indirect impacts to soils and water resources in SRAs are avoided or reduced. As a result, minor to moderate impacts to soils and water resources are expected in SRAs. • Existing heavy metals and hydrocarbon contamination at several abandoned and existing oil and gas operations have impacted soils and water resources. While contaminated	• SRAs are not formally designated; therefore, all areas of the National Seashore receive standard protection under Current Legal and Policy Requirements. Soils and water resources in localized areas where oil and gas operations are conducted could experience impacts of minor to possibly moderate levels, ranging from short- to long-term. • Alternative B, No-Action/Current Management, would provide the minimum protection to soils and water resources by applying basic federal laws and regulations and NPS policies on a project-by-project basis, through which project-specific mitigation measures would be applied. This management strategy could be time-	• Under Alternative C, all SRAs receive maximum resource protection by applying a No Surface Access restriction on all oil and gas operations, including seismic. Therefore, under this alternative, impacts to soils and water resources would not occur within SRAs. • Cumulative impacts to soils and water resources would be the same as described for Alternative A.

IMPACTS TO SOILS AND WATER RESOURCES			
Impacts Common to All Alternatives	**Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas**	**Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis**	**Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas**
effects on groundwater quantity or quality. • Constructing access roads, pads, flowlines and pipelines for up to 18 wells under the RFD scenario could directly effect soils on 250 acres or 0.2 percent of the National Seashore. These activities would result in clearing of vegetative cover, exposing soils to erosion, and compacting and introducing nonnative fill materials. Increased soil erosion could increase sediment loads in nearby surface waters, and disrupt natural surface flow patterns. Careful siting to locate in the least-damaging area and proper number and placement of culverts would allow natural surface flow patterns to continue with minimal impedance. The standard 500-foot offset from waterways would reduce impacts to water quality. Short-term impacts to soils and water resources could range from moderate to significant depending on the size, location and spacing between drillpads. Production of up to 18 wells would have long-term impacts to soils and adjacent water bodies, lasting 20 years or longer. As some operations are developed, however, others would be reclaimed; therefore, only a portion of the estimated 250 acres is expected to impact soils and water resources over the long-term. • A primary impact to soils and water resources from drilling and production operations could result from a release of oil and gas, and contaminating or hazardous substances. Current Legal and Policy Requirements call for stringent operational measures to minimize the potential for any spilled or leaked pollutants to be released into the environment. These include using the least contaminating substances, primary and secondary containment, automatic shut-off valve valves, and storing sufficient spill response equipment and materials on location to effectively respond in the event of a spill. In the event of a	areas are localized in small geographic areas, these contaminants can spread via various pathways, including surface and groundwater, or biologic pathways such as foodchains. Therefore, the cumulative impact to soils and water resources under Alternative A is considered a major impact until the contaminants are removed.	consuming. Impacts to soils and water resources could include impacts to soils and water resources in SRAs; however, no major impacts are anticipated. • Cumulative impacts to soils and water resources would be the same as described for Alternative A.	

IMPACTS TO SOILS AND WATER RESOURCES

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
release, prompt response to remove or neutralize contaminants would follow a Spill Notification and Response Plan contained in the operator's plan of operations. • Within 6 months of of properly plugging the well, the operations area would be reclaimed to natural topographic contours to conform to natural drainage patterns, predisturbance soil chemistry reestablished, and 70% initial native vegetative cover achieved to control soil erosion. • Contamination of soils at 3 sites from previous oil and gas activity persists. Until cleanup is successfully completed, these impacts would persist.			

IMPACTS TO FLOODPLAINS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Siting of oil and gas operations or activities would be permitted in regulatory floodplains only when there is no other practicable alternative, under NPS Floodplain Management Guidelines. • When there is no practicable alternative to siting in a floodplain, selection of the least-damaging floodplain location and utilization of mitigation measures would result in minor to moderate floodplains impacts. Requirements for mitigation would result in no increase in flood hazards and no appreciable loss of beneficial floodplain values. • Leaks and spills of oil and gas, and contaminating or hazardous substances in floodplains could increase flood hazards. Impacts could range from minor to moderate, depending on the type and	• Formal designation of foredunes and washover channels as SRAs under this alternative would help to protect floodplain values, because of the specific provisions provided to these areas, such as No Surface Disturbance for drilling and production operations. • No major adverse cumulative impacts to floodplains are anticipated as a result of future oil and gas operations through application of NPS Floodplain Management Special Directive 93-4 and the SRA designations for foredunes and washover channels.	• Although there is a greater possibility of disruption to foredunes and/or washover channels under Alternative B, it is still expected that impacts to floodplains would be limited to minor to moderate adverse effects, given adherence to Current Legal and Policy Requirements and NPS Floodplain directives. • No major adverse cumulative impacts to floodplains are anticipated as a result of future oil and gas operations through application of the NPS Floodplain Management Special Directive	• There would be no major adverse impacts to floodplain values under Alternative C as a result of the No Surface Access provision applied to all oil and gas operations and activities in SRAs and the selected floodplain siting and use restrictions under NPS directives and policies. • No major adverse cumulative impacts to floodplains are anticipated as a result of future oil and gas operations through formal designation of SRAs and associated floodplain protection measures.

IMPACTS TO FLOODPLAINS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
amount of substance released, flood conditions, and the methods and speed in accomplishing cleanup. If the requirements of the NPS under Current Legal and Policy Requirements are met, there should be no major adverse impacts. • At the completion of operations, reclamation of the site would restore floodplain values and functions.		93-4 and environmental oversight of park staff.	

IMPACTS TO VEGETATION

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Direct impacts to vegetation from parkwide 3-D seismic surveys would effect up to 748 acres (if only uplands vegetation communities are impacted). These impacts would be short-term and could range from minor to moderate. Surveys performed when soils are not saturated, and employing low-impact off-road vehicles and equipment, and a one-way pass method, would minimize damage to and loss of vegetation. The amount of time impacts from the seismic survey are visible would be most dependent upon rainfall frequency and amount. Reclamation activities undertaken during a period of normal precipitation is expected to result in reclamation of disturbed areas to near pre-impact conditions within 1 to 3 years. • Direct impacts to vegetation from oil and gas drilling and production could affect up to 250 acres under the RFD scenario (if only uplands vegetation communities are impacted). Impacts associated with producing wells would be long term, lasting 20-30 years. Indirect impacts could occur to vegetation communities located near well sites; however, with appropriate mitigation under	• The designation of the foredunes and the live oak mottes as SRAs would result in no adverse impacts to these sensitive vegetation types. • The clearing of vegetation expected is relatively small. Also, reclamation requirements would result in restoration of the affected communities in a relatively short time period, since the replacement time for most Padre Island vegetation averages 1 to 3 years. Therefore, no adverse cumulative impacts are expected under this alternative.	• With recognition of the live oak mottes and foredunes as areas to be avoided during Plan of Operations development, there should be no major adverse impacts to vegetation under this alternative. If these areas are not given adequate protection, major adverse impacts could result. • Cumulative impacts would be the same as described under Alternative A.	• Impacts would be the same as described in Impacts Common to All Alternatives, with the possibility of an increase in impacts to vegetation in non-SRA vegetative communities. • The designation of the foredune community and the live oak mottes as SRAs, with a No Surface Access provision, would result in no adverse impacts to these sensitive vegetation types. • Cumulative impacts would be the same as described under Alternative A.

IMPACTS TO VEGETATION

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
current legal and policy requirements, none of the impacts are expected to be major. • Impacts to vegetation are anticipated to be corrected through reclamation by recontouring to natural grade and reseeding with native vegetation, using reserved seed source material taken from the site. Attainment of 70 percent native vegetative cover is expected within 1 to 3 years with normal precipitation, and no major adverse impacts are therefore expected.			

IMPACTS TO WETLANDS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Seismic surveys would have minor and short-term impacts to wetlands, in any wetland community. • Direct, and potentially long-term, impacts to wetlands from oil and gas drilling and production could involve a portion of the 250 acres under the RFD scenario, if wetlands cannot be avoided, estimated at 142.5 acres. At least an equal acreage of indirect wetlands impacts could occur with successful mitigation. Only a small portion of the estimated 142.5 acres would result in long term impacts, because as some oil and gas operations are being undertaken, others are being reclaimed. • The NPS no-net loss policy and DO 77-1 require a minimum 1:1 compensation ratio for direct and indirect impacts to wetlands, to be performed prior to or at the time of impacts. In addition, the requirement to reclaim disturbances and restore wetlands communities to their natural condition at the completion of oil and gas operations should	• SRA restrictions applied in Alternative A would result in fewer direct wetland impacts to the seagrass beds in the Laguna Madre SRA, the wind-tidal flats, and emergent wetlands associated with the three freshwater ponds. • Specific wetlands communities, including the three freshwater ponds, seagrass beds and other wetlands in the Laguna Madre, and wind-tidal flats, receive increased recognition by being identified as SRAs, which heightens awareness that they are sensitive to disturbances and are important for providing habitat for wildlife, particularly for threatened and endangered shorebirds. The SRA restrictions provide for no production activities in the Laguna	• All types of wetlands communities would be affected, proportionately to the total acreages in which each is found in the park, and this could include adverse impacts to wetlands that have been designated as SRAs (Laguna Madre wetlands, wind-tidal flats, e.g.). • No identification of wetlands communities that are known to be highly sensitive to oil and gas activities would be provided to oil and gas operators. Therefore, identification of wetlands communities and Current Legal and Policy Requirements would be applied on a case-by-case basis. This could result in greater variation and the potential for greater impacts to all types of wetlands communities, especially	• Specific wetlands communities that are designated as SRAs or that are parts of larger SRAs, including the three freshwater ponds, Laguna Madre seagrass beds, and wind-tidal flats, are protected by the application of a No Surface Access restriction to all oil and gas operations, including seismic. This would result in no direct impacts to these SRA wetlands communities. However, it may also result in other wetlands communities, such as inland freshwater wetlands and salt fringe wetlands, becoming the focus of wetlands impacts. • Spills of oil and gas, and other contaminating and hazardous substances, may be an indirect effect of oil and gas exploration and development that impacts

IMPACTS TO WETLANDS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
result in no major impact to wetlands, if mitigation is successful in replacing or restoring wetlands functions and values.	Madre or wind-tidal flats, thus eliminating potential long-term adverse impacts from production in these areas. • Spills of oil and gas, and other contaminating and hazardous substances, may be an indirect effect of oil and gas exploration and development that impacts wetlands. These substances could kill wetland plants and benthic fauna. Remediation of spills in coastal wetlands is a difficult task. With restrictions on production operations in wind-tidal flats and the Laguna Madre, the long-term possibility of spills is lessened in these areas. • Cumulative effects of the proposed action on wetlands would include unmitigated wetland losses, the result of failed or inadequate mitigation. Where tidal hydrology is altered, there may be long-term effects for the Laguna Madre ecosystem as a result of diminished primary productivity and dominant plant community changes. The process of ecosystem change in the Laguna Madre as a result of the Gulf Intracoastal Waterway (GIWW) and related past dredging and wetland fills would continue. Wetland losses and fragmentation as a result of this action would contribute to that process. Protection of the barrier dune from breaches would have beneficial cumulative effects for	SRAs. • Each incremental loss of wetland productivity (e.g., nutrients supporting biological processes) affects the Laguna Madre ecosystem. Mitigation actions may take years to replace the habitat values lost; and some mitigation may fail. Long-term impacts of this and other wetland loss in the Laguna may eventually begin to affect overall productivity. The Laguna Madre has been substantially altered by the GIWW, and past oil exploration. The combined effects of wetland losses include increased siltation, reduced primary productivity, changes in dominant communities of seagrasses, and ultimately changes in the fauna. Temporal loss of habitat values and functions, incomplete mitigation, fragmentation of habitats, and similar effects are changing the nature of the Laguna Madre, including major components of Padre Island National Seashore. These processes would continue, and would continue to be a focus of management concern for the NPS.	wetlands. These substances could kill wetland plants and benthic fauna. Remediation of spills in coastal wetlands is a difficult task. With No Surface Access restrictions in wind-tidal flats and the Laguna Madre, there would be little or no possibility of spills in these areas. • The cumulative effect of Alternative C would be relatively small. Mitigation actions and natural recovery processes would restore interior and fringe wetland functions after removal of oil and gas exploration and production equipment. Because this alternative avoids Laguna Madre seagrass beds and wind-tidal flats, the cumulative effects on the Laguna Madre are limited. Temporal losses of interior wetland areas would have some negative effect on waterfowl, migratory birds, and wading birds as a result of lost habitat. Mitigation for wetlands would be at the expense of island upland habitats. Alternative C may reduce the amount of NPS staff time spent in monitoring and enforcement activities, because substantially large areas of wetlands are avoided.

IMPACTS TO WETLANDS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy In Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
	all communities behind the dunes, including wetlands, by protecting them from the effects of severe blowouts.		

IMPACTS TO FISH AND WILDLIFE

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• The standard 500-foot offset from water bodies provided by 36 CFR 9.41(a), would reduce the potential for water quality and quantity impacts and protect fish and wildlife utilizing water and the immediate riparian areas within this protective zone. • Oil and gas operations would cause the displacement of wildlife, and loss and fragmentation of fish and wildlife habitat. Impacts could range from no impacts to major impacts depending on location, timing, scope and duration of operations proposed. • Increased mortality to fish and wildlife would result from vehicles; construction activities; seismic activities; or in the event that a spill of oil and gas, and contaminating and hazardous substances escape containment systems and is released into the environment and comes in contact with fish and wildlife. • Access into previously inaccessible areas provided by new roads would increase human access and potentially increase the risk of mortality to wildlife, through legal or illegal means. • Upon completion of operations, reclamation would return natural conditions to the operations area.	• Formal designation of Sensitive Resource Areas comprising approximately 50 percent of the National Seashore and application of surface use restrictions for geophysical exploration, drilling and production activities provide consistent protection to fish and wildlife and their habitat in SRAs. Sensitive Resource Areas within Padre Island that provide essential habitat for wildlife include foredunes, freshwater ponds, Laguna Madre rookery islands, washover channels, Laguna Madre seagrass beds, relict live oak mottes, and certain visitor use areas. While drilling could be permitted in the Laguna Madre and wind-tidal flats if it meets the least-damaging method, long-term impacts from production activities would not occur in these SRAs. Seismic activities, roads, and pipeline activity could still occur in some SRAs, but seasonal or surface use restrictions would apply to	• Operational standards would be applied under Current Legal and Policy Requirements. No major adverse impact on wildlife is anticipated under Alternative B. However, adequate protection for wildlife-rich SRAs would need to be provided on a case-by-case basis, and impacts would vary with the amount of protection provided. • Cumulative impacts to fish and wildlife would be the same as described under Alternative A.	• There would be no direct impacts from oil and gas operations on fish and wildlife and their habitats within SRAs due to the application of No Surface Access restriction afforded to all SRAs. The known and forecasted effects of Alternative C are not expected to result in actions that threaten the survivability of any wildlife population, and no major adverse impacts would be expected in any area of the park. • Cumulative impacts to fish and wildlife would be the same as described under Alternative A.

IMPACTS TO FISH AND WILDLIFE

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
Wherever possible, habitats would be improved to perpetuate the viability of habitats and increase the survivability of native fish and wildlife. • Over time, standard protection provided to resources in the National Seashore under Current Legal and Policy Requirements would result in maintaining and improving habitat for native fish and wildlife.	limit impacts to minor or moderate levels, at most. Impacts associated with seismic surveys and drilling operations, where they would be permitted in SRAs, would be short-term. • Cumulative impacts to fish and wildlife as a result of oil and gas operations, plus other human-induced activities and development on Padre Island, as well as natural events such as floods and hurricanes, are not expected to result in actions that threaten the survivability of any wildlife population. Therefore, cumulative impacts are not expected to be major under this alternative.		

IMPACTS TO THREATENED AND ENDANGERED SPECIES AND THEIR HABITATS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Oil and gas operations would not be allowed to occur in areas or during specified times if there is a potential to adversely affect threatened or endangered species. The development, if it were allowed, would only occur after consultation under the ESA was completed. When listed species and their habitat are identified to be within the project area, sufficient distance offsets and/or seasonal/timing restrictions to nesting and other sensitive periods in a given species' life cycle would result in avoiding impacts. • Over time, standard protection provided to resources in the National Seashore under Current	• Formal designation of SRAs and specific protection provided by the restrictions in the SRAs (especially those that serve as support/habitat for threatened and endangered species), along with the case-by-case consultation would result in no adverse impacts to any special status species. • No cumulative adverse impacts to threatened and endangered species and their habitats as a result of oil and gas operations,	• Specific protection measures for threatened and endangered species, even in sensitive areas, would be determined through application of Current Legal and Policy Requirements and a case-by-case evaluation under consultation provisions. With adequate input, review, and data, it is expected that there would be no adverse impacts to any special status species. • Cumulative impacts to	• Formal designation of SRAs and specific protection provided by the restrictions in the SRAs (especially those that serve as support/habitat for threatened and endangered species), along with the case-by-case consultation, would result in no adverse impacts to any special status species. No Surface Access restrictions in SRAs would help to ensure no habitat disturbance or disturbance of individual threatened and endangered species present in

IMPACTS TO THREATENED AND ENDANGERED SPECIES AND THEIR HABITATS			
Impacts Common to All Alternatives	**Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas**	**Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis**	**Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas**
Legal and Policy Requirements would result in maintaining and improving habitat for listed species.	plus other human-induced activities and development on Padre Island, as well as natural events such as floods and hurricanes, are expected. Applying the Current Legal and Policy Requirements which include consultation under the ESA, affords the required protective mechanism to identify and avoid impacts to listed species.	threatened and endangered species and their habitats would be the same as described for Alternative A.	these areas. • Cumulative impacts to threatened and endangered species and their habitats would be the same as described for Alternative A.

IMPACTS TO CULTURAL RESOURCES			
Impacts Common to All Alternatives	**Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas**	**Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis**	**Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas**
• Cultural resource surveys required prior to ground disturbance could lead to the discovery of previously unknown archeological sites and other cultural resources, and add to the information about the cultural resources of the park. • Ground-disturbing activities associated with construction of well pads, roads, placement of flowlines, or geophysical exploration has the potential to affect prehistoric, historic, and traditional cultural resources. Sites that cannot be avoided would be excavated so that information is retrieved; however, impacts to the site would be irreversible. • Three-dimensional seismic survey shot holes, 3 to 4 inches in diameter, are smaller than the area typically disrupted by a professional archeologist performing a shovel test; therefore digging of shot holes would not be considered an adverse effect. Detonation of explosive charges may have an	• The designation of four historic properties as Sensitive Resource Areas and establishment of protective zones and operating stipulations would provide consistent protection of the integrity of physical remains and the context of these sites from future nonfederal oil and gas operations. Restrictions on drilling and production in and near SRA cultural sites would limit potential direct and indirect adverse impacts in these areas. • The prescribed buffers and operating restrictions would also provide for more efficient processing of Plans of Operations, reducing time and costs for the operator, NPS, and	• Alternative B, No-Action/Current Management, would provide protection to significant cultural resources by applying basic federal laws and regulations and NPS policies on a project-by-project basis, through which project-specific mitigation measures could be applied. This management strategy would be the most time-consuming of the three alternatives. Negligible impacts to cultural resources are anticipated from the RFD scenario under this alternative. • Cumulative impacts to cultural resources would be the same as described for Alternative A.	• Under Alternative C, four historic properties would be identified as SRAs, and protective zones are established in which a No Surface Access stipulation would apply to all nonfederal oil and gas operations. This alternative provides maximum protection to the significant cultural sites by precluding surface access to nonfederal oil and gas operations and therefore avoiding major adverse impacts. A No Surface Access restriction on geophysical exploration, drilling and production in and near SRA cultural sites would avoid direct and indirect adverse impacts in these areas. Therefore, only negligible impacts to cultural resources are anticipated from the RFD

IMPACTS TO CULTURAL RESOURCES

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
effect on the distribution and condition of artifacts in a surface artifact scatter or the condition of surface features. Each shot hole location would be surveyed by a qualified archeologist, and avoidance would result in repositioning the shot hole location. • A qualified archeologist would monitor ground-disturbing activities so that cultural sites not be visible from the surface are not damaged by construction activities or seismic operations. Operations shall be halted in the area where archeological resources are uncovered and the operations re-evaluated with an NPS archeologist to evaluate the significance of the discovery and to determine how the project in the area of discovery shall be conducted to avoid impacting the site. • Sights, sounds, and odors from wellsites, developed fields, or geophysical exploration activities could have an effect on cultural sites. Mitigation measures including setbacks for siting oil and gas operations, screening, and noise abatement may be employed to mitigate anticipated effects. Some standing structures may require that a sensory buffer be defined in which visual, audible or atmospheric elements do not alter the setting. • Indirect impacts to cultural resources would occur by increased public access into areas that could increase the visibility of cultural resources and result in vandalism, illegal artifact collecting, or illegal excavation. While such activities could be minor and occur sporadically, over a period of time the impacts could be considered cumulatively significant. Conversely, increased access can often increase the recreational or educational value of such sites. • Contamination at a nearby abandoned oil and gas	State Historic Preservation Office staff. • Under Alternative A, negligible cumulative impacts to cultural resources could occur in the event that cultural sites cannot be avoided and excavation/data recovery is required.		scenario under Alternative C. • Similar to Alternative A, more efficient processing of Plans of Operations and consultation with the State Historic Preservation Office are anticipated with the development of protective buffers and operating restrictions. • Cumulative impacts to cultural resources would be the same as described for Alternative A.

IMPACTS TO CULTURAL RESOURCES

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
production facility may be adversely affecting the Novillo Line Camp, listed on the National Register, by introducing an atmospheric element, hydrocarbon odor, which is out of character with the historic setting. Until such time as the operator successfully completes cleanup, which is ongoing, this resource may be adversely affected.			

IMPACTS TO VISITOR EXPERIENCE

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Although there has been little indication to date that oil and gas operations are causing major disruption to the Padre Island National Seashore visitor, there is the possibility that major impacts to visitor experience could occur near certain visitor use areas and other remote locations used by visitors to experience the natural and cultural environments, and view wildlife. Noise, in particular, may affect the visitor, if buffer distances are not sufficient and background levels are exceeded, causing disruption to wildlife use and/or visitor enjoyment, especially to visitors seeking solitude. • Hydrocarbon contamination at several oil and gas production facilities may be degrading visitor experience to Padre Island National Seashore visitors due to the introduction of industrial uses and hydrocarbon odors that is out of character with the natural and cultural surroundings. Until such time as the operators successfully complete clean up and restoration, adverse impacts to visitor experience may continue.	• There are no major impacts expected from the RFD scenario to Visitor Experience under Alternative A due to the specific distance restrictions provided with the SRA buffers; the Current Legal and Policy Requirements, which provide avoidance, mitigation and health and safety measures; and the indications that visitors do not have major issues with oil and gas operations in the park, as evidenced by surveys and the complaint record at the park. • With the application of the SRA buffers, plus the avoidance, mitigation, and health and safety measures provided in the Current Legal and Policy Requirements, there should be no major impacts to visitor experience under Alternative A.	• Current Legal and Policy Requirements, especially the lesser locational restriction provided for near SRA Visitor Use Areas (500-foot), may not provide enough mitigation, so that there is the possibility that major impacts to visitor experience could occur near the SRA Visitor Use Areas and other remote locations used by visitors to experience the natural environment and view wildlife. Noise, in particular, may affect the visitor, if buffer distances are not sufficient and background levels are exceeded, causing disruption to wildlife use and/or visitor enjoyment in these areas. Although there has been little indication to date that noise is causing major disruption to the Padre Island National Seashore visitor, the possibility exists, if oil and gas facilities are sited too close to sensitive use areas.	• There are no expected major adverse impacts in any SRA under Alternative C, given the level of specific protection provided by the "No Surface Access" restriction to all types of oil and gas activity. • With the buffer zones provided for the SRAs, the "No Surface Access" restriction in these areas, the the additional protective measures included in the Current Legal and Policy Requirements for other areas of the park, there would be no major adverse impacts to visitor experience under Alternative C. • Cumulative impacts to visitor experience are the same as described for Alternative A.

IMPACTS TO VISITOR EXPERIENCE			
Impacts Common to All Alternatives	**Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas**	**Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis**	**Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas**
	• Hydrocarbon contamination at an abandoned production facility near the Novillo Line Camp is resulting in hydrocarbon odors which may be degrading visitor experience. Until corrected, this represents a major adverse cumulative effect on the visitor experience.	• If the buffers and other provisions provided for by the Current Legal and Policy Requirements are not sufficient to mitigate impacts that can affect the visitor experience, then there could be major adverse impacts (e.g., from noise). • Cumulative impacts to visitor experience are the same as described for Alternative A.	

THIS PAGE INTENTIALLY LEFT BLANK

CHAPTER 1

INTRODUCTION

CHAPTER 1
INTRODUCTION

PURPOSE AND NEED FOR THIS PLAN

Padre Island National Seashore was established in 1962 to save and preserve a portion of the diminishing seashore of the United States that remains undeveloped, for the purposes of public recreation, benefit, and inspiration. Oil and gas activities were legislatively permitted to continue for development of nonfederal oil and gas minerals. The National Park Service (NPS) recognizes these activities as important to those who have had or will have plans to develop nonfederal oil and gas resources within the park. Many past, present, and future anticipated oil and gas activities have potential resource conflicts which NPS is required to address. At this time, there is no comprehensive program or plan guiding oil and gas activities within the park. Operators are faced with uncertain standards and requirements that vary throughout the park, depending upon the nature of the activity and the sensitivity of the resource to impacts. Unique or sensitive areas having special resource values to the park are vulnerable to impacts from a wide range of oil and gas activities.

The purpose of this Final Oil and Gas Management Plan/Environmental Impact Statement (Plan/FEIS) for Padre Island National Seashore is to manage existing and anticipated oil and gas operations in a manner that provides for hydrocarbon development, while protecting park resources. The plan sets forth the overall approaches that would be implemented over the next 15-20 years to protect natural and cultural resources, visitor use values, and human health and safety. Once finalized, the plan will serve as a guide for directing access for geophysical exploration, exploratory drilling, production, and transportation of nonfederal oil and gas resources in the park. It will also provide a greater degree of certainty to operators, since it provides up-front information on the location of Sensitive Resource Areas and suggests needed mitigation.

SPECIAL MANDATES AND DIRECTION

NPS Authority to Regulate Nonfederal Oil and Gas Development at Padre Island National Seashore

The NPS, as a federal governmental entity, has unambiguous authority to regulate nonfederal oil and gas development in units of the National Park System, including Padre Island National Seashore. The authority to manage and protect federal property arises from the Property Clause of the United States Constitution. The Property Clause provides that "Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States . . ." U.S. Const. Art. IV, ¶ 3, cl. 2. Congress' power over the public lands is without limitations, and extends to conduct that occurs on or off federal land which affects federal lands. Courts have consistently upheld Congress' broad delegation of authority to federal land managing agencies under the Property Clause in a variety of contexts. See Kleppe v. New Mexico, 426 U.S. 526 (1976); Stupak-Thrall v. United States, 70 F.3d 881 (6th Cir. 1995) (upholding Forest Service's authority to regulate privately-held surface rights to a lake within a wilderness area); Duncan Energy Co. v. Forest Service, 50 F.3d 584 (8th Cir. 1995) (upholding Forest Service's authority to regulate activities on federally owned surface from activities related to private mineral rights underlying National Forest); United States v. Vogler, 859 F.2d 638 (9th Cir. 1988) (upholding NPS regulation of access to a private mining claim in a park); Free Enterprise Canoe Renter's

Assoc. v. Watt, 711 F.2d 852 (8th Cir. 1983) (upholding NPS regulations requiring permit for canoe rental businesses located outside park); Minnesota v. Block, 660 F.2d 1240 (8th Cir. 1981) (upholding Forest Service regulation of snowmobile activities on state land).

In 1916, Congress exercised its power under the Property Clause and passed the NPS Organic Act, 16 U.S.C. §1 et seq. Congress directed the NPS to "promote and regulate" units of the National Park System "to conserve the scenery and the natural and historic objects and the wild life therein to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." 16 U.S.C. §1. Congress also mandated that the protection, management, and administration of such units "shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established..." 16 U.S.C. § 1a-1. Congress further authorized the Secretary of the Interior to "make and publish such rules and regulations as he may deem necessary or proper for the use of the parks..." 16 U.S.C. §3.

In 1962, Congress established Padre Island National Seashore. Under Section 4(a) of the enabling legislation and the NPS Organic Act, Congress authorized the Secretary of the Interior to promulgate rules and regulations for nonfederal oil and gas development in the park (16 U.S.C. § 459d *et seq.*).

Pursuant to its authority at 16 U.S.C. §3 and several individual park enabling statutes, the NPS promulgated regulations at 36 C.F.R. Part 9, Subpart B ("9B Regulations') to provide a systemwide regulatory scheme governing the exercise of nonfederal oil and gas rights. The purposes of the regulations are to "insure that activities undertaken pursuant to [nonfederal oil and gas rights] are conducted in a manner consistent with the purposes for which the National Park System and each unit thereof were created, to prevent or minimize damage to the environment and other resource values, and to insure to the extent feasible that all units of the National Park System are left unimpaired for the enjoyment of future generations." 36 C.F.R. § 9.30(a). Section 4(a) of the Padre Island enabling statute authorizes the NPS to protect the federal surface interest at Padre Island National Seashore from potentially harmful activities associated with the exercise of nonfederal oil and gas rights under the 9B regulatory scheme.

The 9B regulations fall within the broad scope of authority granted to the NPS from Congress under the NPS Organic Act - authority that includes the power to regulate conduct that occurs on or off federal land, which may affect federal lands. The regulations are designed to control conduct associated with private mineral rights on federal land to avoid or minimize harm to park resources and values. Thus, the United States need not own the mineral interest beneath Padre Island National Seashore to regulate rights associated with that interest that may affect the federally owned surface.

Both state and federal law govern the conduct of oil and gas operations at Padre Island. However, to the extent that state laws conflict with the federal statutory and regulatory requirements governing the exercise of nonfederal oil and gas rights at Padre Island National Seashore, the state law must yield to federal requirements.

This planning effort is designed to provide Padre Island National Seashore with a comprehensive framework for the NPS to manage the exploration, development, and transportation of nonfederal oil and gas. The planning process will not (indeed it cannot) effect a substantive change to the laws and regulations governing the management of park system resources. Changes to the NPS's governing laws and regulations are made either by Congress or by the NPS through rulemaking under the Administrative Procedures Act, respectively.

Padre Island National Seashore Enabling Legislation

The park was established by Congress on September 28, 1962 (see 16 U.S.C. §459d*et seq.*). The enabling legislation is provided in Appendix A. The relevant sections of the park's enabling legislation that provide guidance regarding the management of nonfederal oil and gas are provided in two sections:

> Sec. 4.(a) When acquiring land, waters, or interests therein, the Secretary shall permit a reservation by the grantor of all or any part of the oil and gas minerals in such land or waters and of other minerals therein which can be removed by similar means, with the right of occupation and use of so much of the surface of the land or waters as may be required for all purposes reasonably incident to the mining or removal of such from beneath the surface of these lands and water and the lands and waters adjacent thereto, under such regulations as may be prescribed by the Secretary with respect to such mining or removal. (See 16 U.S.C. §459d-3(a).)

Under Section 4(a) of the park's enabling legislation and the NPS Organic Act (16 U.S.C. §3), Congress authorized the Secretary of the Interior to promulgate the NPS's Nonfederal Oil and Gas Rights Regulations, 36 CFR 9B. A copy of the 36 CFR 9B regulations is provided in Appendix B.

Section 4(b) of the park's enabling legislation exempted a specific class of nonfederal oil and gas operations from any NPS regulations. This exemption applied to operations existing within Padre Island National Seashore, operating under grants, leases, or easements existing on April 11, 1961. This class of operator was also to be granted additional surface uses and occupancy, pursuant to the 36 CFR Part 9B regulations, which were necessary for the development of oil and gas from outside the boundaries of the park. The last operator at the park to qualify under this exemption ceased production of 4 wells in the Gulf of Mexico, outside the boundaries of the park, and removed all above-ground production facilities located on the island and within the boundaries of the park in 1985.

> Sec. 4.(b) Any acquisition hereunder shall exclude and shall not diminish any right of occupation or use of the surface under grants, leases, or easements existing on April 11, 1961, which are reasonably necessary for the exploration, development, production, storing, processing, or transporting of oil and gas minerals that are removed from outside the boundaries of the National Seashore and the Secretary may grant additional rights of occupation or use of the surface for the purposes aforesaid upon the terms and under such regulations as may be prescribed by him. (See 16 U.S.C. §459d-3(b).)

General Management Plan Direction

The General Management Plan (GMP) is the major planning document for all National Park System units. The GMP sets forth the basic philosophy of the unit, and provides strategies for resolving issues and achieving identified management objectives required for resource management and visitor use. The GMP includes environmental analysis and other required compliance documentation.

In August 1980, Hurricane Allen swept across Padre Island National Seashore. The full fury of the storm demonstrated the vulnerability of structures placed in coastal high-hazard zones. Furthermore, the corrosive salt-air atmosphere of the Gulf shore, which causes a constant, ongoing maintenance problem for any developments, led to the new General Management Plan/Development Concept

Plan (GMP/DCP), to recognize "that left alone, the natural barrier-island processes will perpetuate the unique resource values recognized by Congress and enjoyed by the public. Stated conversely, experience here and in other barrier-island environments has proved that wherever humans disturb the natural features or interfere with natural forces on a barrier island, they eventually destroy or seriously impair the island's natural ability to renew itself. Consequently, the island will be managed to sustain natural processes, accepting natural change as part of its evolution through time and space. Resource management problems will be reduced in the future by avoiding facilities and activities that go counter to the island's natural energy systems."

The Draft GMP/DCP for Padre Island National Seashore was completed in April 1983, and contained an integrated set of proposals to be carried out over a 10-15 year period to:

- ensure the continued protection of the island's natural and cultural resources,
- support the established level and pattern of visitor use, and
- facilitate efficient park operations.

The following strategies were identified in the GMP/DCP to achieve the identified management objectives:

- Natural processes will be allowed to shape the barrier island with as little interference as possible.
- Natural resource manipulation will be limited to localized efforts to correct human-induced impacts.
- The vestiges of historic and prehistoric occupants of the island will be protected from man-caused damage, but not from the effects of natural forces. (NPS policy requires preservation maintenance to protect resources from the effects of natural erosion and deterioration.)
- Facilities that are sited in the coastal high-hazard area (the Malaquite pavilion and campground) will be retained until their maintenance is no longer cost-effective or they are damaged by a storm; at that time they will be removed, and the same service will be provided in a more environmentally sensitive manner.
- Recreational use will be supported by all ongoing services and by increased on-island information and interpretation. Activity zoning will be established around Bird Island Basin to minimize visitor conflicts and disturbance of nesting birds, and driving corridors will be delimited to reduce the potential for resource damage and conflicts among visitors associated with ORV driving along the beach.
- Required island operations and maintenance facilities, including housing for necessary law enforcement personnel, will be consolidated at Malaquite.

The following management objectives were identified in the GMP/DCP:

- Provide for recreational opportunities and development of the National Seashore in a manner that is compatible with the protection of the natural and cultural resources of the area.

- Avoid, to the extent possible, the long- and short-term impacts associated with the occupancy and modification of barrier island floodplains and the destruction or modification of wetlands.
- Encourage a continuing research program, which will provide staff with information needed for interpretation and management of the natural and cultural aspects of the seashore.
- Maintain and foster close liaison and cooperation with governmental and nongovernmental entities and individuals who have an interest in the National Seashore and its surroundings.
- Provide visitors with a varied and balanced interpretive program that offers insights into the natural and cultural values of the seashore.
- Fulfill the commitment to previous property owners by ensuring their ability to recover the reserved oil and gas mineral resources with a minimum of environmental consequences.

The GMP/DCP recognized . . ."that hurricanes will continue to hit the Texas Gulf Coast and that natural and man-made features are vulnerable to storm damage. The perpetuation of the fore-island dune ridge is paramount to the island's storm defenses and thus to the overall preservation of the island. Where the fore-island dune ridge is well developed, the barrier island blocks the storm tidal surge and dissipates wave energy, providing a major defense for the mainland."

The GMP/DCP specifically identified that: "A minerals management plan will be prepared that will identify and map existing leases and existing operations; identify and map critical resources to be protected (beach, dunes, ponds, archeological sites, endangered species, views, etc.); list minerals management policies; assess cumulative impacts of oil and gas operations; and describe procedures for managing oil and gas operations, including the time frames and content of required documentation." These identified tasks will be addressed in this Oil and Gas Management Plan/Environmental Impact Statement. The NPS has chosen to retitle this document from that of "minerals management plan" to the more specific title of "Oil and Gas Management Plan."

The GMP/DCP provided direction in identifying that: "The NPS controls exploration and extraction activities through enforcement of federal regulations; agreements with the state School Land Board (now the Texas State General Land Office), oil companies, and private owners; and the requirement for an approved Plan of Operations, which effectively prevents drilling on the beach, in the dunes, or in ecologically sensitive areas."

The Oil and Gas Management Plan will identify areas closed to access and surface uses, and areas open to access and surface uses with a range of Current Legal and Policy Requirements. Current Legal and Policy Requirements would include operating standards and specific resource protection measures intended to protect natural and cultural resources, and visitor use values.

Current Legal and Policy Requirements

NPS Nonfederal Oil and Gas Rights Regulations, 36 CFR 9B: Pursuant to the authority delegated by the Park Service Organic Act and individual park statutes, the Secretary of the Interior promulgated the 36 CFR Part 9B regulations in 1979 to protect park resources from potentially harmful uncontrolled oil and gas development (see 36 CFR §9.30 et seq.). The regulations apply to operations that require access on or through federally owned or controlled lands or waters in connection with nonfederally owned oil and gas in all National Park System units (36 CFR §9.30(a)). "Operations" is broadly defined under the regulations to include all activities associated with the exploration for and development of nonfederally owned or controlled oil and gas, from gathering basic information to comply with the regulations to the transport of petroleum products (36 CFR §9.31(c)). A copy of the 36 CFR 9B regulations is provided in Appendix B.

The critical component of the regulations is the requirement that an operator submit and obtain NPS approval of a proposed Plan of Operations before commencing oil and gas exploration or production activities (36 CFR §9.36). Such plans are essentially a prospective operator's "blueprint" for conducting activities including impact mitigation and site reclamation. Operators are responsible for preparing a Plan of Operations that addresses all information requirements applicable to proposed operations. Operators must supply this information in sufficient detail to enable the NPS to effectively analyze the impacts of the proposed operations on the particular unit's resources and values, and to determine whether to approve the proposed plan (36 CFR §9.36(c)). The Park Superintendent's or Regional Director's decisions under the 36 CFR Part 9B regulations are administratively appealable by the operator (see 36 CFR §9.49).

Other Applicable Legal and Policy Requirements: The following table (Table 1.1) provides a summary for the Current Legal and Policy Requirements that would apply to any of the alternatives considered in the EIS. These include the 36 CFR 9B and pipeline regulations discussed above, plus many other regulations, executive orders, policies, and guidelines that the NPS can use to control the effects of nonfederal oil and gas development in its parks. A more detailed description of these requirements can be found in Chapter 2 (Part 2) and in Appendix C.

Table 1.1. Legal and Policy Mandates Governing Nonfederal Oil and Gas Operations[1]

AUTHORITIES	RESOURCES AND VALUES AFFORDED PROTECTION
Statutes and Applicable Regulations	
NPS Organic Act, 16 U.S.C. §1 et seq.	All, e.g., air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, T&E species, visitor use and experience
NPS Nonfederal Oil and Gas Regulations – 36 CFR Part 9, Subpart B	All, e.g., air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, T&E species, visitor use and experience
Park System Resource Protection Act, 16 U.S.C. §19jj	All, i.e., any living or non-living resource located in a unit except non-Federally owned resources
Enabling Act for the Big Thicket Preserve, 16 U.S.C. §698a	Natural, scenic and recreational values
American Indian Religious Freedom Act of 1978, 42 U.S.C. §§1996 – 1996a, 43 CFR Part 7	Cultural resources
Antiquities Act, 16 U.S.C. §§431-433, 43 CFR Part 3	Cultural, historic, archeological, paleontological resources
Archeological Resources Protection Act of 1979, 16 U.S.C. §§470aa – 470mm, 43 CFR Part 7	Archeological resources
Clean Air Act, 42 U.S.C. §7401 et. seq., 40 CFR Parts 50, 58, 60, 61, 82, 93, and 48 CFR Part 23	Air resources
Clean Water Act of 1977, 33 U.S.C. §1251 et seq., 40 CFR 110, 112, 116, 117, 230-232, 323, 328, 33 CFR 320-330	Water resources, wetlands, waters of the U.S.
Coastal Zone Management Act of 1972, 16 U.S.C. §1451 et seq., 15 CFR Parts 923, 930, 933	Coastal waters and adjacent shoreline areas

[1] This table summarizes many, but not all, of the statutes, regulations, executive orders and policies that govern the exercise of nonfederal oil and gas rights in park units.

AUTHORITIES	RESOURCES AND VALUES AFFORDED PROTECTION
Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §9601 et. seq., 40 CFR Parts 300, 302, 355, 373	Human health and welfare and the environment
Endangered Species Act of 1973, 16 U.S.C. §§1531-1544, 50 CFR Parts 402, 450	Listed threatened and endangered plant and animal species or subspecies and their designated critical habitat
Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. §136 et. seq. As amended by the Federal Environmental Pesticide Control Act and FIFRA amendments of 1975, 1978, 1980, 1988, 1996, 40 CFR Parts 152-180, except Part 157	Human health and safety and the environment
Federal Land Policy and Management Act of 1976, 43 U.S.C. §1701 et seq., 43 CFR Part 2200	Federal lands
Hazardous Liquid Pipeline Safety Act of 1979, 49 U.S.C. §2001 et seq., 49 CFR Parts 190, 195	Human health and safety and the environment
Hazardous Materials Transportation Act, 49 U.S.C. §5101 et seq.	Human health and safety
Historic Sites, Buildings, and Antiquities Act (Historic Sites Act) of 1935, 16 U.S.C. §461-467	Historic and archeological sites, buildings and objects of national significance
Lacey Act, 16 U.S.C. §3371 et seq., 50 CFR Parts 10-12	Fish, plants, wildlife
Migratory Bird Treaty Act, 16 U.S.C. §703-712, 50 CFR Parts 10, 12, 20, 21	Migratory birds
National Environmental Policy Act, 42 U.S.C. §4321 et seq. , 40 CFR 1500-1508	Cultural and historic resources, natural resources, biodiversity, human health and safety, socioeconomic environment, visitor use and experience
National Historic Preservation Act of 1966, 16 U.S.C. §§470--6, 36 CFR 60, 63, 78, 79, 800	Cultural and historic resources
Native American Graves Protection and Repatriation Act of 1990, 25 U.S.C. §§3001-3013, 43 CFR Part 10	Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony
Natural Gas Pipeline Safety Act of 1968, 49 U.S.C. §1671 et seq. , 49 CFR Parts 190-193 §§4901-4918	Human health and safety, the natural environment
Noise Control Act of 1972, 42 U.S.C. §§4901-4918	Human health and welfare
Oil Pollution Act, 33 U.S.C. §§2701-2761, 40 CFR Part 112; 33 CFR Parts 135, 137, 150; 49 CFR Part 106; 15 CFR Part 990; 33 CFR Part 135; 33 CFR Part 137	Water resources, natural resources
Resource Conservation and Recovery Act, 42 U.S.C. §6901 et. Seq., 40 CFR 240-280, 49 CFR 171-179	Natural resources, human health and safety
Rivers and Harbors Appropriation Act of 1899, 33 U.S.C. §401 et. seq., 33 CFR 322	Shorelines and navigable waterways, tidal waters, wetlands
Safe Drinking Water Act of 1974, 42 U.S.C. §300f et seq., 40 CFR 141-148	Human health, water resources
Executive Orders	
Executive Order 11593 – Protection and Enhancement of the Cultural Environment, 26 FR 8921 (1971)	Cultural resources
Executive Order 11988 - Floodplain Management, 3 CFR 1977 Comp. p. 117, amended by EO 12148, 3 CFR 1979 Comp. p. 412	Floodplains
Executive Order 11990 – Protection of Wetlands, 3 CFR 1977 Comp. p. 121, amended by EO 12608, 3 CFR Comp. p. 245	Wetlands
Executive Order 12088 – Federal Compliance with Pollution Control Standards, 3 CFR 1978 Comp. p. 243, amended by EO 12580, 3 CFR 1987 Comp. p. 193	Natural resources, human health and safety
Executive Order 12630 – Governmental Actions and Interference with Constitutionally Protected Property Rights, 3 CFR 1988 Comp. p. 554	Private property rights
Executive Order 12898 – Federal Actions to Address	Minority and disadvantaged populations

AUTHORITIES	RESOURCES AND VALUES AFFORDED PROTECTION
Environmental Justice in Minority Populations and Low-Income Populations	
Executive Order 13007 – Indian Sacred Sites	American Indian sacred sites
Executive Order 13112 – Control of Invasive Species	Non-native vegetation
Chapter 1 Policies and Guidelines	
NPS Management Policies	Air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, endangered and threatened species, visitor use and experience, visual resources
Dept. of the Interior, Departmental Manual, DM 516 - NEPA policies	All park resources
Dept. of the Interior, Departmental Manual, DM 517 - Pesticides	Human health and safety, vegetation, wildlife
Dept. of the Interior, Departmental Manual, DM 519 - Protection of Cultural Resources	Cultural resources
Department of the Interior's Onshore Oil and Gas Order Number 2, Section III, Drilling Abandonment Requirements	Human health and safety
NPS Director's Order -12 – National Environmental Policy Act Guidelines	All, e.g., natural and cultural resources, human health and safety, socioeconomic environment, visitor use
NPS Director's Order - 28 – Cultural Resource Management	Cultural and historic resources
NPS 66 – Minerals Management Guideline	Natural resources, public health and safety
NPS 77 – Natural Resources Management Guideline	Natural resources
NPS Director's Order 77-1 – Wetland Protection	Wetlands
NPS Special Directive 93-4 – Floodplain Management Guideline	Floodplains
Secretary of the Interior's "Standards and Guidelines for Archeology and Historic Preservation," 48 FR 44716 (1983), also published as Appendix C of NPS Director's Order 28 – Cultural Resource Management	Cultural and historic resources
Government-to-Government Relations with Native American Tribal Governments, (Presidential Memorandum signed April 29, 1994).	Native Americans – Tribal rights and interests
Selected Texas Laws and Regulations	
Texas Natural Resources Code, Title 2, Chapter 40 (Oil Spill Prevention and Response Act of 1991, also liability for natural resources damages from spills), TEX. NAT. RES. CODE tit. 2, §40 (1991)	Human health and safety, natural resources
Texas Natural Resources Code, Title 3, Chapters 81 through 85 (oil and gas operations), TEX. NAT. RES. CODE tit. 3, §§81-85	Human health and safety, natural resources
Texas Administrative Code, Title 16. Economic Regulation, Part 1. Railroad Commission of Texas, Chapter 3. Oil and Gas Division, TEX. ADMIN. CODE tit. 16, §3 (1997)	Human health and safety, natural resources

THE PLANNING PROCESS

The oil and gas management planning process consisted of the following steps: establishing a planning team, developing planning objectives, identifying issues and collecting data, scoping with the public and governmental agencies, generating alternatives, and identifying major issues and evaluating alternatives.

Establishing a Planning Team

The first step in the planning process was establishing an NPS planning team to coordinate and plan the Oil and Gas Management Plan/Environmental Impact Statement. The planning team consisted of approximately 30 NPS staff. Fifteen formed a core team, which was chiefly responsible for developing the plan. Three have significant industry background, while seven others have extensive experience working with the oil and gas industry on regulatory and operational issues. Other NPS staff who contributed to the production of the plan have expertise in the areas of geographic information systems; environmental regulations such as the National Environmental Policy Act, Endangered Species Act, and National Historic Preservation Act; and a range of resource issues including wetlands, hydrology, wildlife including threatened and endangered species, and cultural resources. Four private consultants were contracted, and one graduate student working in an NPS-New Mexico Highlands University partnership project participated in preparing impact analyses.

The interdisciplinary core team determined there were no cooperating agencies participating in the development of this document. Through internal and public scoping, the team did identify the following federal and state agencies that would be involved in the permitting process for nonfederal oil and gas operations within Padre Island National Seashore. These agencies and affiliated groups include:

- **U.S. Fish and Wildlife Service**. Pursuant to Section 7 of the Endangered Species Act, the NPS consults with the F&WS on a project-by-project basis to evaluate the adequacy of resource survey information and associated mitigation measures being employed to avoid or mitigate potential impacts to threatened/endangered species or their habitat.

- Also pursuant to Section 7 of the Endangered Species Act, the NPS consults with the **Texas Parks and Wildlife Department** on a project-by-project basis to request an updated list of state-listed special status species; and with the **National Marine Fisheries Service** for a list of special status marine species.

- The **Texas Parks and Wildlife Department, Texas State General Land Office, and Texas Natural Resource Conservation Commission** share natural resource trusteeship of the biota, submerged lands, and groundwater, respectively, at Padre Island National Seashore.

- **Texas State Historic Preservation Officer**. Pursuant to Section 106 of the National Historic Preservation Act, the NPS would consult with the SHPO on a project-by-project basis to evaluate the adequacy of cultural resources survey information and mitigation measures to avoid impacting significant cultural resources.

- **Texas State General Land Office**. This state agency performs several important roles pertaining to the nonfederal oil and gas program at Padre Island National Seashore. The

GLO administers the leasing program for state-owned oil and gas that are located under the submerged waters within the boundaries of the park. It also administers the federally-approved Coastal Zone Management Program, for which the NPS would consult on a voluntary basis to ensure consistency with the intent of the program.

- **Tonkawa Tribe**. Pursuant to Section 106 of the National Historic Preservation Act, the NPS is responsible for determining whether or not historic properties to which American Indian tribes may ascribe cultural or religious significance may be affected by its undertakings. The Tonkawa Tribe of Oklahoma was consulted because their customary homeland before 1859 was the south Texas area just north of Padre Island and because of their past relationship with the Karankawa people, Padre Island's native inhabitants. At a July 1995 meeting in Oklahoma City between the NPS and representatives of the Oklahoma tribes to discuss tribal affiliations with national parks in Texas and Oklahoma, none of the 16 federally recognized tribes present (the Tonkawa Tribe was not present) asserted any association with Padre Island. Further, at an October 28, 1996, meeting of the Working Group on Historic Preservation of the Seven Tribes of the Anadarko Agency, Oklahoma, members present unanimously recommended to NPS that the Tonkawa Tribe be consulted for any activities affecting national park lands in south and southwest Texas. The NPS consulted with the Tonkawa Tribe through correspondence and telephone calls beginning in July 1997 and during a visit to the park by an officially designated tribal representative in May 1998. The tribal representative's preliminary conclusion was that Padre Island is too far south of Tonkawa customary lands for the tribe to identify historic properties of cultural or religious significance or to have specific concerns about the potential impacts of the oil and gas operations. The Tonkawa Tribe, however, is concerned about the health of the Padre Island ecosystem in general and wishes to be kept informed about the oil and gas management plan and about NPS management plans for the Island in general.

- **Railroad Commission of Texas**. This state agency regulates oil and gas production under its Statewide Oil and Gas Rules.

- The **U.S. Army Corps of Engineers** administers Section 404 permitting for dredge and fill into waters of the United States. Operators whose operations require Section 404 permitting would consult with the Corps for such permits. The COE would also provide certification of wetlands delineations performed by operators of prospective sites and adjacent lands needed to identify resource issues that may be affected by a proposed operation and to evaluate potential direct and indirect impacts on wetlands.

  The Corps also administers Section 10 of the Rivers and Harbors Act of 1899. A Department of Army authorization is required for work in, on, or below navigable waters of the United States. Navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. (33 CFR 329.4)

Developing Planning Objectives

The planning objectives used by the planning team in developing this Plan/FEIS were:

- Identify which park resources and values are most sensitive to oil and gas exploration and development disturbance, and define impact mitigation requirements to protect such resources and values.
- Establish reasonable oil and gas exploration and development performance standards to protect park resources and values.
- Provide pertinent information to oil and gas owners and operators that will facilitate operations planning and compliance with all applicable regulations.

Identifying Resources and Collecting Data

During the scoping process, the planning team identified many resources that could be affected by nonfederal oil and gas operations. The following is the initial list of resources that came out of scoping meetings and discussions:

- Air Quality
- Cultural Resources
- Fish and Wildlife
- Floodplains
- Foredunes
- Freshwater Ponds
- Local and Regional Economies
- Natural Quiet
- Night Sky
- Oil and Gas Exploration and Development
- Park Operations
- Relict Live Oaks
- Rookery Islands
- Seagrass Beds
- Soils
- Threatened and Endangered Wildlife Species and their Habitats
- Vegetation
- Visitor Experience, and Human Health and Safety
- Visitor Use Areas
- Visual Quality
- Washover Channels
- Water Resources
- Wetlands

During 1996 and early 1997, additional information was collected about these resources. A vegetation classification map was completed for use as a base map, and additional information was collected to map and describe certain resources. All of the topics listed above were analyzed by the team and presented and discussed during the public scoping process described below. Criteria were developed to evaluate relative importance of these issues in relation to the park and the proposed oil and gas operations.

Based on the team's evaluation of these resources and public input received (both during scoping and on the Draft EIS), resources or locations identified as being particularly sensitive to oil and gas operations were designated as Sensitive Resource Areas (SRAs). These SRAs were used in developing and evaluating alternatives.

SRAs were selected and considered to be particularly important because they met one or more of the following criteria:

- cannot be successfully reclaimed using state-of-the-art methods;
- are important historic, cultural, and archeological sites;
- are developed areas that support visitor use and enjoyment;
- support threatened and endangered species habitat; and/or
- provide a natural defense for the island and mainland against major storm surges associated with tropical storms.

Of the remaining resources on the initial list, nine (9) were identified as having the potential to experience major impacts from oil and gas development, or as being important to overall environmental quality; and one topic (oil and gas exploration and development) could be affected by resource protection measures under the plan alternatives. These issues were selected for more detailed analysis and are addressed in Chapters 3 and 4 of this Plan/FEIS. The remaining topics on the initial list were not carried through for detailed analysis, but are discussed at the end of this chapter.

Public Scoping and Comments

The public scoping process is required under the National Environmental Policy Act (NEPA). Scoping under NEPA involves the solicitation of comments and concerns from the public regarding projects that are proposed on federal land. Issues and concerns raised by the public during the scoping period are used by the NPS to establish which issues and resource topics need to be addressed in the EIS.

Early in the planning process, the planning team consulted with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Texas Parks and Wildlife Department about threatened and endangered species that could occur in the park; with the State Historic Preservation Office about cultural resources; and with the Tonkawa Tribe to inform them of the planning process and issues that could affect lands that may be significant to them, and to determine if there were any resource issues with which the Tonkawa Tribe had ethnographic affiliation.

In June 1997, the NPS mailed a public scoping newsletter to over 300 individuals, organizations, and government agencies. The newsletter announced the beginning of the EIS scoping period and the location, date, and time of the scoping open house. A notice of intent was published in the*Federal Register* on June 10, 1997. The NPS also published the notice of intent and announced the scoping open house by placing newspaper advertisements in the Austin *American-Statesman*, Houston *Chronicle*, and Corpus Christi *Caller Times*. The notices of intent and newsletter provided the public opportunities for scheduling additional scoping open houses; however, the NPS received no requests for additional scoping meetings.

The scoping newsletter also provided information on the planning process and schedule, and described how agencies and the public could be involved. The newsletter identified oil and gas management plan goals and planning objectives, sensitive resources and values, and preliminary management strategies. The NPS developed the preliminary planning framework to inform agencies and the public of what the NPS was considering, but more important, to provide agencies and the public with enough information with which they could bring other ideas, comments, suggestions, and management strategies to the decision-making process.

The formal public scoping period for the proposed Oil and Gas Management Plan/Environmental Impact Statement for Padre Island National Seashore concluded on January 6, 1998. During this period, one scoping open house was held in Corpus Christi, Texas. All issues, concerns, and alternatives identified during scoping have been considered by the NPS for inclusion in the EIS.

A second newsletter was released on March 6, 1998, to over 280 individuals, organizations, and government agencies. The newsletter summarized the results of the scoping open house and the written comments received by the NPS. The newsletter categorized and summarized issues, concerns, and alternatives raised. Although the formal scoping period ended on January 6, 1998, the NPS continued to consider public comments throughout the EIS process, as allowed by the overall EIS schedule. This includes solicitation of public comments on the Draft EIS. All issues, concerns, and alternatives identified during scoping and obtained from public comment on the Draft EIS were considered by the NPS for inclusion in this Final EIS.

What We Heard From You: In response to publishing the notice of intent, hosting the scoping open house, and distributing the Public Scoping Newsletter, nine comment letters were received by the NPS during the scoping period, and 13 individuals asked to be added to the mailing list for receiving the Draft EIS.

To encourage early and open public participation, the NPS hosted an open house in Corpus Christi, Texas, on July 9, 1997, at the Omni Bayfront. Ten members of the public attended. Four participants represented three different oil and gas companies; one participant represented a consulting firm; three participants represented private mineral owners at the National Seashore; one participant represented an environmental organization; and one participant represented the state university system.

The Draft EIS was distributed for review and comment from February 26 through May 12, 1999. Fifteen (15) letters were received.

Scoping Comments: The following are issues and questions raised in the comment letters received by the NPS and recorded at the scoping open house. The comments, which are summarized below by major subject area, were considered in the completion of this Plan/FEIS.

- **Compliance with State and Federal Regulations**

  An approved Plan of Operations will serve as a permit for exploration and development of nonfederal minerals on the seashore's federal lands, such a plan must be consistent with the State of Texas' federally approved coastal management program if there is any potential for impacts to coastal resources outside those federal lands. I therefore encourage you to consider consistency with the Texas Coastal Management Program (CMP) during development of the management plan and the environmental impact statement.

  Will endangered species permits be necessary? What other permits will this project need? Who will pay the costs of obtaining these permits?

- **Planning Goals and Objectives**

  The stated goals and planning objectives in the Public Scoping Newsletter are very good and adequately outline the given task.

- **Planning Process**

  How will the plan be updated?

  Will the plan address 3D seismic operations?

- **Identification of Resources and Issues**

  I agree with the sensitive resources and values that have been initially identified. The National Seashore is a spot famous for its bird-watching and other wildlife watching opportunities. Your identified resources and values seem to cover these areas and the other important features of the area.

  Maintaining pristine water quality should also be a defining criteria. Beaches along many of the coastal areas are full of tar balls resulting from past oil spills and accidents. How can we be sure that this will not happen to Padre Island National Seashore?

  Protecting the aquifer should be a major consideration.

  What effect will oil and gas development have on sport fishing and recreation?

  Will these activities be restricted so as not to harm or interfere with fish spawning patterns, marine mammal migrations, aquatic food chains, reptiles and nesting birds?

  What effects will siltation and drilling have upon marine organisms?

  What impacts and effects will the proposed action have upon threatened and endangered species? The endangered Green Sea Turtle, Hawksbill Sea Turtle, Kemp's Ridley Sea Turtle, and Leatherback Sea Turtle, plus the threatened Loggerhead Sea Turtle are all found within the area. These species use the Padre Island National Seashore for nesting and the proposed action may disturb their habitat thereby constituting a taking.

  [Information that should be included in the plan to facilitate oil and gas operations planning is] any information which would impact either the timing, or method of implementation of any oil and gas operation.." More specifically, pertinent information should include any and all geographic "off limits" areas (visitor, environmental, historical), seasonal nuances, and guidelines for mobilization and de-mobilization of equipment and personnel.

  The bullets as expressed in the newsletter that deal with specific items, species, etc., appear to be consistent with that usually encountered by oil and gas operators in other sensitive areas, however, I do get concerned with hard to define or very general criteria. For instance, "scenic integrity, a sense of history, sounds of nature" if vigorously applied, or construed to the extreme, by certain groups or individuals, then these could very possibly preclude <u>any</u> oil and gas operations. As long as the criteria, resources and values are ranked consistent with, what I assume from the titling of this project, is permitting oil and gas operations with minimal impact, then the identified criteria is workable.

How much oil and gas is present? Do the environmental costs outweigh the monetary benefits?

- **Alternatives**

If there are certain (hopefully, very limited) geographic areas, seasons, situations or conditions that need to be held sacrosanct then, they should be clearly set forth from the beginning.

Taking "management strategy" to a different connotation, I would offer the following framework. Institute a panel of industry and environmental experts to oversee the permitting process. Permitting would originate under the auspices of this panel by the requesting party. The initial meeting could be patterned after the Louisiana Department of Natural Resources' "Geologic Review Meeting," which is the "informal" process that this agency has utilized to pull together various state and federal agencies into one room for initial comment. I would recommend that the "informal" be removed and that the panel be "independent," rather than a subset of commenting agencies. Further, the panel should remain in a position of authority throughout the permitting process.

...develop a plan that is in the best interest of the natural environment of the National Seashore as well as allowing the mineral owners to exercise their rights to oil and gas exploration on their lands.

...almost all Oil and Gas Operations that I am familiar with are usually more than happy to comply with reasonable regulations on environmentally sensitive lands.

I would like to see the National Park Service adopt a policy that allows exploration and development and protects the environment. To me, this can most easily be accomplished by developing a general plan that allows the mineral owners their rights and is not so restrictive as to prohibit economic exploration.

I believe that clear mapping of the area with some type of an impact sensitivity rating that would establish the concerns for the area and risk that would be acceptable would allow project planning to proceed without the full structure of the management plan being available.

It should be possible to develop some minimum impact requirements for these operations and the[n] allow the companies to establish a quality control program to ensure that they perform as indicated. I believe that ISO 14000 could be used as the basis for having independent 3rd party verification of performance at these sites.

What about drilling outside the Padre Island National Seashore area on an angle to reach the oil and gas reserves?

How can one be certain that the proposed developers have a good record of environmental stewardship and compliance? How will the developers be held accountable for their activities? Who will remediate operations that are not conducted properly?

Should environmental problems occur, how will the problem (such as a spill) be cleaned up? Will the cleanup equipment be located nearby or on site? If not, how long will it take to arrive and who will pay for cleanup operations? How soon will the cleanup occur? Who will be responsible for fish, mammal and reptile kills? What about the litter and general havoc upon the area caused by oil and gas developers? Who will pay for future environmental degradation such as pipeline ruptures brought about by these activities? What if problems occur several years down the road? Who will pay to cleanup future spills?

Kemp's ridleys are nesting at the Seashore in an incredible breakthrough for sea turtle conservation. The entire area of beach and coastal waters should be declared a sanctuary in order to give the turtles an opportunity to nest without fishing vessels, oil field traffic or any type of commercial traffic.

The beach should remain the peaceful, quiet, untouched place that it is. All of us need places that provide the solitude, space and scenery which we need to offset the frantic pace of our daily lives.

Specific guidelines should be provided for operations, such as for drilling a well, or dealing with contaminants.

Public Comment on the Draft EIS: The comment letters received on the Draft EIS are reproduced at the end of Chapter 5, along with responses to all substantive comments. The comments provided in these letters were considered and incorporated, where appropriate, into this Plan/FEIS.

Generating Alternatives

This Plan/FEIS for Padre Island National Seashore identifies and analyzes a reasonable range of alternative strategies for managing the exploration, development, and transportation of the nonfederal oil and gas mineral estate underlying Padre Island National Seashore necessary to protect natural, cultural, and visitor use values, as well as human health and safety.

As a result of public scoping and the resource analysis conducted by the EIS team, the NPS considered three alternatives to describe the different options available to the NPS for managing nonfederal oil and gas exploration and development in the park. These alternatives included the No-Action alternative, plus two additional alternatives that were developed to respond to the issues mentioned above, especially the identification of specific SRAs. Each alternative presents a different level of application of oil and gas management constraints. Together with the Current Legal and Policy Requirements, each of the alternatives forms a separate land-use plan.

The term "Current Legal and Policy Requirements" as used in the description of alternatives means application of all pertinent federal and state laws, regulations, and policies governing resource protection and oil and gas operations conducted in the park. These include NPS regulations at 36 CFR 9B, which require operators to use technology and methods least damaging to resources, while ensuring the protection of human health and safety. Current Legal and Policy Requirements are based primarily on laws, regulations, manuals, and existing land use plans.

The plan alternatives are described in Chapter 2, along with the Current Legal and Policy Requirements. A brief summary of the alternatives follows below:

Alternative A, Proposed Action (Preferred Alternative): This alternative would provide for no surface occupancy or specific restricted access in designated SRAs, plus designated buffer areas. Generally, geophysical (seismic) exploration could be allowed in SRAs under Current Legal and Policy Requirements. In all other areas of Padre Island National Seashore, oil and gas activities would be permitted under Current Legal and Policy Requirements.

In SRAs where surface access is restricted, directional drilling from a surface location outside an SRA to access a bottomhole location underlying the SRA would be permitted. Directional drilling technology for placement of pipelines under SRAs to avoid surface impacts would also be permitted.

SRAs are shown on Table 2.2, with the maximum acreage for protective buffers. SRAs, with their maximum protective buffers, comprise 68,731 acres, or 53 percent of the park. Since specific restrictions would be applied to specific types of oil and gas activities for each SRA, the total SRA acreage would not be totally off-limits to all types of oil and gas operations.

Alternative B, No-Action (Current Management): All areas, or 100 percent of the park, including SRAs, would be open to nonfederal oil and gas exploration, development, production, and transportation under Current Legal and Policy Requirements.

Alternative C, Maximum Resource Protection in All Sensitive Resource Areas: In general, a "No Surface Access" restriction would be applied to all types of oil and gas activities in all SRAs, comprising 68,731 acres or 53 percent of the park. In all other areas of the park, oil and gas activities would be permitted under Current Legal and Policy Requirements. Directional drilling from a surface location outside SRAs to access bottomhole locations underlying SRAs would be permitted. Directional drilling technology for placement of pipelines under SRAs to avoid surface impacts would also be permitted.

Identifying Important Issues and Evaluating Alternatives

Issues to be Analyzed in Depth: As previously mentioned, the EIS team conducted an evaluation of the initial issues identified, based on their experience and public input, and decided which issues were most important in relation to the park, the decision to be made regarding the different plan alternatives, and overall environmental quality. The team developed issues to define problems (or benefits) that might occur should action be taken (in this case, if ongoing actions continued). The issues analyzed in depth in Chapters 3 and 4 are as follows:

- **Oil and Gas Exploration and Development** – considered an important issue because oil and gas mineral rights are a nonfederal property interest, and there is the potential for controversy.

  Oil and gas development could be impacted by resource protection measures that are included in the various alternatives analyzed in this Plan/FEIS. NPS requirement for oil and gas operators to use methods least-damaging to park resources and values could increase operating costs, lower income to mineral owners and operators, reduce environmental risk and liability to operators, and result in decisions to not undertake further drilling and exploration.

- **Air Quality** – considered an important issue because of its contribution to the overall environmental quality in the park and surrounding region.

Drilling, production, transport and storage of hydrocarbons; the use of gasoline and diesel-powered engines (vehicles, earthmoving equipment, generators, compressors, etc.); and maintenance activities such as use of herbicides for vegetation control on and around operations sites, emit pollutants including nitrogen oxides, carbon oxides, sulfur oxides, particulate matter, and objectionable odors. These emissions could degrade air quality locally within Padre Island National Seashore.

Ground-disturbing activities associated with construction of roads, pads and pipelines; and vehicle use on and off paved roads; and exhaust from combustion of gasoline and diesel-powered vehicles and equipment from all types of oil and gas operations could increase emission of particulate matter (dust) thereby reducing visibility.

- **Soils and Water Resources** – considered an important issue because the highly porous sand at Padre Island National Seashore allows for rapid transport of any leaked or spilled oil and gas, and other contaminating or hazardous substances into the shallow perched freshwater aquifer that supports the park's substantial wetlands and important biotic communities. Several of the park's water resources were identified as SRAs, including the three freshwater ponds and the Laguna Madre.

  Several incidents of hydrocarbon and heavy metal contamination resulting from oil and gas operations in the past have resulted in remediation that has been costly and controversial. Future releases of hydrocarbons or other contaminating and hazardous substances from vehicle use, drilling and production activities, and transportation of hydrocarbons could contaminate soils and degrade water quality. Contamination could occur by releasing contaminants directly onto soil or in water, or indirectly from subsequent transport of contaminated soil and water into adjacent areas.

  Construction of roads, pads, and pipelines, and off-road vehicle use, could increase soil erosion, rutting and compaction, introduce nonnative construction materials, alter natural hydrologic flow, and degrade water quality.

- **Floodplains** – considered an important issue because nearly all of Padre Island is in the 100-year floodplain, and hurricanes or prolonged rain events can cause extreme flood events that can result in hazardous conditions for oil and gas operations. In addition, foredunes and washover channels were designated as SRAs because of their hydrologic and ecological value.

  Construction of roads, pads, pipelines, and associated oil and gas operations could alter floodplain conditions to increase risk to life and property which cannot be adequately mitigated by design or modification of actions, cause natural floodplain values to not be restored, or reduce beneficial floodplain values.

  Reclamation activities such as recontouring and revegetation could have a beneficial effect by restoring natural floodplain values.

- **Vegetation** – considered an important issue because the vegetation of Padre Island includes numerous plant communities that contribute to its ecological integrity, help to control erosion, and provide a natural visual setting. Disturbance of the native vegetation by oil and gas operations and other developments has resulted in sites with little vegetation and/or increased erosion potential.

Vegetation could be trimmed along seismic survey source and receiver lines, routinely cut along pipelines, or totally cleared in areas for construction of roads, pads, and pipelines.

Off-road vehicle use could crush, damage or uproot vegetation.

Releases of oil and gas, and other contaminating and hazardous substances could harm or kill vegetation.

The live oak mottes could be affected by oil and gas operations. The live oak mottes were designated as SRAs because of their rarity and ecological value because they provide important wildlife habitat that is scarce in the park.

Reclamation of disturbed areas could restore areas to their pre-disturbance vegetative cover and composition.

- **Wetlands** – considered an important issue because over 60 percent of the park consist of wetlands; therefore, oil and gas activities cannot avoid impacting wetlands.

  Wetlands are a major contributor to the high ecological value of the park, and their high productivity and habitat support functions that are susceptible to impacts from oil and gas operations and other developmental pressures.

  Vehicle use in areas with saturated soils could result in deeper rutting. Rutting could result in loss of vegetation, alter hydrologic flow, and increase soil erosion.

  Construction of roads, pads, pipelines, and associated oil and gas activities in wetlands could cause the loss of wetlands vegetation, disrupt soils, and alter the natural hydrologic regime. These effects could change the functions and values of the wetlands community.

  Release of oil and gas, and other contaminating and hazardous substances could result in degradation of the water quality within the wetlands, damage or kill vegetation and biotic life.

  Reclamation of oil and gas operations sites to pre-disturbance conditions could result in short-term impacts from equipment. However, long-term benefits to wetland areas could be achieved when the site is restored to its natural condition.

  Several wetlands communities were identified as SRAs because of their sensitivity to impacts and high biological values (seagrass beds in Laguna Madre, and wind-tidal flats).

- **Fish and Wildlife** – considered an important issue because Padre Island is home to many fish and wildlife species that add to its value and visitor experience, and that would be susceptible to the hazardous materials and habitat disturbance associated with oil and gas operations. The rookery islands in the Laguna Madre were specifically recognized as an SRA and would be particularly vulnerable to disturbance from oil and gas operations, especially during certain seasons.

  Construction of roads, pads, flowlines and pipelines could displace fish and wildlife, cause the direct loss of fish and wildlife habitat, and fragment habitat.

Aquatic wildlife could experience degradation of water quality due to increased turbidity as a result of using airguns associated with seismic surveys in water, and earthmoving activities for building roads, pads, and pipelines in or near surface waters.

Use of airguns in water-based geophysical exploration operations generate high velocity shock waves that could stun or kill fish.

Driving vehicles off-road to perform surveys, lay seismic receiver cables and drill shot holes, or to inspect or maintain facilities, could temporarily disturb and displace sensitive species though noise and vibrations. Animals that do not move quickly or freeze in response to noise, such as snakes or lizards, could be crushed or wounded by vehicles on or off roads. Off-road vehicle use could also crush and kill vegetation, compact soils and alter wildlife microhabitat.

Increased noise from detonation of seismic explosives, diesel engines on exploratory drilling rigs, compressors at production operations and pipelines, and other equipment and activities, could increase wildlife stress levels, deplete energy reserves, interrupt feeding, and disrupt behavior critical to reproduction or rearing of young. Abandonment of young increases the potential for predation. Abandonment of nests could reduce chances that eggs will hatch.

Increased noise could interfere with wildlife communications necessary for learning and reproduction. These effects could reduce reproductive rates, increase mortality, and reduce the survivability of individuals of a population. Many wildlife, such as deer, rely on acute hearing to detect predators.

Vibrations from detonation of seismic explosives or use of heavy vehicles and equipment could affect embryonic development, particularly to eggs of birds, fish, amphibians and reptiles, startle fish and wildlife, and reduce the survivability of individuals of a population.

Fish and wildlife could be injured or killed if they come into contact with or ingest oil and gas, or other contaminating and hazardous substances that could be released from vehicles on and off roads, from drilling or production equipment, and pipelines.

Hydrocarbons, heavy metals, and other contaminating or hazardous substances could be ingested by fish and wildlife and be stored in fatty tissues. This effect could biomagnify over time and could be particularly harmful to predatory fish or fish-eating birds and mammals when fat tissues are consumed.

Use of herbicides to control exotic vegetation in and around oil and gas operations over the life of operations could be directly toxic to wildlife, or be transported by wind or surface waters and indirectly affect fish and wildlife.

Heavy equipment and earthmoving activities used in reclaiming oil and gas operations sites could crush or displace fish and wildlife and contribute to turbidity in surface waters. However, after reclamation has been achieved, the area could be returned as productive fish and wildlife habitat.

- **Threatened and Endangered Species and Their Habitats** – considered an important issue because of the rarity and sensitivity of these species, and their habitats, to the effects of oil and gas operations. Of particular concern is the presence of important sea turtle habitat and incubation areas.

- **Cultural Resources** – considered an important issue because of the unique and educational nature of these resources and their susceptibility to disturbance or activities which can disrupt their character. For example, hydrocarbon contamination from an abandoned natural gas processing facility spread via surface water into Novillo Line Camp, a historic site listed on the National Register of Historic Places. The contamination is resulting in visible sheening on surface water and strong hydrocarbon odor, which degrades the character and setting of the historic property. Also, several cultural sites were specifically identified as SRAs (three line camps and the Mansfield Archaeological District).

  The NPS requirement for oil and gas operators to perform cultural resource surveys as a part of information requirements of a plan of operations could result in adding information about cultural resources in the parks.

  Vehicle use off of improved roadways could disturb or destroy exposed or buried cultural resource materials.

  Detonation of explosives in seismic survey shotholes and use of heavy oil and gas vehicles and equipment near or over cultural resources could disturb the distribution and damage artifacts in a surface artifact scatter or the condition of surface features of cultural landscapes, historic structures, or ethnographic resources.

  Increased public access via new gas and oil field access roads could increase the visibility of cultural resources and result in illegal activities, such as vandalism, artifact collecting, and excavation.

  Any ground disturbing activities associated with clearing and construction of roads, pads, and pipelines could disturb or destroy surface and buried archeological materials, ethnographic resources and historic structures, and alter cultural landscapes.

  Sights, sounds, and odors from oil and gas vehicles and equipment from construction sites, wellsites, production operations, or geophysical exploration operations could introduce atmospheric elements that could alter the historic setting and affect the integrity of certain cultural resources.

  Leaks and spills of oil and gas, and other contaminating and hazardous substances from vehicles and equipment along access roads or from well sites, production sites, and pipelines could damage or destroy cultural resources.

- **Visitor Experience** – considered an important issue because oil and gas operations introduce an industrial element in a natural environment, with potential conflicts with visitor uses, enjoyment, and safety. Several high-use visitor use areas that would be particularly affected by oil and gas operations were identified as SRAs (Malaquite Visitor Center/RV Campground, Bird Island Basin, and Grasslands Nature Trail).

  Oil and gas operations could produce unpleasant smells, alter the natural or historic visual scene, destroy natural quiet and degrade water quality. These effects could change visitor experience of the parks and affect visitor uses.

Oil and gas operations could threaten human health and safety from a variety of causes, including increased vehicular traffic, particularly from large vehicles that have reduced maneuverability or visibility; from moving equipment at wells and production facilities; from rupture and explosion of wellheads and pipelines; and from contact through inhalation, absorption or ingestion of hydrocarbons and contaminating substances as a result of spills, explosions and fires.

The impacts anticipated from the alternatives for these issues are described in detail in Chapter 4, and the issues or resources themselves are described under Affected Environment, Chapter 3. A comparative summary of impacts is included in Table 2.4.

Resources and Issues Evaluated and Dropped from Detailed Analysis: For the remaining issues, a resource analysis or evaluation was conducted, but the team concluded that these issues were either already included under other issues that would be discussed in detail, or did not require additional analysis. In many cases, these issues were not major issues or values for the park, and the impacts expected (assuming application of all required mitigation) would be negligible or minor. Since these topics would not be major factors in the EIS decision-making process, they were dropped from further detailed evaluation. These topics include:

- Local and Regional Economies
- Park Operations

In addition, there are several topics that must be considered in an EIS (mandatory EIS topics, NPS DO-12). Several of these were not evaluated for various reasons:

- Possible Conflicts Between the Proposed Action and Land Use Plans, Policies, or Controls
- Sustainability and Long-term Management, and Energy Requirements and Conservation Potential
- Socially or Economically Disadvantaged Populations
- Prime and Unique Agricultural Lands

The following discussion provides a brief summary of the issues that were not evaluated in detail, along with the specific reasons why these were eliminated from further analysis. The resource evaluations are available in the project file.

Local and Regional Economies: There were approximately 1,000 new wells drilled in the Corpus Christi area during 1997 alone. This compares to a historical average of about one well per year drilled inside the present boundary of Padre Island National Seashore. Natural gas production in the District was 1,350 BCF in 1997. The USGS estimates 80 BCF of natural gas would be discovered underneath Padre Island over the next 30 years. That is equivalent to less than 3 BCF/year on average, or about 0.2 percent of District 4 natural gas daily production.

In the rare event that a serious spill event would occur, the public could perceive that the park is not a desirable place to visit. Tourism could fall, resulting in reduced revenues to the local economy. The likelihood of this happening is very small, considering the precautions and mitigation required of the operators.

Impacts to local and regional economies could be considered major, if there were discernible changes in revenue flow, salaries, unemployment rates, and/or utilization of local goods and services, or conflicts with exiting ways of life with the local and regional areas. However, given the above information, especially considering the minimal amount of oil and gas production historically present and also expected in the park, the local or regional economies would not be measurably affected under any of the alternatives. Therefore, this topic was eliminated from further detailed analysis.

Park Operations: Padre Island National Seashore has been assigned different management zoning categories that reflect different park operations and resources. These include the natural zone, historic zone, development zone, and special use zone. Many of the park's sensitive cultural and natural features (including many SRAs identified and used in the EIS analysis) can be found within the natural or historic zones. The development zone includes areas where development or intensive use substantially alters the natural environment. These areas include the ranger station, maintenance facility, visitor use areas, surface roads, and utilities.

Oil and gas operations affect different park operations in different ways and to a different extent, depending on the nature of the operation. Many of these operational areas are covered and discussed under other issues, especially issues dealing with sensitive natural and cultural resources and visitor experience.

Management of private oil and gas operations in Padre Island requires dedication of park and support office staff time. NPS personnel spend time meeting with operators to discuss regulatory requirements, procedures, and resource issues. They evaluate submitted plans, prepare environmental assessments, and set performance bond amounts. Then, when approved work is underway, personnel spend time monitoring operations and reclamation to ensure compliance with the Plan of Operations. Management costs are partially offset by having better operations in the park. Improved operating standards reduce the likelihood of spills and other accidents. For those spills that do occur, contingency planning (required in a Plan of Operations) works to minimize the associated impacts. This translates to a decreased burden on the NPS in terms of responding to oil- and gas- related emergencies.

In general, the less sensitive park operations are not expected to be adversely affected by the proposed oil and gas development under any of the alternatives. Any operations that might experience major adverse impacts are addressed under other issues that include the specific operation or area in question. For all operations in the natural zones, appropriate mitigation measures under Current Legal and Policy Requirements would require such things as remediation of any contamination and reclamation to natural contours, with native vegetation cover to 70 percent of preimpact conditions, or even more stringent mitigation for certain resources and natural areas. Also, the 36 CFR 9B regulations §9.41(a) provide an operating standard indicating that "surface operations shall at no time be conducted within 500 feet of any structure or facility (excluding roads) used for unit interpretation, public recreation or for the administration of the unit, unless specifically authorized by an approved Plan of Operations." Application of this requirement is expected to minimize impacts on most park operations.

Park management would actually benefit under Alternative A. Although the overall NPS expense of managing private oil and gas operations is not expected to change, park and support office time necessary to handle individual permit applications would be reduced, and park staff time could be shifted to other aspects of oil and gas management or other park purposes.

In conclusion, it was determined that oil and gas development would have no major impacts on park operations that would not be covered under other issues addressed in detail, and this topic was eliminated from further analysis.

Possible Conflicts Between the Proposed Action and Land Use Plans, Policies, or Controls: This EIS is consistent with the NPS Organic Act, park enabling legislation, the General Management Plan for Padre Island National Seashore, and all applicable policies and controls.

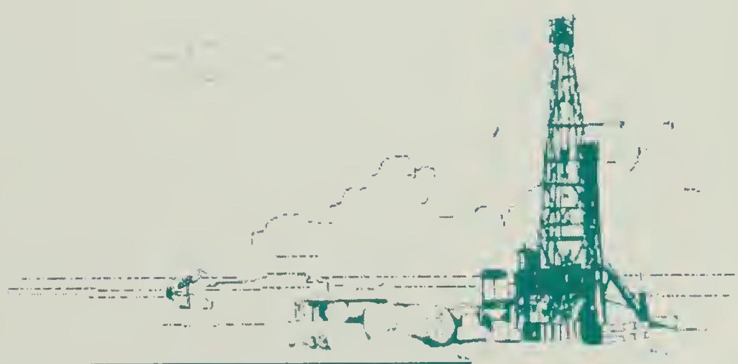
Sustainability and Long-term Management, and Energy Requirements and Conservation Potential: This EIS is not concerned with construction and maintenance of dwellings or structures for public use; therefore, this topic is not evaluated.

Socially or Economically Disadvantaged Populations: This EIS does not address or affect socially or economically disadvantaged populations; therefore, this topic is not evaluated.

Prime and Unique Agricultural Lands: There are no prime or unique agricultural lands within or adjacent to Padre Island National Seashore.

CHAPTER 2
PART I

PLAN ALTERNATIVES



CHAPTER 2
PART I, PLAN ALTERNATIVES

INTRODUCTION

This chapter contains two sections, the first of which discusses plan alternatives, and the second, Current Legal and Policy Requirements that would be applied regardless of which alternative is selected.

The first section outlines three proposed plan alternatives that represent different approaches for managing the exploration, development, and transportation of nonfederal oil and gas underlying Padre Island National Seashore, while protecting natural and cultural resources, human health and safety, and allowing for public use and enjoyment of those resources. The difference between the plan alternatives is the allocation of surface acreage in the park that is proposed for either No Surface Occupancy, No Surface Access, or other restrictions on surface disturbance or time of use. These areas represent important natural and cultural resources and visitor use areas, and are designated as Sensitive Resource Areas (SRAs). No long-term occupancy and surface disturbances associated with nonfederal oil and gas exploration and development would be permitted in areas designated as No Surface Occupancy. Surface access and uses associated with nonfederal oil and gas exploration and development within all remaining acreage not proposed as No Surface Occupancy or No Surface Access zones under each alternative would be subject to a variety of resource and visitor use protection measures under Current Legal and Policy Requirements.

The second section of the chapter summarizes the Current Legal and Policy Requirements (resource protection measures) that will be applied regardless of which alternative is selected. This direction is fundamental; its associated guidance is based on laws, regulations, manuals, policies, executive orders, and applicable direction provided in NPS planning documents. Table 1.1 lists all of the legal and policy mandates and the resources they are intended to protect. In addition, Appendix A (enabling act for the National Seashore), Appendix B (National Park Service Nonfederal Oil and Gas Rights Regulations – 36 CFR 9B), and Appendix C (Federal Laws, Regulations, Executive Orders, Policies and Guidelines that Apply to Nonfederal Oil and Gas Activities) describe the regulatory framework that govern nonfederal oil and gas activities in Padre Island National Seashore.

FUTURE MODIFICATIONS TO THE OIL AND GAS MANAGEMENT PLAN

The Current Legal and Policy Requirements presented in this chapter are anticipated to be supplemented in the future as technology improves and as we learn more about the most effective methods to protect park resources and values and avoiding conflicts with visitor use, enjoyment, and safety. Also, as new or revised regulations, policies, and land use planning direction are implemented, the Current Legal and Policy Requirements described in this chapter will be updated and supplemented.

APPLICABILITY OF THE PLAN TO NEW LANDS AND WATERS THAT MAY BE ADDED TO THE PARK IN THE FUTURE, OR IN RESPONSE TO DYNAMIC CHANGES TO THE ENVIRONMENT

If new lands and waters are added to Padre Island National Seashore in the future, the land classification system used in this EIS would guide the management restrictions on the added lands and waters.

Padre Island is a coastal barrier island subject to dynamic change, particularly in the event of a hurricane. Future storm events are likely to change the land classification currently shown in the EIS. When such environmental changes occur, the maps will be revised and the restrictions based upon environmental factors will continue to serve as a guide. For example, if a storm eliminated an existing permanent freshwater pond and the site became an emergent wetland, that site would no longer be managed as an SRA. Conversely, if a storm created a new washover channel, that site would automatically be treated as an SRA.

EXEMPTIONS FROM THE PLAN

This plan takes into consideration future technological innovations. Given technological changes and improvements, and in the event that best available technologies are applied, specific elements of the selected plan or Current Legal and Policy Requirements may be exempted. All requests for an exemption shall be presented in a Plan of Operations with sufficient discussion how the potentially impacted resource or value would be protected by replacing the plan restriction or Current Legal and Policy Requirement with a technological innovation. Approval of exemptions shall be documented with full discussion and evaluation of potential impacts in the accompanying Environmental Assessment for a proposed Plan of Operations.

TYPES OF OIL AND GAS OPERATIONS

There are four general phases of petroleum development: (1) exploration, (2) drilling, (3) production, and (4) abandonment and reclamation. Surface uses vary for each phase of development vary in terms of the amount of surface disturbance and the duration of operations. Also, operations related to one or all of the phases may be occurring in the same area at any given time. Appendix D, Types of Oil and Gas Operations, is provided to give the reader a general understanding of common activities associated with each phase of oil and gas development.

REASONABLY FORESEEABLE DEVELOPMENT SCENARIO

In order to assess the possible environmental effects that could occur under any of the alternatives presented in this plan, the United States Geological Survey (USGS) and the National Park Service (NPS) worked together to estimate the remaining hydrocarbon reserves in the National Seashore and to develop a projection of the type and level of activities that could occur to develop these reserves. Initially, the USGS estimated the remaining hydrocarbon potential beneath Padre Island National Seashore. The USGS Assessment of Remaining Hydrocarbon Resources Beneath Padre Island National Seashore, contained in Appendix E, discusses at length the geology, target formations, and remaining hydrocarbon potential within Padre Island National Seashore. Based on this information, the NPS prepared a Reasonably Foreseeable Development Scenario (RFD Scenario) for the production of the remaining hydrocarbons.

Future oil and gas exploration and development may not occur as predicted in the RFD Scenario. The RFD scenario only provides a reasonable basis for analyzing potential effects of oil and gas related activities in the National Seashore among the alternatives presented in this EIS.

The Reasonably Foreseeable Development Scenario is based on these assumptions:

- Approximately 80 BCF of natural gas and associated liquid hydrocarbons is discovered and produced from inside Padre Island National Seashore over the next 30 years. The volume is based on the USGS assessment of the undiscovered oil and gas resource potential of Padre Island National Seashore.

- The demand, price, and availability of domestic hydrocarbons remain relatively stable.

- Information obtained via 3D-Seismic will result in a success ratio of two discoveries for each three exploration wells.

- The locations for wells described in these scenarios are in addition to existing wells that are producing, shut-in, or plugged and abandoned.

- Because Padre Island National Seashore is nearly 70 miles long and only 1/2 to 3 miles in width, it is likely that discovered fields will overlap the boundary of Padre Island National Seashore.

An estimated 12 new wells inside Padre Island National Seashore are projected to produce 80 BCF over the next 30 years. A possible sequence of development would be:

- Obtain 3D-Seismic data over all areas in Padre Island National Seashore.

- Drill 6 exploration wells, 4 of which are commercially successful discoveries. Two (2) exploratory wells would be dry-holes and would be plugged immediately and the associated developments reclaimed within 6 months.

- Three (3) of the discovery wells prompt drilling of 2 additional wells inside the National Seashore, to fully develop each of the 3 fields.

- One (1) of the discovery wells remains a single well field or an extension of an existing field.

There is a reasonable expectation that surface disturbances associated with drilling and production operations could be reduced with the following mitigation measures:

- Most of the potential bottomhole locations inside the National Seashore could be accessed by directionally drilling from a surface location outside the boundaries of the National Seashore. This is technologically possible due to the narrow configuration of the National Seashore;

- Drilling and producing one or more wells from a single pad;

- Utilizing existing abandoned drilling sites or other previously disturbed areas for drilling and production operations; and,

- Directionally drilling pipelines under Sensitive Resource Areas.

The following section provides a description of typical hydrocarbon exploration and production activities and an estimate of the area of surface disturbance that would occur to develop the nonfederal oil and gas reserves beneath the National Seashore. The following acreage estimates are used to assess the impacts on resources in the National Seashore and are presented in Chapter 4, Environmental Consequences.

Exploration Activities

A 3-D seismic program for the National Seashore could involve 64 shot points per square mile. This would involve drilling 100-foot shot holes loaded with 10 pounds of explosives. With mini-charges and shallower holes, the number of shot points could increase three to nine-fold. The park is approximately 200 square miles. With 64 shot points per square mile, the total number of shot points could be minimally 12,800. Shot points and receiver points would be separated by 1,980 feet. Shot points would be 220 feet apart.

Actual surface disturbance associated with the conduct of 3-D seismic exploration operations would likely vary depending upon the type of equipment used and utilization of applicable SRA stipulations and performance standards. It should be noted that expected surface impacts would largely be limited to terrestrial areas, including wind-tidal flats. Marine seismic operations conducted in the Laguna Madre and Gulf of Mexico waters of the National Seashore would be expected to result in very minimal impacts to submerged lands.

Recently approved 3-D seismic operations in the upper 10 miles of the National Seashore provide a basis for calculating the estimated area of surface impact resulting from such operations. Use of low-impact, tracked aluminum buggies for drilling shot holes along source lines and the placement/retrieval of geophones and cable along receiver lines results in a direct surface impact width of approximately 7.5 feet. This impact width equates to about one (1) acre of direct impact per mile of buggy use. The NPS estimates that the conduct of 3-D seismic operations on terrestrial lands within the National Seashore would likely require a total of 748 miles of buggy use (408 miles of source lines and 340 miles of geophone receiver lines). The anticipated area of direct impact to the surface would be approximately 748 acres, or 0.88 percent of the terrestrial land base. This estimate does not take into account multiple trips for trouble-shooting receiver lines or redrilling source lines.

Drilling and Production Operations

Rather than try to choose which of the six RFD exploratory wells would be dry holes and which would be the single producer of a field, the interdisciplinary team assumed that all six RFD exploratory wells would be fully developed and evaluated the potential for environmental impacts based on 18 wells (6 exploratory wells x 3 wells to develop each of 6 fields = 18 wells). The interdisciplinary team sited the 6 exploratory wells evenly along the length of the National Seashore in a variety of landcover classification types.

RFD #1 is located in the Laguna Madre near the north boundary of the park. Access for a drilling barge is via existing channels or dredging new channels from the intracoastal waterway. The development wells may be drilled in the Laguna Madre from barges or directionally drilled from a surface location on the western side of the National Seashore. Production facilities could be located on a terrestrial site on Padre Island (not on North Bird Island). Flowlines from the wells would transport production to the production facility. Product could then be transported by a flowline to an existing pipeline at a point north of Bird Island Basin to carry product to the mainland.

Activity Under RFD #1	Dimensions	Surface Disturbance
Dredge channel in Laguna Madre for access by Drill rig barge	50' x 2,000'	= 2.30 acres
Dredge to place flowline from well in Laguna Madre to west edge of Padre Island	50' x 3,000'	= 3.44 acres
Continue placement of flowline cross-island to production facility site just west of park road	50' x 2 miles	= 12.12 acres
Production facility	300' x 300'	= 2.07 acres
Access road from Park Road 22	20' x 1 mile	= 2.42 acres
Flowline to tie-in with existing pipeline north of Bird Island Basin to transport product to mainland	50' x 1 mile	= 6.06 acres
Total Surface Disturbance:		28.41 acres

RFD #2 is located near milepost 10. Access to the drilling site is via the beach, with entry to the back-island gained through an existing road cut through the dune line near milepost 6. Existing oil and gas roads are improved and used to the extent possible. Approximately 1 mile of new access road and a new 2-acre pad are put in to drill the exploration well. One development well would be drilled directionally from the existing pad, while a second development well would require an additional 1/2 mile of access road and a 2-acre drilling pad. One of the bottomhole targets is in the Gulf of Mexico on a State of Texas lease tract. New production facilities are installed with gas tied into the Murdock Pass lateral pipeline, while liquids are stored on location and transported via tank trucks.

Activity Under RFD #2	Dimensions	Surface Disturbance
Road extension	20' x 1 mile	= 2.42 acres
Exploratory well pad	300' x 300'	= 2.07 acres
Development well #1		= 0.00 acres
Development well #2 road extension	20' x 1/2 miles	= 1.21 acre
Drill pad	300' x 300'	= 2.07 acres
Flowline to Murdock Pass	50' x 6 miles	= 36.36 acres
Total surface disturbance:		44.13 acres

RFD #3 is located near milepost 15. Access to a drilling site north of Yarborough Pass is via improvement of existing oil and gas roads and construction of new road and well pad. Approximately 1/2 mile of new access road is constructed to a well pad built on a wind-tidal flat. One development well needs an additional 1/2 mile of access road and a well pad on a wind-tidal flat. A second development well is drilled directionally from one of the two new well locations. Production is transported via pipeline to new production facilities located at Yarborough Pass. Gas production is tied into the Murdock Pass lateral pipeline, and liquids are stored on location until transported by tank trucks.

Activity Under RFD #3	Dimensions	Surface Disturbance
Access road	20' x 1/2 mile	= 1.00 acre
Exploratory well pad	300' x 300'	= 2.07 acres
Development well #1 access road	20' x 1/2 miles	= 1.21 acres
Pad #2	300' x 300'	= 2.07 acres
Production facility at Yarborough Pass	300' x 300'	= 2.07 acres
Flowline to Yarborough Pass	50' x 7,000'	= 8.03 acres
Total surface disturbance:		16.45 acres

RFD #4 is located near milepost 25. Access to the drilling site is via the beach, with entry to the back-island gained with a cut through the dune line (using the existing road cut to the cultural site, Green Hill Line Camp). The exploration well is a straight hole and is located south of Green Hill. One development well requires construction of 1 mile of new access road and a 2-acre drilling pad. A second development well is reached using directional drilling from one of the new well locations. Production is transported via pipeline to new facilities located at Yarborough Pass. Gas production is tied into the Murdock Pass lateral pipeline, and liquids are stored on location until transported by tank trucks.

Activity Under RFD #4	Dimensions	Surface Disturbance
Widen and stabilize existing dune cut and entry road to Green Hill		= 0.50 acre
Road extension south immediately upon entry behind dune	20' x 1/2 mile	= 1.21 acres
Development well #1 road extension	20' x 1 mile	= 2.42 acres
Development Well Pad #1	300' x 300'	= 2.07 acres
Pipeline corridor to Yarborough Pass	20' x 13 miles	= 78.79 acres
Total surface disturbance:		84.99 acres

RFD #5 is located near milepost 33 in a wind-tidal flat. Access to the drilling site is via the beach, with a road constructed to the back-island through the edge of a washover channel. Approximately 1 mile of new road is constructed from the beach. One 2-acre pad is built to support the exploration well. Directionally drilled development wells and production facilities are located at the same site, expanding the pad to 3 acres. Production is transported via pipeline to new facilities located at Yarborough Pass. Gas production is tied into the Murdock Pass lateral pipeline, and liquids are stored on location until transported by tank trucks.

Activity Under RFD #5	Dimensions	Surface Disturbance
Road through edge of washover channel	20' x 1 mile	= 0.50 acre
Road	20' x 1 mile	= 2.42 acres
Exploratory well pad	300' x 300'	= 2.07 acres
Extended pad for 2 development wells		= 1.00 acre
Pipeline corridor to tie-in to RFD #4 pipeline To carry product to Yarborough Pass	20' x 7 miles	= 42.42 acres
Total surface disturbance:		48.41 acres

RFD #6 is located near milepost 53. Access is provided by barge at Mansfield Channel. From there, equipment is transported north on the beach, where access to the back-island is gained with a cut through the dune line. The exploration well requires 1/2 mile of new road and a well pad. One development well requires construction of 1/2 mile of new access road and a drilling pad. A second development well is reached using directional drilling from one of the new well locations. One of the well pads is expanded to 3 acres to locate separation, storage, and pumping/compression facilities. Production is moved to the mainland via new pipeline.

Activity Under RFD #6	Dimensions	Surface Disturbance
Improve loading area at Mansfield Channel near the Gulf beach		= 0.50 acre
Stabilize cut through dune		= 0.50 acre
Access road	20' x 1/2 mile	= 1.21 acres
Exploratory well pad	300' x 300'	= 2.07 acres
Development Well #1 access road	20' x 1/2 mile	= 1.21 acres
Development Well #1 pad	300' x 300'	= 2.07 acres
Pad expansion for Development Well #2 onto exploratory well pad or development well pad #1		= 0.50 acre
Flowline to existing pipeline tie-in 3 miles offshore in Gulf of Mexico	50' x 3 statute miles	=18.18 acres
Total surface disturbance:		26.74 acres

Table 2.1. Approximate Acreages Associated with RFD Scenario

Action	Wells Projected	Surface Disturbance in Acres
RFD #1	3 wells projected	26.74 acres
RFD #2	3 wells projected	44.13 acres
RFD #3	3 wells projected	16.45 acres
RFD #4	3 wells projected	84.99 acres
RFD #5	3 wells projected	48.41 acres
RFD #6	3 wells projected	26.74 acres
Total – Well development	18 wells projected	249.13 acres (represents about 0.2 percent of the 130,434 total acres of Padre Island National Seashore)
Seismic Survey	N/A	748 acres (represents 0.88 percent of the 84,726 acres of terrestrial land base of Padre Island National Seashore)
TOTAL – Seismic Plus Wells	18	Approximately 250 + 748 = 998 acres (represents 0.77 percent of the 130,434 total acres of Padre Island National Seashore)

The RFD scenario predicts the number of wells, the extent of roads and pipelines, seismic surveys, and other appurtenant facilities and activities associated with surface disturbance for the next 15 to 20 years. The RFD scenario provides a method to test the site-specific effectiveness of mitigation measures, and to provide a basis to measure and compare the three alternatives and address cumulative effects.

To ensure that there is no misunderstanding, the NPS wants to underscore that the presented RFD scenario is solely hypothetical. The formulation of actual development plans rests with companies and private individuals. The NPS responds to proposed Plans of Operations submitted by operators who have secured the right to explore for and/or develop nonfederal oil and gas underlying the National Seashore, and identifies needed surface use stipulations.

MAPPING AND DEFINING SENSITIVE RESOURCE AREAS

Alternative scenarios for oil and gas operations were developed based on the sensitivity of park resources to oil and gas operations. During the interdisciplinary team's initial evaluation and analysis of all potentially affected resources, criteria were developed to identify those resources considered particularly sensitive to oil and gas exploration, development, and/or transportation. In addition, public comments on the Draft Plan/EIS were considered. Based on both the scoping analysis and public comments received, 17 specific resources or locations were designated as Sensitive Resource Areas (SRAs) that would be used in generating alternatives.

Table 2.2 (below) provides a listing of the SRAs and information on their extent in the park. More detailed information about these SRAs and maps showing their location within Padre Island are provided in Chapter 3.

Table 2.2. Sensitive Resource Areas in Acres and Percent of Park

Sensitive Resource Area	Acres (w/buffers)	Percent of Park	Discussed Under this Topic in EIS
Cultural Sites:			Cultural Resources
-Novillo Line Camp	377 acres	0.29%	
-Green Hill Line Camp	311 acres	0.24%	
-Black Hill Line Camp	313 acres	0.24%	
-Mansfield Cut Archeological District	2,702 acres	2.07%	
Freshwater Ponds:			Soil and Water Resources
-Pond A	33 acres	0.03%	
-Pond B	33 acres	0.03%	
-Pond C	42 acres	0.03%	
Laguna Madre	30,503 acres	23.39%	Wetlands (and Water Resources)
Wind-Tidal Flats	28,287acres	21.69%	Wetlands
Visitor Use Areas:			Visitor Use
-Malaquite Visitor Center and RV Campground	470 acres	0.36%	
-Bird Island Basin	380 acres	0.29%	
-Grasslands Nature Trail	318 acres	0.24%	
Foredunes	3,200 acres	2.45%	Floodplains (and Vegetation)
Washover Channels	1,192 acres	0.91%	Floodplains
Rookery Islands	530 acres	0.41%	Fish and Wildlife
Relict Live Oak Mottes:			Vegetation
-Live Oak Motte 1	22 acres	0.02%	
-Live Oak Motte 2	18 acres	0.01%	
Totals:	**68,731 acres**	**52.70%**	

SRAs were plotted on park maps and were used in developing alternatives. Buffers around each SRA were developed and specific restrictions applied to protect the areas from various types of oil and gas activities. The following section describes the three alternatives developed by using the SRAs and varying the degree of surface occupancy or access allowed.

PLAN ALTERNATIVES

The alternatives considered in this EIS include the No-Action alternative, as required under NEPA, and two additional alternatives that were developed using SRAs to address the issue of managing the exploration and development of nonfederal oil and gas underlying Padre Island, consistent with the purposes and values of the park and NPS mandates for resource protection. The No-Action/Current Management alternative, Alternative B, evaluates the continued implementation of the current program of oil and gas management, while the other two alternatives provide an analysis of the effects of formally designating specific areas as SRAs. Alternative A, the Proposed Action, was developed to provide specific protection for certain SRAs, specific to the resource characteristics, qualities, and values. Alternative C was developed to focus on maximum protection in all SRAs, and assigns the most acreage under No Surface Access restrictions. These alternatives provide a reasonable range of options for oil and gas management in Padre Island National Seashore.

All the alternatives are subject to Current Legal and Policy Requirements, including Operations Performance Standards required pursuant to 36 CFR §9.41. Operations in the park must employ a variety of impact mitigation techniques and fulfill operations requirements pursuant to the NPS's Nonfederal Oil and Gas Rights Regulations. These requirements are included in Plans of Operations or attached as Conditions of Approval during the review/Plan of Operations approval process. The NPS will apply Current Legal and Policy Requirements only where the NPS manages the surface, or to avoid or mitigate adverse impacts from directional drilling operations proposed from a surface location outside the park to mineral estate underlying the park. Many of these protective measures are applied to oil and gas development in consultation with other federal and state agencies under applicable rules and regulations. These Current Legal and Policy Requirements are discussed in detail at the end of this chapter and in Appendix C.

The following provides a more detailed description of the three alternatives. Table 2.3 provides a comparison of the three alternatives.

Alternative A, Proposed Action (Preferred Alternative):

- **No Surface Occupancy in Some Sensitive Resource Areas**
- **Restricted Access in Other Sensitive Resource Areas**
- **Seismic Operations Permitted Under Current Legal and Policy Requirements**
- **All Other Areas of the Park Could be Developed Under Current Legal and Policy Requirements**

Alternative A provides an analysis of the effects of formally designating specific areas within the park as Sensitive Resource Areas. In these SRAs, NPS would apply its laws, regulations, and policies for resource protection, specific to the characteristics, qualities and values associated with those areas. Activities associated with oil and gas extraction in the designated SRAs would be tailored and defined according to the resources present in those areas. Some SRAs would be precluded from oil and gas activities due to the extreme sensitivity and value of the area to the overall legislated purpose of the park and park objectives. Other SRAs would be managed to protect sensitive resources, while allowing for certain degrees of oil and gas development. Seismic operations would be permitted, following all Current Legal and Policy Requirements. In all other areas of the park not designated as SRAs, oil and gas operations would be permitted, again following Current Legal and Policy Requirements.

Under this alternative, specific operating restrictions would be applied to specific types of oil and gas activities for each SRA. Therefore, the total SRA acreage would not be totally off-limits to all types of oil and gas activities. The total SRA acreage (with buffers) is 68,731 acres, or 53 percent of the park. The non-SRA acreage (61,703 acres or 47 percent of the park) would be available for road development, drilling, and production, under Current Legal and Policy Requirements. All of the park (130,434 acres) would be open to seismic operations, also following Current Legal and Policy Requirements.

Surface disturbance associated with seismic surveys could occur on an estimated 748 acres, or 0.88 percent of the terrestrial land base of the park. With adequate precipitation to support regrowth, the disturbance is expected to be short term in nature. Surface disturbance associated with developing the RFD wells could occur on an estimated 250 acres, to construct access roads, well pads, production facilities, and pipeline corridors necessary to produce 80 BCF over the next 30 years; however, the surface locations for some of the 18 RFD wells might be moved away from SRAs, but bottomhole locations could still be reached via directional drilling. Successful rehabilitation of well pads and pipeline corridors would reduce the amount of long-term surface disturbance.

Alternative B, No-Action (Current Management):

- **All Areas of the Park Could be Developed under Current Legal and Policy Requirements**

Alternative B provides an analysis of the current program of oil and gas management. Oil and gas proposals would be reviewed on a case-by-case basis, and mitigation measures would be implemented as needed to comply with all applicable laws, regulations, and policies. There would be no SRAs formally designated. Operators would not know in advance what type of mitigation would be required or what activities might be precluded in certain sensitive areas that NPS is mandated by law to protect. This uncertainty would continue under this alternative. Conflicts between NPS mandates to protect certain SRAs and operators' expectations for development of oil and gas reserves would continue throughout the park over the long term.

A total of 130,434 acres exist within the administered boundaries of Padre Island National Seashore. Under this alternative, all 130,434 acres of the surface of Padre Island National Seashore could be available for development under Current Legal and Policy Requirements.

Surface disturbance associated with seismic surveys could occur on an estimated 748 acres, or 0.88 percent of the terrestrial land base of the park. With adequate precipitation to support regrowth, the disturbance is expected to be short term in nature.

The RFD scenario projects the development of up to 18 wells to produce 80 BCF over the next 30 years. Surface disturbance associated with developing these wells would occur on approximately 250 acres for access roads, well pads, production facilities, and pipeline corridors. Successful rehabilitation of well pads and pipeline corridors would reduce the amount of long-term surface disturbance.

Alternative C, Maximum Resource Protection in All Sensitive Resource Areas:

- **No Surface Access in Sensitive Resource Areas**
- **All Other Areas of the Park Could be Developed under Current Legal and Policy Requirements**

Alternative C provides an analysis of the effects of formally designating SRAs within the park; however, the management of those areas differ in the degree to which oil and gas development can affect the surface of those areas. As in Alternative A, this alternative (C) identifies areas within the park that are most sensitive to resource impacts and have values, qualities and characteristics which NPS is mandated to protect. However, in Alternative C, the degree to which oil and gas activities could occur without impacting the surface of those areas varies from that defined in Alternative A.

The primary emphasis of this alternative is to focus on the maximum protection of all SRAs. Most of the SRAs shown on Figures 3.1, 3.2, and 3.3 and listed in Table 2.3 would be closed to surface access associated with nonfederal oil and gas operations. However, areas closed to surface occupancy could be reached via directional drilling technology.

Under this scenario, approximately 68,731 acres identified as SRAs (with buffers) would be essentially off limits to any oil and gas surface uses. Where the SRAs are small (such as cultural sites) or linear (such as foredunes), operators could plan geophysical operations around them, and directionally drill underneath them, if desired. However, the Laguna Madre and wind-tidal flats cover an extensive 58,790 acres, which would be unavailable for geophysical exploration. Lack of current or site-specific 3-D seismic data may deter operators from drilling extended-reach directional wells underneath the Laguna Madre and wind-tidal flats. In this scenario, a portion of this acreage may be effectively unavailable for oil and gas development.

COMPARISON OF IMPACTS OF PLAN ALTERNATIVES

Chapter 4 of this Plan/FEIS describes the impacts that would be expected from implementing the Proposed Action (Alternative A) or the other two plan alternatives. These impacts are described for each of the issues carried through for detailed analysis. Table 2.4 provides a summary of the impacts for each alternative.

Table 2.3. Sensitive Resource Area Acreages (with Buffers) and Operating Restrictions that would be Applied under the Proposed Action (Alternative A), and Alternatives B and C[1]

Alternative A Proposed Action (Preferred Alternative)	Acres	Alternative B No-Action/Current Management	Acres	Alternative C Maximum Resource Protection in All SRAs	Acres
Sensitive Resource Areas would be provided specific protection by applying No Surface Occupancy, No Surface Disturbance, No Surface Access, and/or Seasonal/Time Restrictions to specific types of oil and gas activities within designated buffer areas.	68,731 acres or 53% of National Seashore	No specific protection would be provided to Sensitive Resource Areas. All areas of Padre Island National Seashore, including Sensitive Resource Areas, may be protected from adverse impacts of oil and gas activities by applying CLPR on a case-by-case basis.	130,434 acres or 100% of National Seashore	Sensitive Resource Areas would be provided the most protection by applying "No Surface Access" to all types of oil and gas activities within the maximum buffer areas Of all SRAs. Directional drilling from surface locations outside SRAs to access bottomhole locations under SRAs, and for placement of pipelines, would be permitted.	68,731 acres or 53% of National Seashore
In all other areas of Padre Island National Seashore, oil and gas activities may be permitted under CLPR.	61,703 acres or 47% of National Seashore			In all other areas of Padre Island National Seashore, oil and gas activities may be permitted under CLPR.	61,703 acres or 47% of National Seashore
Cultural Sites - To protect the integrity of physical remains and the context therein of significant cultural sites:		Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.		No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations in:	
-No surface occupancy for drilling or production within 1,500 feet of					
Novillo Line Camp,	377 acres	Novillo Line Camp	377 acres	Novillo Line Camp	377 acres
Green Hill Line Camp,	311 acres	Green Hill Line Camp	311 acres	Green Hill Line Camp	311 acres
and Black Hill Line Camp;	313 acres	Black Hill Line Camp	313 acres	Black Hill Line Camp	313 acres
		Mansfield Archeological District	2,702 acres	Mansfield Archeological District	2,702 acres
-No surface disturbance for pipeline operations within 500 feet of					
Novillo Line Camp,	115 acres				
Green Hill Line Camp, or	70 acres				
Black Hill Line Camp;	77 acres				
-No surface disturbance within the Mansfield Archeological District;	2,702 acres				
-Geophysical exploration may be permitted within					
Novillo Line Camp,	32 acres				
Green Hill Line Camp,	20 acres				
and Black Hill Line Camps under CLPR.	18 acres				
Freshwater Ponds - To preserve water sources for invertebrates, fish, birds, and wildlife; to preserve groundwater discharge areas; and to protect wildlife viewing areas:		Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.		No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	
-No vehicular access and no surface disturbance within 500 feet of					
Pond A,	33 acres	Pond A	33 acres	Pond A	33 acres
Pond B, and	33 acres	Pond B	33 acres	Pond B	33 acres
Pond C.	42 acres	Pond C	42 acres	Pond C	42 acres

Alternative A Proposed Action (Preferred Alternative)	Acres	Alternative B No-Action/Current Management	Acres	Alternative C Maximum Resource Protection in All SRAs	Acres
Laguna Madre - To preserve essential habitat for all sensitive marine biota in the Laguna Madre, including, but not limited to, submerged vegetation, invertebrates, fin-fish, colonial waterbirds, migratory bird species, marine turtles, and dolphins: -Geophysical exploration may be permitted under CLPR. Dredging of new channels required for drilling operations may be permitted if they meet the least damaging method, but production operations must be located on Padre Island on uplands locations, or outside the National Seashore.	30,503 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.	25,240 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	25,240 acres
Wind-Tidal Flats - To protect hydrogeologic conditions that allow for inundation by wind-driven Laguna Madre waters, the Gulf of Mexico waters through washovers, or rain events that support algal growth and macroinvertebrates, and provide important feeding, resting, and loafing areas for shorebirds and threatened/endangered species, including Piping and Mountain Plovers, and Peregrine Falcons: -No placement of fill, or compaction and rutting more than 1 inch deep; except geophysical exploration and construction of roads, drilling pads, and pipelines may be permitted if they meet the least damaging method. Production operations must be located outside wind-tidal flats on uplands locations.	28,287 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.	29,127 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	29,127 acres
Visitor Use Areas - To protect the visitor experience by preserving natural darkness, ambient noise levels and visual quality; and protecting human health and safety: -No surface occupancy for access roads, drilling, production, and pipeline operations within 1,500 feet of: Malaquite Visitor Center/RV Campground; Bird Island Basin; and Grasslands Nature Trail. -Geophysical exploration may be permitted under CLPR within Malaquite Visitor Center/RV Campground; Bird Island Basin; and Grasslands Nature Trail.	 470 acres 380 acres 318 acres 470 acres 380 acres 318 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR: Malaquite Visitor Center and Malaquite RV Campground; Bird Island Basin; Grasslands Nature Trail	 470 acres 380 acres 318 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations: Malaquite Visitor Center and Campground; Bird Island Basin; Grasslands Nature Trail	 470 acres 380 acres 318 acres

Alternative A Proposed Action (Preferred Alternative)	Acres	Alternative B No-Action/Current Management	Acres	Alternative C Maximum Resource Protection in All SRAs	Acres
Foredunes - To preserve dune integrity for protection of back-island environment and provide a major defense for the mainland to block storm tidal surge and dissipate wave energy: -No surface disturbance, except roads may be permitted if they meet the least damaging method of access. Drilling of shotholes is not permitted in the primary dune line, but placement of receiver lines, on foot, may be permitted.	3,200 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.	3,200 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	3,200 acres
Washover Channels - To preserve resting, loafing, feeding, and nesting habitat for raptors, shorebirds, and wading birds, including threatened and endangered species; and to recognize these areas as being highly dynamic in that washover channels provide intermittent hydrologic connections between the Laguna Madre and Gulf of Mexico during hurricanes: -No surface occupancy for drilling, production, or pipeline operations, except roads may be permitted if they meet the least damaging method of access. -Geophysical exploration may be permitted under CLPR.	1,192 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.	1,192 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	1,192 acres
Rookery Islands - To preserve islands for waterbird nesting and reproduction: -No surface access within 1,000 feet of island edge from February 15 through September 30. -No surface occupancy for drilling, production, or pipeline operations within 1,000 feet of island edge year-round. -Geophysical exploration may be permitted between October 1 through February 14, under CLPR.	530 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR.	530 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.	530 acres
Relict Live Oak Mottes - To preserve two unique vegetative communities of live oak mottes: -No surface disturbance within 500 feet around Live Oak Motte A, and Live Oak Motte B	 22 acres 18 acres	Geophysical exploration, drilling, production, and pipeline operations may be permitted under CLPR: Live Oak Motte A Live Oak Motte B	 22 acres 18 acres	No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations: Live Oak Motte A Live Oak Motte B	 22 acres 18 acres
Totals:	**68,731 acres**	**Total Acres:**	**68,731 acres**	**Total Acres:**	**68,731 acres**

[1] Under Alternative B, SRAs are not formally designated but would be identified on a case-by-case basis.

NOTE: CLPR = Current Legal and Policy Requirements.

Table 2.4. Summary of Impacts, Padre Island National Seashore Oil and Gas Management Plan/EIS

IMPACTS TO OIL AND GAS EXPLORATION AND DEVELOPMENT			
Impacts Common to All Alternatives	**Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas**	**Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis**	**Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas**
• Nonfederal oil and gas exploration and development costs would be higher inside the National Seashore than for similar properties outside its boundaries. Operators would experience additional costs to prepare Plans of Operations, to secure a performance bond, to implement resource protection measures, and to reclaim sites. The immediate and long-term effects could include lost production opportunities, increased costs of exploration and production, and a loss in royalties which could have a minor to moderate adverse impact on mineral owners, lessees, and operators. • Operators would need to plan for the increased processing time to prepare and approve a NPS Plan of Operations. The increased processing time is not expected to cause lengthy delays for the operator. • Mineral owners may find it more difficult to lease (or may receive a lower price for) properties with unproven or marginal oil and gas reserves, or properties burdened with extra environmental constraints. • If the requirement to prepare a Plan of Operations is waived for directionally drilling from a surface location outside the park to a bottomhole target inside the park, operations could commence sooner than if they were conducted within the boundaries of the National Seashore. Drilling costs and operating time would increase for directionally drilled wells. These increased costs could result in a minor, adverse, financial impact on mineral owners and/or lessees but could be offset by reduced compliance and mitigation measures that are required inside the National Seashore.	• NPS anticipates that costs and time associated with preparing and approving Plans of Operations under Alternative A would be less than Alternative B, No-Action/Current Management, because the O&GMP would allow operators to know in advance specific locations in the park where access would likely be denied or severely restricted. • Current Legal and Policy Requirements would allow for almost full geophysical characterization of the oil and gas prospects of the park. In some SRAs, resource protection and timing restrictions would limit some or all surface uses for geophysical exploration activities. • All oil and gas reserves beneath the park would be accessible for extraction, although costs could be higher due to surface restrictions applied to Sensitive Resource Areas. This could have a minor to moderate adverse impact on mineral owners, operators, or lessees. • Under Alternative A, all oil and gas reserves would be accessible for exploration and development; the level of oil and gas activity is not expected to change appreciably from past and current levels. As new	• The NPS anticipates that time requirements would be greater than for Alternative A or C, because the lack of a plan would not allow operators to know in advance the specific locations in the park where access would likely be denied or severely restricted. Inconsistencies are possible without a plan and this could cause frustration, longer negotiations, and unanticipated denials, resulting in a minor to moderate adverse impact to the owner/operators or lessees. • Full geophysical characterization of the oil and gas prospects of the park would be allowed. • All oil and gas reserves beneath the park would be accessible for extraction. • Under Alternative B, all oil and gas reserves would be accessible for exploration and development; the level of oil and gas activity would not be expected to change appreciably from past and current levels. As new discoveries are made and developed, older operations would move from production to reclamation. Thus, there are no anticipated cumulative impacts on oil and gas exploration and development under Alternative B.	• NPS anticipates that, similar to Alternative A, costs and time associated with preparing and approving Plans of Operations under Alternative C would be less than Alternative B, No-Action/Current Management, because the O&GMP would allow operators to know in advance specific locations in the park where access would likely be denied. • No Surface Access to the 68,731 acres of SRAs would preclude these areas from geophysical exploration. While operators could use existing well and geophysical data available at the time this plan is implemented, the inability to conduct newer 3-D seismic surveys is likely to interfere with full characterization of the oil and gas prospects underlying these areas of the park and could result in moderate to major adverse impacts. • Some oil and gas reserves beneath the park may not be accessible for extraction because a small portion of the Laguna Madre and wind-tidal flats may not be accessible by directional drilling. If commercial quantities of oil and gas occur within this area, these oil and gas reserves beneath the park would not be accessible for extraction, resulting in a moderate to major adverse

IMPACTS TO OIL AND GAS EXPLORATION AND DEVELOPMENT

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
	discoveries are made and developed, older operations would move from production to reclamation. Thus, there are no anticipated cumulative impacts on oil and gas exploration and development under Alternative A, the Proposed Action.		impact to owner/operators or lessees. • Under Alternative C, there would be a potential reduction in the acreage available for oil and gas exploration and development, primarily in seagrass beds and wind-tidal flats. A potential reduction in available acreage for exploration and production may lower the estimate of recoverable oil and gas reserves in the park. Because the presence or absence of commercial quantities of oil or gas in any specific area is highly speculative, any estimates of final impact to the oil and gas owners and operators would be largely conjectural.

IMPACTS TO AIR QUALITY

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Impacts to the Class II air quality of Padre Island National Seashore are expected to be negligible to moderate and localized where oil and gas operations exist or may occur in the future. The duration of impacts would depend on the type of operation proposed. • Emissions of particulate matter (PM) would increase as a result of earthmoving activities from site construction, vehicle exhaust from use of vehicles during all types of operations, dust from traffic on unpaved roads, combustion of diesel-powered equipment, and the oil and gas itself. Increased particulate matter would cause slight	• Padre Island National Seashore has good natural wind dispersion. The prevailing southeasterly winds would carry contaminants away from the park, minimizing the potential for developing concentrations in excess of any applicable standards (Ambient and PSD standards and increments). Therefore, no major impacts to air quality would be expected from any oil and gas operations.	• Impacts would be the same as described for Alternative A, but with more opportunities for impacts to occur within SRAs. • Cumulative impacts to air quality would be the same as described for Alternative A.	• Impacts would be the same as described for Alternative A, but with fewer opportunities for even minor impacts to occur within SRAs. • Cumulative impacts to air quality would be the same as described for Alternative A.

IMPACTS TO AIR QUALITY

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
impairment of visibility within localized areas of activity. Mitigation measures including road watering could prevent or minimize release of dust and suspended particulates from vehicle traffic and construction activities. Burning of vegetation, construction debris or site-produced wastes would not be allowed, and fire prevention and suppression equipment would be provided by the operator on site. • Exploratory drilling activities would introduce emissions of nitrogen oxides (NO_x), carbon oxides (CO_x), and sulfur oxides (SO_x) during the continuous drilling activities of a 30 to 90-day period as a result of operating large diesel engines which power the drill rigs, pumps and auxiliary equipment. Precautions such as use of blow-out preventers should preclude the occurrence of major impacts resulting from well drilling. • Emissions from production operations would be considerably less than during drilling activities, however, over the long life associated with production operations, emissions form production could exceed drilling operations. Emissions from production operations include release of gaseous pollutants such as carbon monoxide (CO), hydrocarbons, nitrogen oxides (NOx), and sulfur oxides (SOx) as a result of operating separation facilities, disposal of liquid waste and unwanted gas, burning of waste petroleum products, routine emission of objectionable odors, and venting of noxious vapors from storage tanks. • Odor annoyance would be an effect of drilling and production activities, particularly if visitor uses or wildlife are affected. • Emission of hydrocarbons from routine operations or leaks and spills could react with nitrogen oxide to produce ozone. Ozone, nitrogen dioxide, and	• Cumulative impacts to air quality are expected to be negligible and within federal standards.		

IMPACTS TO AIR QUALITY

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
sulfur dioxide are toxic to plants. Impacts are expected to be limited to areas in close proximity to each well. No significant impact to human health and vegetation are expected. • In the future, impacts to air quality would be evaluated in project-specific plans of operations. Depending on the location and type of operations, mitigation could be required to meet NPS standards or PSD permitting under the State Implementation Plan.			

IMPACTS TO SOILS AND WATER RESOURCES

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• A parkwide 3-D seismic survey would impact soils on 748 acres. Effects to soils include erosion, compaction, rutting and contamination. Impacts would be short-term and negligible if mitigation techniques under Current Legal and Policy Requirements are used. Primary measures include avoiding vehicle use on saturated soils, or using light weight vehicles to minimize rutting and damage to vegetative cover. • Water quality could experience short-term impacts from 3-D seismic activities. These effects are expected to be minor with the application of equipment requirements, access restrictions, and monitoring of compliance with the plan of operations, and particularly the standard 500-foot offset from waterways (36 CFR 9.41(a)). If exemptions are given to permit access for seismic activities in waterways, turbidity could increase as a result of foot and/or vehicle/boat traffic, vibrations from detonation of explosives in shotholes, and use of airguns. Seismic activities are expected to have minor	• Formal designation of SRAs, and application of specific protection would provide consistent protection of soils and water resources in Sensitive Resource Areas from future nonfederal oil and gas operations. • As a result of the specific protection provided to SRAs, direct and indirect impacts to soils and water resources in SRAs are avoided or reduced. As a result, minor to moderate impacts to soils and water resources are expected in SRAs. • Existing heavy metals and hydrocarbon contamination at several abandoned and existing oil and gas operations have impacted soils and water resources. While contaminated	• SRAs are not formally designated; therefore, all areas of the National Seashore receive standard protection under Current Legal and Policy Requirements. Soils and water resources in localized areas where oil and gas operations are conducted could experience impacts of minor to possibly moderate levels, ranging from short- to long-term. • Alternative B, No-Action/Current Management, would provide the minimum protection to soils and water resources by applying basic federal laws and regulations and NPS policies on a project-by-project basis, through which project-specific mitigation measures would be applied. This management strategy could be time-	• Under Alternative C, all SRAs receive maximum resource protection by applying a No Surface Access restriction on all oil and gas operations, including seismic. Therefore, under this alternative, impacts to soils and water resources would not occur within SRAs. • Cumulative impacts to soils and water resources would be the same as described for Alternative A.

IMPACTS TO SOILS AND WATER RESOURCES			
Impacts Common to All Alternatives	**Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas**	**Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis**	**Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas**
effects on groundwater quantity or quality. • Constructing access roads, pads, flowlines and pipelines for up to 18 wells under the RFD scenario could directly effect soils on 250 acres or 0.2 percent of the National Seashore. These activities would result in clearing of vegetative cover, exposing soils to erosion, and compacting and introducing nonnative fill materials. Increased soil erosion could increase sediment loads in nearby surface waters, and disrupt natural surface flow patterns. Careful siting to locate in the least-damaging area and proper number and placement of culverts would allow natural surface flow patterns to continue with minimal impedance. The standard 500-foot offset from waterways would reduce impacts to water quality. Short-term impacts to soils and water resources could range from moderate to significant depending on the size, location and spacing between drillpads. Production of up to 18 wells would have long-term impacts to soils and adjacent water bodies, lasting 20 years or longer. As some operations are developed, however, others would be reclaimed; therefore, only a portion of the estimated 250 acres is expected to impact soils and water resources over the long-term. • A primary impact to soils and water resources from drilling and production operations could result from a release of oil and gas, and contaminating or hazardous substances. Current Legal and Policy Requirements call for stringent operational measures to minimize the potential for any spilled or leaked pollutants to be released into the environment. These include using the least contaminating substances, primary and secondary containment, automatic shut-off valve valves, and storing sufficient spill response equipment and materials on location to effectively respond in the event of a spill. In the event of a	areas are localized in small geographic areas, these contaminants can spread via various pathways, including surface and groundwater, or biologic pathways such as foodchains. Therefore, the cumulative impact to soils and water resources under Alternative A is considered a major impact until the contaminants are removed.	consuming. Impacts to soils and water resources could include impacts to soils and water resources in SRAs; however, no major impacts are anticipated. • Cumulative impacts to soils and water resources would be the same as described for Alternative A.	

IMPACTS TO SOILS AND WATER RESOURCES

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
release, prompt response to remove or neutralize contaminants would follow a Spill Notification and Response Plan contained in the operator's plan of operations. • Within 6 months of of properly plugging the well, the operations area would be reclaimed to natural topographic contours to conform to natural drainage patterns, predisturbance soil chemistry reestablished, and 70% initial native vegetative cover achieved to control soil erosion. • Contamination of soils at 3 sites from previous oil and gas activity persists. Until cleanup is successfully completed, these impacts would persist.			

IMPACTS TO FLOODPLAINS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Siting of oil and gas operations or activities would be permitted in regulatory floodplains only when there is no other practicable alternative, under NPS Floodplain Management Guidelines. • When there is no practicable alternative to siting in a floodplain, selection of the least-damaging floodplain location and utilization of mitigation measures would result in minor to moderate floodplains impacts. Requirements for mitigation would result in no increase in flood hazards and no appreciable loss of beneficial floodplain values. • Leaks and spills of oil and gas, and contaminating or hazardous substances in floodplains could increase flood hazards. Impacts could range from minor to moderate, depending on the type and	• Formal designation of foredunes and washover channels as SRAs under this alternative would help to protect floodplain values, because of the specific provisions provided to these areas, such as No Surface Disturbance for drilling and production operations. • No major adverse cumulative impacts to floodplains are anticipated as a result of future oil and gas operations through application of NPS Floodplain Management Special Directive 93-4 and the SRA designations for foredunes and washover channels.	• Although there is a greater possibility of disruption to foredunes and/or washover channels under Alternative B, it is still expected that impacts to floodplains would be limited to minor to moderate adverse effects, given adherence to Current Legal and Policy Requirements and NPS Floodplain directives. • No major adverse cumulative impacts to floodplains are anticipated as a result of future oil and gas operations through application of the NPS Floodplain Management Special Directive	• There would be no major adverse impacts to floodplain values under Alternative C as a result of the No Surface Access provision applied to all oil and gas operations and activities in SRAs and the selected floodplain siting and use restrictions under NPS directives and policies. • No major adverse cumulative impacts to floodplains are anticipated as a result of future oil and gas operations through formal designation of SRAs and associated floodplain protection measures.

IMPACTS TO FLOODPLAINS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
amount of substance released, flood conditions, and the methods and speed in accomplishing cleanup. If the requirements of the NPS under Current Legal and Policy Requirements are met, there should be no major adverse impacts. • At the completion of operations, reclamation of the site would restore floodplain values and functions.		93-4 and environmental oversight of park staff.	

IMPACTS TO VEGETATION

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Direct impacts to vegetation from parkwide 3-D seismic surveys would effect up to 748 acres (if only uplands vegetation communities are impacted). These impacts would be short-term and could range from minor to moderate. Surveys performed when soils are not saturated, and employing low-impact off-road vehicles and equipment, and a one-way pass method, would minimize damage to and loss of vegetation. The amount of time impacts from the seismic survey are visible would be most dependent upon rainfall frequency and amount. Reclamation activities undertaken during a period of normal precipitation is expected to result in reclamation of disturbed areas to near pre-impact conditions within 1 to 3 years. • Direct impacts to vegetation from oil and gas drilling and production could affect up to 250 acres under the RFD scenario (if only uplands vegetation communities are impacted). Impacts associated with producing wells would be long term, lasting 20-30 years. Indirect impacts could occur to Vegetation communities located near well sites; however, with appropriate mitigation under	• The designation of the foredunes and the live oak mottes as SRAs would result in no adverse impacts to these sensitive vegetation types. • The clearing of vegetation expected is relatively small. Also, reclamation requirements would result in restoration of the affected communities in a relatively short time period, since the replacement time for most Padre Island vegetation averages 1 to 3 years. Therefore, no adverse cumulative impacts are expected under this alternative.	• With recognition of the live oak mottes and foredunes as areas to be avoided during Plan of Operations development, there should be no major adverse impacts to vegetation under this alternative. If these areas are not given adequate protection, major adverse impacts could result. • Cumulative impacts would be the same as described under Alternative A.	• Impacts would be the same as described in Impacts Common to All Alternatives, with the possibility of an increase in impacts to vegetation in non-SRA vegetative communities. • The designation of the foredune community and the live oak mottes as SRAs, with a No Surface Access provision, would result in no adverse impacts to these sensitive vegetation types. • Cumulative impacts would be the same as described under Alternative A.

IMPACTS TO VEGETATION

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
current legal and policy requirements, none of the impacts are expected to be major. • Impacts to vegetation are anticipated to be corrected through reclamation by recontouring to natural grade and reseeding with native vegetation, using reserved seed source material taken from the site. Attainment of 70 percent native vegetative cover is expected within 1 to 3 years with normal precipitation, and no major adverse impacts are therefore expected.			

IMPACTS TO WETLANDS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Seismic surveys would have minor and short-term impacts to wetlands, in any wetland community. • Direct, and potentially long-term, impacts to wetlands from oil and gas drilling and production could involve a portion of the 250 acres under the RFD scenario, if wetlands cannot be avoided, estimated at 142.5 acres. At least an equal acreage of indirect wetlands impacts could occur with successful mitigation. Only a small portion of the estimated 142.5 acres would result in long term impacts, because as some oil and gas operations are being undertaken, others are being reclaimed. • The NPS no-net loss policy and DO 77-1 require a minimum 1:1 compensation ratio for direct and indirect impacts to wetlands, to be performed prior to or at the time of impacts. In addition, the requirement to reclaim disturbances and restore wetlands communities to their natural condition at the completion of oil and gas operations should	• SRA restrictions applied in Alternative A would result in fewer direct wetland impacts to the seagrass beds in the Laguna Madre SRA, the wind-tidal flats, and emergent wetlands associated with the three freshwater ponds. • Specific wetlands communities, including the three freshwater ponds, seagrass beds and other wetlands in the Laguna Madre, and wind-tidal flats, receive increased recognition by being identified as SRAs, which heightens awareness that they are sensitive to disturbances and are important for providing habitat for wildlife, particularly for threatened and endangered shorebirds. The SRA restrictions provide for no production activities in the Laguna	• All types of wetlands communities would be affected, proportionately to the total acreages in which each is found in the park, and this could include adverse impacts to wetlands that have been designated as SRAs (Laguna Madre wetlands, wind-tidal flats, e.g.). • No identification of wetlands communities that are known to be highly sensitive to oil and gas activities would be provided to oil and gas operators. Therefore, identification of wetlands communities and Current Legal and Policy Requirements would be applied on a case-by-case basis. This could result in greater variation and the potential for greater impacts to all types of wetlands communities, especially	• Specific wetlands communities that are designated as SRAs or that are parts of larger SRAs, including the three freshwater ponds, Laguna Madre seagrass beds, and wind-tidal flats, are protected by the application of a No Surface Access restriction to all oil and gas operations, including seismic. This would result in no direct impacts to these SRA wetlands communities. However, it may also result in other wetlands communities, such as inland freshwater wetlands and salt fringe wetlands, becoming the focus of wetlands impacts. • Spills of oil and gas, and other contaminating and hazardous substances, may be an indirect effect of oil and gas exploration and development that impacts

IMPACTS TO WETLANDS			
Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
result in no major impact to wetlands, if mitigation is successful in replacing or restoring wetlands functions and values.	Madre or wind-tidal flats, thus eliminating potential long-term adverse impacts from production in these areas. • Spills of oil and gas, and other contaminating and hazardous substances, may be an indirect effect of oil and gas exploration and development that impacts wetlands. These substances could kill wetland plants and benthic fauna. Remediation of spills in coastal wetlands is a difficult task. With restrictions on production operations in wind-tidal flats and the Laguna Madre, the long-term possibility of spills is lessened in these areas. • Cumulative effects of the proposed action on wetlands would include unmitigated wetland losses, the result of failed or inadequate mitigation. Where tidal hydrology is altered, there may be long-term effects for the Laguna Madre ecosystem as a result of diminished primary productivity and dominant plant community changes. The process of ecosystem change in the Laguna Madre as a result of the Gulf Intracoastal Waterway (GIWW) and related past dredging and wetland fills would continue. Wetland losses and fragmentation as a result of this action would contribute to that process. Protection of the barrier dune from breaches would have beneficial cumulative effects for	SRAs. • Each incremental loss of wetland productivity (e.g., nutrients supporting biological processes) affects the Laguna Madre ecosystem. Mitigation actions may take years to replace the habitat values lost; and some mitigation may fail. Long-term impacts of this and other wetland loss in the Laguna may eventually begin to affect overall productivity. The Laguna Madre has been substantially altered by the GIWW, and past oil exploration. The combined effects of wetland losses include increased siltation, reduced primary productivity, changes in dominant communities of seagrasses, and ultimately changes in the fauna. Temporal loss of habitat values and functions, incomplete mitigation, fragmentation of habitats, and similar effects are changing the nature of the Laguna Madre, including major components of Padre Island National Seashore. These processes would continue, and would continue to be a focus of management concern for the NPS.	wetlands. These substances could kill wetland plants and benthic fauna. Remediation of spills in coastal wetlands is a difficult task. With No Surface Access restrictions in wind-tidal flats and the Laguna Madre, there would be little or no possibility of spills in these areas. • The cumulative effect of Alternative C would be relatively small. Mitigation actions and natural recovery processes would restore interior and fringe wetland functions after removal of oil and gas exploration and production equipment. Because this alternative avoids Laguna Madre seagrass beds and wind-tidal flats, the cumulative effects on the Laguna Madre are limited. Temporal losses of interior wetland areas would have some negative effect on waterfowl, migratory birds, and wading birds as a result of lost habitat. Mitigation for wetlands would be at the expense of island upland habitats. Alternative C may reduce the amount of NPS staff time spent in monitoring and enforcement activities, because substantially large areas of wetlands are avoided.

IMPACTS TO WETLANDS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
	all communities behind the dunes, including wetlands, by protecting them from the effects of severe blowouts.		

IMPACTS TO FISH AND WILDLIFE

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• The standard 500-foot offset from water bodies provided by 36 CFR 9.41(a), would reduce the potential for water quality and quantity impacts and protect fish and wildlife utilizing water and the immediate riparian areas within this protective zone. • Oil and gas operations would cause the displacement of wildlife, and loss and fragmentation of fish and wildlife habitat. Impacts could range from no impacts to major impacts depending on location, timing, scope and duration of operations proposed. • Increased mortality to fish and wildlife would result from vehicles; construction activities; seismic activities; or in the event that a spill of oil and gas, and contaminating and hazardous substances escape containment systems and is released into the environment and comes in contact with fish and wildlife. • Access into previously inaccessible areas provided by new roads would increase human access and potentially increase the risk of mortality to wildlife, through legal or illegal means. • Upon completion of operations, reclamation would return natural conditions to the operations area.	• Formal designation of Sensitive Resource Areas comprising approximately 50 percent of the National Seashore and application of surface use restrictions for geophysical exploration, drilling and production activities provide consistent protection to fish and wildlife and their habitat in SRAs. Sensitive Resource Areas within Padre Island that provide essential habitat for wildlife include foredunes, freshwater ponds, Laguna Madre rookery islands, washover channels, Laguna Madre seagrass beds, relict live oak mottes, and certain visitor use areas. While drilling could be permitted in the Laguna Madre and wind-tidal flats if it meets the least-damaging method, long-term impacts from production activities would not occur in these SRAs. Seismic activities, roads, and pipeline activity could still occur in some SRAs, but seasonal or surface use restrictions would apply to	• Operational standards would be applied under Current Legal and Policy Requirements. No major adverse impact on wildlife is anticipated under Alternative B. However, adequate protection for wildlife-rich SRAs would need to be provided on a case-by-case basis, and impacts would vary with the amount of protection provided. • Cumulative impacts to fish and wildlife would be the same as described under Alternative A.	• There would be no direct impacts from oil and gas operations on fish and wildllife and their habitats within SRAs due to the application of No Surface Access restriction afforded to all SRAs. The known and forecasted effects of Alternative C are not expected to result in actions that threaten the survivability of any wildlife population, and no major adverse impacts would be expected in any area of the park. • Cumulative impacts to fish and wildlife would be the same as described under Alternative A.

IMPACTS TO FISH AND WILDLIFE

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
Wherever possible, habitats would be improved to perpetuate the viability of habitats and increase the survivability of native fish and wildlife. • Over time, standard protection provided to resources in the National Seashore under Current Legal and Policy Requirements would result in maintaining and improving habitat for native fish and wildlife.	limit impacts to minor or moderate levels, at most. Impacts associated with seismic surveys and drilling operations, where they would be permitted in SRAs, would be short-term. • Cumulative impacts to fish and wildlife as a result of oil and gas operations, plus other human-induced activities and development on Padre Island, as well as natural events such as floods and hurricanes, are not expected to result in actions that threaten the survivability of any wildlife population. Therefore, cumulative impacts are not expected to be major under this alternative.		

IMPACTS TO THREATENED AND ENDANGERED SPECIES AND THEIR HABITATS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Oil and gas operations would not be allowed to occur in areas or during specified times if there is a potential to adversely affect threatened or endangered species. The development, if it were allowed, would only occur after consultation under the ESA was completed. When listed species and their habitat are identified to be within the project area, sufficient distance offsets and/or seasonal/timing restrictions to nesting and other sensitive periods in a given species' life cycle would result in avoiding impacts. • Over time, standard protection provided to resources in the National Seashore under Current	• Formal designation of SRAs and specific protection provided by the restrictions in the SRAs (especially those that serve as support/habitat for threatened and endangered species), along with the case-by-case consultation would result in no adverse impacts to any special status species. • No cumulative adverse impacts to threatened and endangered species and their habitats as a result of oil and gas operations,	• Specific protection measures for threatened and endangered species, even in sensitive areas, would be determined through application of Current Legal and Policy Requirements and a case-by-case evaluation under consultation provisions. With adequate input, review, and data, it is expected that there would be no adverse impacts to any special status species. • Cumulative impacts to threatened and endangered	• Formal designation of SRAs and specific protection provided by the restrictions in the SRAs (especially those that serve as support/habitat for threatened and endangered species), along with the case-by-case consultation, would result in no adverse impacts to any special status species. No Surface Access restrictions in SRAs would help to ensure no habitat disturbance or disturbance of individual threatened and endangered species present in

IMPACTS TO THREATENED AND ENDANGERED SPECIES AND THEIR HABITATS

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
Legal and Policy Requirements would result in maintaining and improving habitat for listed species.	plus other human-induced activities and development on Padre Island, as well as natural events such as floods and hurricanes, are expected. Applying the Current Legal and Policy Requirements which include consultation under the ESA, affords the required protective mechanism to identify and avoid impacts to listed species.	species and their habitats would be the same as described for Alternative A.	these areas. • Cumulative impacts to threatened and endangered species and their habitats would be the same as described for Alternative A.

IMPACTS TO CULTURAL RESOURCES

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Cultural resource surveys required prior to ground disturbance could lead to the discovery of previously unknown archeological sites and other cultural resources, and add to the information about the cultural resources of the park. • Ground-disturbing activities associated with construction of well pads, roads, placement of flowlines, or geophysical exploration has the potential to affect prehistoric, historic, and traditional cultural resources. Sites that cannot be avoided would be excavated so that information is retrieved; however, impacts to the site would be irreversible. • Three-dimensional seismic survey shot holes, 3 to 4 inches in diameter, are smaller than the area typically disrupted by a professional archeologist performing a shovel test; therefore digging of shot holes would not be considered an adverse effect. Detonation of explosive charges may have an	• The designation of four historic properties as Sensitive Resource Areas and establishment of protective zones and operating stipulations would provide consistent protection of the integrity of physical remains and the context of these sites from future nonfederal oil and gas operations. Restrictions on drilling and production in and near SRA cultural sites would limit potential direct and indirect adverse impacts in these areas. • The prescribed buffers and operating restrictions would also provide for more efficient processing of Plans of Operations, reducing time and costs for the operator, NPS, and	• Alternative B, No-Action/Current Management, would provide protection to significant cultural resources by applying basic federal laws and regulations and NPS policies on a project-by-project basis, through which project-specific mitigation measures could be applied. This management strategy would be the most time-consuming of the three alternatives. Negligible impacts to cultural resources are anticipated from the RFD scenario under this alternative. • Cumulative impacts to cultural resources would be the same as described for Alternative A.	• Under Alternative C, four historic properties would be identified as SRAs, and protective zones are established in which a No Surface Access stipulation would apply to all nonfederal oil and gas operations. This alternative provides maximum protection to the significant cultural sites by precluding surface access to nonfederal oil and gas operations and therefore avoiding major adverse impacts. A No Surface Access restriction on geophysical exploration, drilling and production in and near SRA cultural sites would avoid direct and indirect adverse impacts in these areas. Therefore, only negligible impacts to cultural resources are anticipated from the RFD

IMPACTS TO CULTURAL RESOURCES			
Impacts Common to All Alternatives	**Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas**	**Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis**	**Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas**
effect on the distribution and condition of artifacts in a surface artifact scatter or the condition of surface features. Each shot hole location would be surveyed by a qualified archeologist, and avoidance would result in repositioning the shot hole location. • A qualified archeologist would monitor ground-disturbing activities so that cultural sites not be visible from the surface are not damaged by construction activities or seismic operations. Operations shall be halted in the area where archeological resources are uncovered and the operations re-evaluated with an NPS archeologist to evaluate the significance of the discovery and to determine how the project in the area of discovery shall be conducted to avoid impacting the site. • Sights, sounds, and odors from wellsites, developed fields, or geophysical exploration activities could have an effect on cultural sites. Mitigation measures including setbacks for siting oil and gas operations, screening, and noise abatement may be employed to mitigate anticipated effects. Some standing structures may require that a sensory buffer be defined in which visual, audible or atmospheric elements do not alter the setting. • Indirect impacts to cultural resources would occur by increased public access into areas that could increase the visibility of cultural resources and result in vandalism, illegal artifact collecting, or illegal excavation. While such activities could be minor and occur sporadically, over a period of time the impacts could be considered cumulatively significant. Conversely, increased access can often increase the recreational or educational value of such sites. • Contamination at a nearby abandoned oil and gas	State Historic Preservation Office staff. • Under Alternative A, negligible cumulative impacts to cultural resources could occur in the event that cultural sites cannot be avoided and excavation/data recovery is required.		scenario under Alternative C. • Similar to Alternative A, more efficient processing of Plans of Operations and consultation with the State Historic Preservation Office are anticipated with the development of protective buffers and operating restrictions. • Cumulative impacts to cultural resources would be the same as described for Alternative A.

IMPACTS TO CULTURAL RESOURCES

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
production facility may be adversely affecting the Novillo Line Camp, listed on the National Register, by introducing an atmospheric element, hydrocarbon odor, which is out of character with the historic setting. Until such time as the operator successfully completes cleanup, which is ongoing, this resource may be adversely affected.			

IMPACTS TO VISITOR EXPERIENCE

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
• Although there has been little indication to date that oil and gas operations are causing major disruption to the Padre Island National Seashore visitor, there is the possibility that major impacts to visitor experience could occur near certain visitor use areas and other remote locations used by visitors to experience the natural and cultural environments, and view wildlife. Noise, in particular, may affect the visitor, if buffer distances are not sufficient and background levels are exceeded, causing disruption to wildlife use and/or visitor enjoyment, especially to visitors seeking solitude. • Hydrocarbon contamination at several oil and gas production facilities may be degrading visitor experience to Padre Island National Seashore visitors due to the introduction of industrial uses and hydrocarbon odors that is out of character with the natural and cultural surroundings. Until such time as the operators successfully complete clean up and restoration, adverse impacts to visitor experience may continue.	• There are no major impacts expected from the RFD scenario to Visitor Experience under Alternative A due to the specific distance restrictions provided with the SRA buffers; the Current Legal and Policy Requirements, which provide avoidance, mitigation and health and safety measures; and the indications that visitors do not have major issues with oil and gas operations in the park, as evidenced by surveys and the complaint record at the park. • With the application of the SRA buffers, plus the avoidance, mitigation, and health and safety measures provided in the Current Legal and Policy Requirements, there should be no major impacts to visitor experience under Alternative A.	• Current Legal and Policy Requirements, especially the lesser locational restriction provided for near SRA Visitor Use Areas (500-foot), may not provide enough mitigation, so that there is the possibility that major impacts to visitor experience could occur near the SRA Visitor Use Areas and other remote locations used by visitors to experience the natural environment and view wildlife. Noise, in particular, may affect the visitor, if buffer distances are not sufficient and background levels are exceeded, causing disruption to wildlife use and/or visitor enjoyment in these areas. Although there has been little indication to date that noise is causing major disruption to the Padre Island National Seashore visitor, the possibility exists, if oil and gas facilities are sited too close to sensitive use areas.	• There are no expected major adverse impacts in any SRA under Alternative C, given the level of specific protection provided by the "No Surface Access" restriction to all types of oil and gas activity. • With the buffer zones provided for the SRAs, the "No Surface Access" restriction in these areas, the the additional protective measures included in the Current Legal and Policy Requirements for other areas of the park, there would be no major adverse impacts to visitor experience under Alternative C. • Cumulative impacts to visitor experience are the same as described for Alternative A.

IMPACTS TO VISITOR EXPERIENCE

Impacts Common to All Alternatives	Alternative A Proposed Action (Preferred Alternative) - No Surface Occupancy in Some Sensitive Resource Areas	Alternative B No-Action/Current Management - Current Legal and Policy Requirements Applied on a Case-by-Case Basis	Alternative C Maximum Resource Protection in All SRAs - No Surface Access in All Sensitive Resource Areas
	• Hydrocarbon contamination at an abandoned production facility near the Novillo Line Camp is resulting in hydrocarbon odors which may be degrading visitor experience. Until corrected, this represents a major adverse cumulative effect on the visitor experience.	• If the buffers and other provisions provided for by the Current Legal and Policy Requirements are not sufficient to mitigate impacts that can affect the visitor experience, then there could be major adverse impacts (e.g., from noise). • Cumulative impacts to visitor experience are the same as described for Alternative A.	

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

In developing alternatives, there were some alternatives that were considered, but, after further investigation, were eliminated from detailed evaluation. Those alternatives, and the reasons for their elimination follow.

1. **No nonfederal oil and gas development**. The option of eliminating all oil and gas development at Padre Island National Seashore was considered. Alternatives need to meet all planning objectives, and, although this alternative would protect, preserve, and interpret resources and values and avoid conflicts with visitor use, enjoyment, and safety, it does not meet the third goal of permitting access for geophysical exploration, exploratory drilling, and production and transportation of nonfederal oil and gas resources. Padre Island's enabling legislation contains provisions related to nonfederal oil and gas operations, and NPS regulations provide for reasonable access for nonfederal oil and gas exploration, development, and transportation. Totally eliminating those activities is inconsistent with law and regulation.

2. **No Surface Occupancy**. The option to allow nonfederal oil and gas operations, but restricting operators to a No Surface Occupancy constraint was considered. This alternative meets the same two of three goals as above, but for the same reasons as described above, does not meet the third goal of permitting access for geophysical exploration, exploratory drilling, and production and transportation of nonfederal oil and gas resources.

CHAPTER 2
PART II

CURRENT LEGAL AND POLICY REQUIREMENTS

CHAPTER 2
PART II, CURRENT LEGAL AND POLICY REQUIREMENTS

INTRODUCTION

All nonfederal oil and gas activities in units of the National Park Service are subject to current legal and policy requirements. This section describes the Current Legal and Policy Requirements that will continue to guide decisions in Padre Island National Seashore, regardless of which alternative is selected. This direction is fundamental; its associated guidance is based on laws, regulations, NPS policies, executive orders, and applicable direction provided in park planning documents. The result of this management direction is a variety of resource and visitor use protection measures, including Operating Standards, Surface Use Restrictions, Time/Seasonal Limitations, and other resource impact mitigation techniques. Before approving a Plan of Operations, the NPS must decide whether Current Legal and Policy Requirements are needed to avoid or mitigate adverse impacts. If Current Legal and Policy Requirements are determined to be needed in order to avoid or mitigate potential impacts, and are not included in a Plan of Operations, the NPS may attach them as conditions of approval.

This second part of Chapter 2 containing Current Legal and Policy Requirements, is organized in two sections. The first section is a description of the NPS's Nonfederal Oil and Gas Rights Regulations, while the second half provides resource and oil-and-gas operations-specific operating standards, including time/seasonal limitations and other mitigation techniques.

A summary of the supporting Federal Laws, Regulations, Executive Orders, Policies, and Guidelines that Apply to Nonfederal Oil and Gas Activities on National Park Service lands are included in Appendix C.

NONFEDERAL OIL AND GAS RIGHTS REGULATIONS

The NPS has the primary responsibility for managing mineral activity in National Park System units in conjunction with nonfederally owned oil and gas and ensuring that nonfederal oil and gas activity does not impair unit resources or values. NPS regulations governing nonfederal oil and gas rights are published at Title 36 of the Code of Federal Regulations, Part 9, Subpart B (CFR Part 9B). The regulations have been promulgated under the authority of the NPS Organic Act (16 U.S.C. §3) and several individual park enabling acts, including that of Padre Island National Seashore. The final rulemaking on the regulations was published in the *Federal Register*, Volume 43, Number 237, page 57822 (43 FR 57822) on December 8, 1978, with an effective date of January 8, 1979. A reference copy of the 36 CFR Part 9B regulations is presented in Appendix B.

The NPS discharges its protective responsibilities under its general authorities (e.g., National Park Service Organic Act, General Authorities Act of 1970, etc.) and the regulations at 36 CFR Part 9B, by:

- evaluating proposed Plans of Operations and approving such plans if they meet standards that protect park resources and values,
- enforcing the regulations, and
- considering acquisition of the nonfederal oil and gas interest.

If the National Park Service determines that the proposed oil and gas development would conflict with the protection or management of other resources or visitor uses, the regulations and NEPA process identify measures to mitigate impacts. Such mitigation measures may be applied as conditions of approval. However, if derogation of park values and purposes cannot be sufficiently modified to meet this standard, then the Service has a final recourse to seek to extinguish the associated mineral right through acquisition, unless otherwise directed by Congress.

In applying the NPS's Nonfederal Oil and Gas Rights Regulations, the NPS respects the constitutionally guaranteed property rights of mineral owners. As set forth in the Fifth Amendment to the constitution, "...no person shall be deprived of property without due process of law; nor shall private property be taken for public use without just compensation." The NPS's position to not contravene this amendment is underscored by Executive Order 12630, "Governmental Actions and Interference With Constitutionally Protected Property Rights." The alternatives presented and evaluated in this document observe this executive order.

Overview of 36 CFR 9B Process

Under existing NPS regulations, each operator requiring access across or through NPS lands or water may conduct activities only under a Plan of Operations approved by the NPS. The Plan of Operations provides the means for the NPS to approve private oil and gas activities in the park. Once approved, it serves as the operator's permit. Through the plan, the NPS and the operators aim to use methods and equipment that (1) are least damaging to the natural, cultural, and recreational resources of the park, (2) protect the public, and (3) do not seriously interfere with park management.

A key component of preparing the Plan of Operations is a detailed description of the environment that will be affected by the proposed activities. Operators first conduct plant, animal, cultural, hydrological, or topographic surveys as needed to adequately describe the environment in the areas in which they plan to work. Once the environmental conditions are known, operators must plan the use of methods and equipment that are least damaging to resources. The surveys also provide a basis for designing reclamation.

Based on the scale of operations, the Plan of Operations preparation can range from $1,000 up to and exceeding $45,000. The wide range demonstrates the differences in a plan's scope and content, variations in the number and types of environmental surveys needed, and the company's approach to planning (in-house or contracted).

Next, operators often need to modify operations from their standard methods to minimize the environmental impacts. For example, to avoid impacting certain resources, an operator may need to construct a longer access road or use directional drilling. Sometimes avoidance of areas (e.g., storm washover channels) is often both an environmental and logistical concern, so it can be difficult to separate the environmental expenses. Another example is costs incurred for waste and contaminant disposal outside the park, whereas onsite disposal of certain wastes may be negotiable in other areas. These and other modifications can add to project cost.

Some upfront expenditures may result in future savings for operators. For example, the NPS requires dikes around and impermeable barriers underneath new storage tanks to provide secondary containment. An uncontained spill or unnoticed leaks from a tank can cover large areas, flow into nearby surface waters, and seep into ground waters. Clean up and restoration of the damaged area to meet State of Texas and other federal requirements can cost hundreds of thousands of dollars. A typical $5,000 investment for secondary containment at a small tank battery might save the operator 50 times that amount.

Next, the NPS commonly requires operators to take a more active role in reclamation of the site compared with other areas outside the park. Clean up of contaminated soil or water, removal of non-native materials used in operations, returning natural contours, establishing native vegetation, and monitoring are common reclamation activities inside the park, but less common outside. On more remote locations down-island, removal of caliche road and pad building material can be a substantial cost at Padre Island.

Finally, maintaining a performance bond to guarantee compliance with the plan is an annual cost to the operator. Regulations limit the maximum bond amount to $200,000 for all operations under a given operator in a single park. Annual costs to maintain bonds through a surety company range from 1 percent to 3 percent face value, which translates to a maximum cost of $2,000 to $6,000 per year. Operators may also elect to deposit other types of securities such as cash, certificates of deposit, or government bonds in lieu of a surety bond to lower their out-of-pocket expenses.

Taken all together, these additional costs are usually a small percentage of an operator's total expenses, perhaps less than 10 percent. Even though these costs are a small percentage of operating costs, they become more important for marginal projects, such as producing wells late in their economic life.

Another issue facing operators in NPS units is the length of time it takes to obtain a permit. Under the best of circumstances, the permitting process can take 5 to 6 months, including 3 to 4 months of NPS review and approval. Table 2.5 provides an explanation of the process and associated time periods. Under current management practices, the NPS looks at oil and gas proposals individually under the 36 CFR 9B regulations. There is no written guidance to help operators interpret the regulations and apply them specifically to Padre Island. At times, this has caused confusion and added to permitting delays.

Table 2.5. NPS Processing Time for a Plan of Operations

Action	NPS Response Time	Reference
Operator contacts park regarding interest in oil and gas activities.	Same Day	Subject to Park Staff Availability
Park provides Operator copies of 36 CFR 9B regulations, Standards, and Requirements for a Plan of Operations, and other information, as necessary.	Same Day	Subject to Park Staff Availability
Operator submits written request for temporary access to gather basic information needed to complete a Plan. Request includes documentation of the right to conduct operations associated with the private mineral right.	Variable - NPS Provides Assistance as Needed	Subject to Operator Response
Park issues 60-day data collection permit with park resource/visitor protection stipulations.	1 - 2 days	
Operator conducts surveys, including biological, wetlands delineations, and cultural, as applicable.	Variable - NPS Provides Assistance as Needed	Subject to Operator Response or Timing Restrictions
Operator submits draft Plan of Operations to park.	Variable - NPS Provides Assistance as Needed	Subject to Operator Response
NPS performs a completeness and technical review. Park accepts Plan of Operations as complete *OR* returns it to the operator with specific directions on how to complete the plan.	30 days	NPS Policy from NPS Procedures Governing Nonfederal Oil and Gas Rights, 1992, and 36 CFR §9.36(c).
Plan of Operations Decision	**60 days**	**See Below**
Park writes an environmental assessment or adopts operator's consultant-prepared EA, incorporates other environmental compliance (NHPA, Wetlands, ESA), and initiates mandated consultations, completes public review, finalizes decision documents, and notifies the Operator if the plan has been approved, conditionally approved, or rejected.	60 days (includes 30-day public review of EA)	36 CFR §9.37, 36 CFR §9.52(b), NPS DO-77.1 for Wetlands Compliance, and DO-12 for NEPA Compliance. Operator notified if additional time is needed per 36 CFR §9.37(b)(6).
Operator agrees to any conditions of approval, shows applicable state and federal permits, and files suitable performance bond.	Variable	Subject to Operator Response
Total NPS Response Time	3 to 4 months	Dependent on Compliance Requirements

OPERATING STANDARDS, TIME/SEASONAL LIMITATIONS, AND OTHER MITIGATION TECHNIQUES

Operating Standards (36 CFR §9.41)

The regulations at 36 CFR §9.41 list several operating standards applicable to nonfederal oil and gas operations conducted under Plans of Operations in National Park System units. These are listed below under the applicable resource or oil and gas operations headings, along with other operating requirements and impact mitigation techniques. All proposed Plans of Operations submitted by operators to the NPS must adequately explain specific actions that will be taken to achieve compliance with applicable operating standards (36 CFR §9.36(a)(11)). If operations are approved, operators must ensure compliance with all applicable operating standards during the conduct of operations.

- If drilling or well production operation is suspended for more than 24 hours, but less than 30 days, the well must be shut in by either activating blow-out prevention equipment, or closing well-head valves, respectively (36 CFR §9.41(c)).

- If a well production operation is suspended for more than 30 days, the well must be either shut in by closing well-head valves or properly plugged as acceptable to the superintendent (36 CFR §9.41(c)).

- A legible sign showing the operator or owner name, operation name, and unique operation number must be displayed and properly maintained at each drilling operation, producing well, pipeline, storage tank(s), or processing facility (36 CFR §9.41(d)).

  Signs should include:

  - The Company Name,
  - Operation Name and Railroad Commission of Texas Number (if a well), and
  - Name and Phone Number of Contact in Case of Emergency.

Administrative Operating Standards

- The operator will be held fully accountable for their contractors' or subcontractors' compliance with the requirements of the approved Plan of Operations. (36 CFR 9.41(g))

- A copy of the temporary operating permit or approved Plan of Operations, whichever is applicable, and any additional operating standards or conditions for plan approval, must be kept by each seismic crew, or subcontractor performing work as part of the approved operations.

- The NPS does not warrant title or the accuracy of the descriptions provided in the operator's lease agreements with the mineral owner or other mineral lessees.

Third-party Monitoring of 3-D Seismic Exploration

The NPS has the authority to require an operator to hire a third-party monitor to ensure that the operator complies with the terms of their Plan of Operations, and to ensure the protection of park resources. A stipulation requiring a 3-D (three-dimensional seismic) operator to hire a third-party monitor is not a universal rule to be applied to every 3-D seismic proposal. As with all other proposals exercising nonfederal oil and gas rights in park units, the NPS evaluates each 3-D seismic proposal on a case-by-case basis. Given the nature and scope of 3-D seismic proposals and the nationally significant park resources at stake, the NPS will alert 3-D operators early in the regulatory process of the likelihood adequate monitoring will be a critical element of their operation in order to meet the 36 CFR 9B standards. If the operator's monitoring plans appear to be inadequate, given the scope of the operation, and that without those capabilities the operation will put the park's nationally significant resources at risk, the NPS will inform the operator that monitoring is likely to be an essential element of their plan.

Three-dimensional (3-D) seismic surveys provide high-resolution images of the subsurface, enabling oil and gas developers to more accurately locate geologic structures favorable to oil and gas deposits. Although data gathered from a 3-D seismic survey will benefit park resources by minimizing surface disturbance (fewer dry holes drilled and a reduction of multiple 2-D surveys), the 3-D seismic operation itself presents unique challenges to NPS resource managers, especially the need to adequately monitor these operations.

Summary of 3-D Seismic Operations: The technology used to acquire the data (vibroseis, shot hole explosives, or Poulter (above-ground explosives)) is the same as conventional 2-D seismic, but the seismic lines are run in a dense grid pattern that can cover many square miles. Typically, the 3-D operation will run 7 days a week, 12 hours a day, and for up to 9 months. An average crew is 50 people, but can be as high as 75. Because of the multiple seismic lines, surface resources potentially impacted at any one time are greatly increased. Along with the increase in seismic lines there is an increase in the number of vehicles impacting surface resources. Shots per mile vary. The average is about 80, but for deeper imaging, this number climbs quickly to as many as 260. A 3-D operation is extremely complex logistically. Operations are phased, with specific tasks continually leapfrogging others. In short, 3-D seismic operations will likely increase the immediate potential threats to NPS resources at least ten-fold.

Under NPS regulations in 36 CFR 9B, an operator proposing to exercise nonfederal oil and gas rights in a park unit must demonstrate to the NPS through a Plan of Operations how they will meet all pertinent 36 CFR 9B provisions, including 36 CFR 9B operating standards and approval standards. The language contained in the following operating standard and approval standard gives the NPS the authority to ensure that operations will protect park resources:

- 36 CFR §9.41(f): "Operator shall carry on all operations and maintain the site at all times in a safe and workmanlike manner, having due regard for preservation of the environment of the unit."

- 36 CFR §9.37(a)(3): "[The regional director shall not approve a Plan of Operations] for operations at a site the surface of which is owned or controlled by the federal government, where operations would substantially interfere with the management of the unit to ensure the preservation of its natural and ecological integrity in perpetuity or would significantly injure the federally-owned or controlled lands or waters."

If the NPS determines that a third-party monitor is necessary for the 3-D operator's plan to meet the above operating and approval standards, the NPS has the authority to stipulate that the plan contain such a requirement under the following regulatory provision:

- CFR §9.37(b)(2), Conditional Approval of a Plan of Operations: “Within sixty (60) days of the receipt of a Plan of Operations, the regional director shall make an environmental analysis of such plan, and:...notify the operator that the Plan of Operations has been conditionally approved, subject to the operator’s acceptance of specific provisions and stipulations.”

Under 36 CFR §9.37(f), all approved Plans of Operations are conditioned upon the superintendent's right to access an operation to monitor and ensure compliance with a Plan of Operations. Because under this scenario a third party will handle monitoring, the superintendent can exercise his/her right to access and monitor the operation through the third party via specific stipulations. Under 36 CFR §9.37(b)(2) and 9.37(f), the NPS may fashion additional stipulations designed to ensure that the operator complies with its plan and that the third-party monitor fulfills the NPS’s goal of protecting the unit's resources. Examples of additional stipulations include, but are not limited to:

- the NPS must approve the selection of the monitor and the terms of the operator's contract with the third-party monitor;

- the contract must include a provision requiring the monitor to report directly to the NPS, and not to the company, and identify the frequency of reports (daily, weekly, monthly); and

- the NPS may suspend the Plan of Operations if the quality of the monitoring performed is unsatisfactory to the NPS.

Protection of Air Quality

The NPS has a responsibility to protect air quality under both the 1916 Organic Act and the 1990 Clean Air Act (42 U.S.C. 7401, et seq.). According to the NPS Management Policies, the NPS will seek to perpetuate the best possible air quality in parks because of its critical importance to visitor enjoyment, human health, scenic vistas, and the preservation of natural systems and cultural resources (NPS 1988, 4:17).

Consideration of air quality impacts and associated mitigation measures will be evaluated on a project-by-project basis. It is anticipated, however, that because of prevailing winds, Class II air quality values in the park are not expected to be impacted by proposed nonfederal oil and gas operations. The NPS consults with the Texas Natural Resources Conservation Commission, which is the state-designated agency that the U.S. Environmental Protection Agency has delegated, permitting authority under the Clean Air Act, and with the U.S. Environmental Protection Agency, when adverse impacts to air quality values are anticipated.

Performance Standard: To protect the Class II air quality at Padre Island National Seashore.

Operating Standards:

- Operators shall be required to comply with the Clean Air Act and incorporate appropriate discussion of anticipated air quality impacts, mitigation measures, and any permitting requirements in proposed Plans of Operations.

- Operations will be designed to protect Class II air quality values and comply with the State Implementation Plan under the Clean Air Act.

- Use minimum number of vehicles necessary to complete work

- Use equipment with appropriate pollution control devices installed.

- Do not burn vegetation, construction debris, or site produced wastes.

- Flaring of organic gases from wells should be minimized and temporary. Such gases should be utilized for energy production with appropriate process and pollution controls applied to minimize air pollutant emissions.

- Take necessary precautions to prevent wildfires. Provide on-site fire suppression equipment.

Consistency with the Texas Coastal Zone Management Program

The Coastal Zone Management Act (CZMA) (16 U.S.C. 1451, et seq.) was enacted by Congress in 1972 to improve the nation's management of coastal resources, which were being irretrievably damaged or lost due to poorly planned development. Specific concerns were the loss of living marine resources and wildlife habitat, decreasing open space for public use, and shoreline erosion. Congress also recognized the need to resolve conflicts between various uses that were competing for coastal lands and waters (USDOC, NOAA, 1988a). The NPS will comply with provisions of state coastal zone management plans prepared under the Coastal Zone Management Act when such provisions are more environmentally restrictive than NPS management zoning (NPS 1988, 4:20).

The basic goal of the CZMA is to encourage and assist coastal states to voluntarily develop comprehensive management programs. The CZMA establishes a state-federal partnership in which the states take the lead in managing their coastal resources, while the federal government provides financial and technical assistance and agrees to act in a manner consistent with the federally-approved state management programs. The CZMA is implemented by the Office of Ocean and Coastal Resource Management (OCRM), within NOAA's National Oceanic Service. The Texas General Land Office is the Lead State Coastal Agency.

The Coastal Zone Reauthorization Amendments of 1990 amended the federal consistency provisions to counter the Supreme Court's 1984 decision in *Secretary of the Interior v. California*. This clarified that all federal agency activities, whether in or outside of the coastal zone, are subject to the consistency requirements of Section 307(c)(a) of the CZMA if the activities affect natural resources, land uses, or water uses in the coastal zone.

The new provisions encourage each state, under a Coastal Zone Enhancement Grants Program in Section 309, to improve continually its CZM program in one or more of eight identified national priority areas: coastal wetlands management and protection; natural hazards management (including potential sea and Great Lakes level rise); public access improvements; reduction in marine debris; assessment of cumulative and secondary impacts of coastal growth and development; special area management planning; ocean resource planning; and siting of coastal energy and government facilities. Three new program approval requirements were also added in Section 306(d)(14), (15), and (16), dealing with public participation in permitting processes; consistency determinations, providing a mechanism to ensure that all state agencies will adhere to the program; and requiring enforceable policies and mechanisms to implement the applicable requirements of the new Coastal Nonpoint Pollution Control Programs, respectively.

Oil and gas exploration and production, including geophysical operations, waste management, pipeline placement, and activities associated with access to the exploration or production site are to be managed subject to the Texas Coastal Zone Management Program policies.

Federal lands such as Padre Island National Seashore are excluded from the coastal zone. According to the August 1996 Texas Coastal Management Program/Final Environmental Impact Statement, prepared by the National Oceanic and Atmospheric Administration of the Office of Ocean and Coastal Resource Management and the State of Texas Coastal Coordination Council, "While activities on excluded federal lands are not required to comply with the TCMP goals and policies, an activity that has spillover effects on Coastal Natural Resource Areas (CNRAs) is subject to the federal consistency requirement (Part II, 2-5).

In the event that the NPS is considering approval of a Plan of Operations, and the proposed nonfederal oil and gas operation has potential spillover effects on CNRAs, the NPS will consult with the Texas General Land Office for a consistency determination. In these cases, a consistency certification must be referred by the Coastal Coordination Council within 45 days of receipt by the Council Secretary of an administratively complete consistency certification, or the action is conclusively presumed to be consistent.

Performance Standards and Operating Standards needed to avoid or minimize potential adverse impacts to coastal natural resource areas are those found under several resource topics, including protection of water resources, wetlands, fish and wildlife, and threatened and endangered species.

Control of Contaminating and Hazardous Substances

Performance Standards: To prevent the release of contaminating and hazardous substances into the environment; and to respond quickly and effectively to contain and clean up spills that do occur. **Contaminating substances** is defined at 36 CFR §9.31(o) as "those substances, including but not limited to, salt water or any other injurious or toxic chemical, waste oil or waste emulsified oil, basic sediment, mud (drilling fluid) with injurious or toxic additives, or injurious or toxic substances produced or used in the drilling, development, production, transportation, or on-site storage, refining, and processing of oil and gas."

Operating Standard: Operators conducting oil and gas drilling and production operations will often use or generate substances that meet this definition, and are therefore required to fully comply with the provisions of 36 CFR §9.45 during the conduct of operations. Operators must include a "Contaminating or Toxic Substance Spill Control Plan" in their Plan of Operations. The Spill Control Plan will:

- list the types and amounts of contaminating substances proposed for use in operations;
- describe potential hazards to humans and the environment and respective mitigation techniques;
- describe actions to be taken to handle, store, clean up, and dispose of such substances;
- describe the equipment and methods for containment and clean up of contaminating substances, including a description of the equipment available on-site versus those available from local contractors; and
- include an emergency spill response plan in the event of accidents, fires, or spills, prepared by a qualified spill specialist.

If determined to be adequate by the superintendent, a Spill Prevention Control and Countermeasure Plan, approved under 40 CFR part 112, may be used to satisfy the oil spill contingency plan requirements.

- Confine brine water and all other waste and contaminating substances to the smallest practicable area, and prevent escape of such substances due to percolation, rain, high water, or other causes. Properly store and promptly remove all wastes and contaminating substances to prevent contamination, pollution, damage, and injury to unit resources and values. (36 CFR 9.45)

- The operator will immediately stop work if contamination is found in the operating area and notify the park superintendent or his/her designated representative.

- The operator will be liable for pollution or other damages, as a result of their operations, to government-owned lands and property.

- Operators shall make efforts to use the least hazardous and/or contaminating substances necessary in the conduct of operations if those choices are available; and to store the minimum quantity on site needed to maintain operations.

- Hazardous and contaminating substances shall be properly stored in secondary containment systems.

- The operator shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under an approved Plan of Operations. This shall include liability arising from the occupancy or use of public lands under an approved Plan of Operations. This shall include liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq., or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, et seq.) on this approved surface use (unless the release or threatened release is wholly unrelated to operator's activity in this approved surface use), or resulting from the activity of operator on this approved surface use. This applies without regard to whether a release is caused by the operator, their agent, or unrelated third parties.

- Any collection and laboratory analyses of soil, sediment, surface water or groundwater samples conducted before well drilling, or after well drilling, production, or a change of ownership or leasing rights, shall follow the NPS's "Guideline for the Detection and Quantification of Contamination at Oil and Gas Operations," contained in Appendix F.

Protection of Cultural Resources

The NPS Management Policies provide specific direction for protection of cultural resources:

Archeological Resources. "Archeological resources will be left undisturbed unless removal of artifacts or intervention into fabric is justified by protection, research, interpretive, or development requirements. They will be preserved in a stable condition to prevent degradation and loss of research, interpretive, or development requirements..." (NPS 1988, 5:5)

Historic Sites and Structures. The National Park Service will identify, evaluate, monitor, and protect historic structures, ruins, earthworks, camps, submerged cultural resources, and cemeteries within its boundaries.

Cultural Landscapes. ". . . Every effort will be made to ensure that routine park [and other] operations do not intrude unnecessarily on a cultural landscape by introducing visible, audible, or atmospheric elements out of character with the historic environment. Trash disposal, storage of materials, parking or vehicles, and other operational activities will be conducted out of public view to the maximum extent feasible. . ." (NPS 1988, 5:6)

Ethnographic Resources. "Certain contemporary Native American and other communities are permitted by law, regulation, or policy to pursue customary religious, subsistence, and other cultural uses of park resources which they are traditionally associated. Such continuing use is often essential to the survival of family, community, or regional cultural systems, including patterns of belief and economic and religious life. Recognizing that its resource protection mandate affects this human use and cultural context of park resources, the National Park Service will plan and execute programs in ways that safeguard cultural and natural resources while reflecting informed concern for the contemporary peoples and cultures traditionally associated with them. (NPS 1988, 5:11)

Federal laws providing for protection and management of the cultural resources at Padre Island National Seashore include the National Historic Preservation Act of 1966 (NHPA), as amended; the Archeological and Historic Preservation Act of 1974; the Archeological Resources Protection Act of 1979 (ARPA); the American Indian Religious Freedom Act of 1978; the Native American Graves Protection and Repatriation Act; Executive Order 13007; Mining in the National Parks Act of 1976; and the National Park Service's Organic Act. The term "cultural resources" includes various components of archeological, ethnographic, historic architectural, and historic landscape resources.

Regulations included in 36 CFR §9.47 specifically address operator responsibilities of protecting significant cultural resources as related to nonfederal oil and gas operations in National Park System units. Historic properties are those cultural resources that meet criteria for inclusion in the National Register of Historic Places (NRHP). Historic properties known to exist within the park are the Novillo Line Camp and the Mansfield Cut Underwater Archeological District. In addition, the NPS evaluation of the Green Hill Line Camp and the Black Hill Line Camp (including their cultural landscapes) indicates that they are eligible for listing on the NRHP.

Section 106 of NHPA: Identification, evaluation, and protection of historic properties within NPS lands must be considered at the Plan of Operations preparation and review/approval stages. In exercising the Plan of Operations approval provisions under 36 CFR 9.37, the NPS regional director must comply with the provisions of Section 106 of the NHPA. In part, this act authorizes the establishment of a National Register of Historic Places (NRHP) and allows for the inventory, assessment, and nomination of cultural properties to the NRHP. Additionally, any effects of a proposed operation on properties eligible for, or listed on, the NRHP must be assessed, in conjunction with the State Historic Preservation Officer (SHPO), prior to Plan of Operations approval. Section 106 of the Act provides the Advisory Council on Historic Preservation (ACHP) with an opportunity to comment on the effect of an agency's undertakings in historic properties.

Adverse effects on NRHP properties are those that result from undertakings, such as oil and gas operations, which will diminish the integrity of the characteristics that qualify the property for inclusion on the NRHP. These can be direct or indirect impacts, such as destruction of original fabric or context, or visual intrusions into the historic scene.

Adverse effects on historic properties are avoided whenever possible. When adverse impacts caused by NPS projects or authorized actions cannot be avoided, mitigation measures will be taken. The nature of mitigation measures will depend on the adverse impact and the scientific and socio-cultural values of the resource involved. As required, recommended mitigation is coordinated with the SHPO and the ACHP. This review process takes at least 30 days. Consultation can be facilitated by procedures outlined in the NPS Servicewide Programmatic Agreement (PA), which contains an agreement between the NPS, the SHPO, and the ACHP. Under this Servicewide PA, a streamlined consultation process allows the NPS to approve actions that have no impact or no adverse impact on historic properties before formal consultation with the SHPO. The PA also speeds mitigation of impacts in cases where the SHPO and the NPS concur on a course of action, because this concurrence can eliminate consultations with the ACHP.

Antiquities Act and ARPA: An operator's conduct of operations must conform to the provisions of the Antiquities Act of 1906 (16 U.S.C. §431-433) and the Archaeological Resources Protection Act (16 U.S.C. §470aa); that is, operators conducting nonfederal oil and gas operations on surface estate owned by the United States may not injure, alter, destroy, or collect any object, structure, or site of historical, archaeological, or cultural value without written authorization issued by the NPS (36 CFR §9.47(a)).

Nonfederal oil and gas operators conducting operations under an approved Plan of Operations on federally-owned surface estate are excepted from the permit requirements of ARPA. This exception is based on the fact that such operations are exclusively for purposes other than excavation or removal of archeological resources. General earth-moving excavations conducted under an approved Plan of Operations are not construed to be "excavation or removal" of archeological resources (43 CFR §7.5(b)(1)). However, operators on federal lands engaged in operations without, or contrary to, an approved Plan of Operations, who remove, alter, or deface archeological resources, are in violation of ARPA and are subject to the criminal and civil penalties.

Note that operator's contractors performing cultural resource surveys must obtain an ARPA permit if such surveys involve collection of archeological resources. An operator must also obtain an ARPA permit prior to salvaging any previously unknown archeological resources discovered during operations. The NPS regional director will advise an operator how to obtain an ARPA permit.

Archeological Surveys for 3-D Seismic Operations: Due to the size of 3-D seismic operations, the NPS has developed the following approach for archeological survey that can identify, evaluate, and protect historic properties in compliance with the NHPA and other statutes and NPS policy and yet be feasible for the operators of large-scale seismic operations:

- Any activities that do not qualify as ground-disturbing (i.e., hand-held drilling of shot holes of 3-inch diameter or less, and non-rutting vehicles) will not require archeological survey.

- Wells and related facilities will not be allowed on any historic properties or within a distance that directly or indirectly impacts the integrity of such resources.

- Archeological survey (including shovel-testing) will be conducted ahead of any ground-disturbing activities. Ground disturbance is defined as earth-moving (be it blading, rutting, etc.) below 2 inches of the present ground surface. Areas of ground disturbance typically include access roads, storage areas, heavy equipment parking areas, and other related use areas including disturbance resulting from removal of fill brought in to create roads or drill pads. Areas of disturbance should be restricted to an absolute minimum required for safe operation and construction of facilities.

  Particular care should be taken in areas where there is a high probability of archeological sites occurring. Based on current information, such areas would include: (1) the banks of natural channel cuts through the island; (2) between the west shore of the island (along the Laguna Madre) to the mid-island ephemeral ponds; (3) within, and immediately behind, the foredunes along the eastern side of the island; and (4) within the vicinity of the former ranching complexes at Novillo, Green Hill, and Black Hill line camps, and the Mansfield Cut Archeological District. Most of the known prehistoric archeological sites occur within the foredunes and immediately behind them, while the late prehistoric sites occur between the ponds and Laguna Madre. The other two areas are where the known historic sites tend to occur.

When a cultural resource survey is required, the operator shall provide to the NPS the necessary cultural resources survey of the project area or area of effect. Such cultural resource surveys may include identification and evaluation of archeological sites, historic structures, cultural landscapes, and traditional cultural properties, and must be conducted by professionally qualified cultural resource experts who have knowledge of the specific resource type in question. The NPS will provide operators with available existing cultural resource information.

Operator surveys will result in a final report that allows the NPS to determine National Register eligibility and effect. All newly discovered archeological sites will be recorded both on State of Texas computerized site forms and NPS Archeological Sites Management Information System (ASMIS) forms. GPS locations (requested in NAD 83) and site location maps will also be required.

- Operators shall employ a qualified archeologist to monitor all ground-disturbing activities. Qualified archeologists are those who meet the Secretary of Interior Standards and Guidelines for Archeology and Historic Preservation.

Unanticipated Discovery: The NPS is responsible, under 36 CFR 800.11, for providing a plan of action to address properties discovered during implementation of an undertaking.

If any unknown cultural resource is discovered during the conduct of approved operations, and such resource might be altered or destroyed by the operations, the operator must immediately cease operations in the immediate area and notify the superintendent. The operator must leave the discovery intact until the superintendent grants permission to proceed with the operations (36 CFR §9.47(b)). Before any further activities occur, a qualified cultural resource expert will assess the cultural resources, evaluate their National Register eligibility, and consult with the State Historic Preservation Officer. Minor recordation, stabilization, or data recovery may be necessary during this action and will be conducted at the operator's expense. Until eligibility of the discovered historic properties can be determined, no further disturbance to the cultural resources may occur. Any plans for mitigating the negative impacts to historic properties will be subject to approval of the NPS, and it is the responsibility of the operator to provide for any necessary mitigation efforts.

Damage to Previously Identified Sites: This stipulation applies to situations where operations have damaged a previously identified cultural resource that was visible on the ground surface. If, in its operations, a nonfederal oil and gas operator damages, or is found to have damaged, any historic or prehistoric ruin, monument, or site, or any object of antiquity subject to the Antiquities Act of 1906 or the Archeological Resources Protection Act of 1979 (16 U.S.C. 470) and the National Historic Preservation Act, as amended, the operator will prepare and implement a data recovery plan at his/her expense. The operator will obtain at his/her expense, a qualified permitted archeologist to carry out the specific instruction of the NPS.

A qualified cultural resource monitor may be required during operations or reclamation activities if the work is in a particularly sensitive area and/or reclamation was not done immediately following operations. Additionally, the NPS may require an archeologist to inspect reroutes to determine if cultural sites were successfully avoided. If required, this information shall be included in a monitoring report submitted to the NPS, along with an assessment of the damage, if any, to the cultural resources that were to be avoided.

Employees of the operator and subcontractors shall be made aware that any collection of artifacts is punishable by law and that the company is liable under trespass regulations, the Antiquities Act, and the Archeological Resources Protection Act for fines and possible costs for any cultural resources damaged by vehicular traffic or collection.

Fire Management

Performance Standard: Fire is a powerful phenomenon, with the potential to drastically alter the vegetative cover of any park. All fires are classified as either prescribed fires or wildfires. Wildfires will be suppressed. (NPS 1988, 4:14)

Operating Standards:

- The operator shall include in its Plan of Operations a Fire Management Plan, which the NPS will review.
- Accumulations of oil and other materials deemed to be fire hazards in the vicinity of well locations and storage tanks will be prevented and removed (36 CFR §9.41(f)).

Protection of Floodplain Values/Hurricane Preparedness

The occupancy and modification of floodplains will be avoided wherever possible. Where no practicable alternatives exist, mitigating measures will be implemented to minimize potential harm to life, property, and the natural values of floodplains. Management of floodplains is subject to the provisions of Executive Order 11988, "Floodplain Management" (42 U.S.C. 4321). (NPS 1988, 4:16) The NPS Special Directive 93-4 (August 11, 1993), "Floodplain Management Guideline," provides requirements for implementing the floodplain protection and management actions under the executive order.

Nonfederal oil and gas operators shall include in their proposed Plans of Operations copies of all pertinent county floodplain development permits. All pertinent floodplain development permits would be required by the NPS prior to approving a Plan of Operations.

Performance Standard: Protect floodplain values; minimize potential harm to life, property, and the natural values of floodplains.

Operating Standards:

- Avoid siting oil and gas developments requiring surface occupancy in 100-year coastal flood areas, which includes washover channels.

- Confine brine water and all other waste and contaminating substances to the smallest practicable area, and prevent escape of such substances due to percolation, rain, high water, or other causes. Properly store and promptly remove all wastes and contaminating substances to prevent contamination, pollution, damage, and injury to unit resources and values. (36 CFR 9.45)

- Storage tanks shall be firmly secured to reduce risk of tank failure during high wind and water.

- Storage tanks shall be emptied and filled with water in preparation for hurricanes.

Emergency Preparedness Plan for Hurricanes: The primary objectives of the Emergency Preparedness Plan for Padre Island National Seashore are to protect and save human lives, and to protect property and keep physical losses at a minimum. The hurricane season begins June 1 and ends November 30 each year. The Emergency Preparedness Plan comprises a warning system consisting of three color alerts:

- ***Green Alert*** will be issued when a tropical storm develops a circular pattern with winds above 39 miles per hour within 700 miles or 48 hours of Padre Island National Seashore and the storm appears to be moving toward the South Texas coast.

- ***Yellow Alert*** will be issued when the National Weather Service issues a "Hurricane Watch" for the Padre Island area.

- ***Red Alert*** will be issued when the National Weather Service issues a "Hurricane Warning" for the Padre Island area.

Oil and gas operators will be bound by the Padre Island National Seashore Emergency Preparedness Plan. When a Yellow Alert is established, the operator will be required to initiate shut-down activities of their operations on the island. Upon issuance of a Red Alert, the island is evacuated and the park closed to entry.

For shutdown, the operator will be required to empty all above-ground tanks of products and fill the tanks with water in advance of the hurricane approaching, and remove or secure all loose equipment and/or supplies. As much as reasonably possible, the operator should remove contaminating and hazardous substances from the park.

High Pressure Precautions (36 CFR §9.43)

Operators conducting drilling operations subject to an approved Plan of Operations must take all necessary precautions to maintain control of wells at all times. This requirement is particularly important when exploratory drilling operations are conducted in areas where minimal or no data on subsurface formation pressures are available.

A proposed Plan of Operations for the drilling of an oil and gas well must specify that all equipment, methods, and materials to be used to ensure proper control of the well. Information that should be adequately addressed in a Plan of Operations for the conduct of a drilling operation include, but are not limited to:

- anticipated pressures to be encountered;

- manufacturer and type of blow-out preventers to be used (e.g., annular, blind ram, and pipe ram preventers);

- blow-out preventer activation system;

- pressure rating on each blow-out preventer;

- blow-out preventer inspection procedures;

- type of casing anchors to be used and method of securing anchors;

- casing cementing methods and materials, particularly surface casing (surface casing must be cemented through the entire length); and

- drilling fluid (mud) program, properties, constituents, and weights.

Protection of Human Health and Safety

The saving of human life will take precedence over all other management actions. The NPS and its concessionaires, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. The NPS will work cooperatively with other federal, state, and local agencies, organizations, and individuals to carry out this responsibility. However, park visitors assume a certain degree of risk and responsibility for their own safety when visiting areas that are managed and maintained as natural, cultural, or recreational environments. (NPS 1988, 8:5)

Proper siting of new operations and the application of Current Legal and Policy Requirements will aid nonfederal oil and gas operations in avoiding visitor use conflicts, protecting the health and safety of visitors, and protecting visitor use and enjoyment of park resources.

Performance Standard: Provide for maximum protection of human life.

Operating Standards:

- The operations site must be maintained in a safe and orderly condition (36 CFR §9.41(f)).

- Minimize conflicts with visitor use.

- Operations shall be restricted to specified times during a day, or during certain days in a week to minimize conflicts with visitor uses.

- For drilling operations that routinely operate continuously, operators may be required to hire qualified security personnel to monitor egress and ingress to the drill site.

- Noise mitigation is required for developments to avoid or minimize impacting nearby visitor use areas. Mitigation could include siting of equipment, and use of alternative equipment such as quiet design mufflers, acoustic covers, acoustically insulated buildings, and specifications for muffler discharge direction (See Natural Quiet).

- Acceptable fences for the protection of visitors and wildlife shall be constructed around, but not limited to, exploratory drilling locations, production wells, high pressure equipment, hazardous equipment, and storage tanks, unless otherwise authorized by the superintendent (36 CFR §9.41(e)).

- Design for fencing, and requirements for locks and other security measures shall be approved by the NPS prior to construction or implementation (see 36 CFR 9.41(e)).

- All hazardous areas in or near visitor use must be clearly marked with acceptable warning signs (36 CFR §9.41(e)).

- Minimum altitude requirements for aircraft over the National Seashore, particularly over visitor use developments, will protect human heath and safety.

Surface operations may not be conducted within 500 feet of any structure or facility, excluding roads, used for unit interpretation, public recreation, or administration, unless specifically authorized by the regional director (see 36 CFR 9.41(a)).

Integrated Pest Management

Performance Standard: The choice to use a chemical pesticide will be based on a review by Regional and Washington Office coordinators of all other available options and a determination that these options are either not acceptable or not feasible. Chemical pesticides that are not specifically exempt from reporting (regardless of who the applicator is) will be used only with prior approval by the director on an annual basis. The application of such pesticides is subject to the federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), Department of the Interior policies and procedures (DM 517), the NPS Pesticide Use Guideline (draft), Environmental Protection Agency regulations in 40 CFR and Occupational Safety and Health Administration regulations (NPS 1988, 4:14).

Operating Standard: Selection and use of pesticide or herbicide shall be approved by the NPS prior to application.

Protection of Natural Quiet

The NPS will strive to preserve the natural quiet and the natural sounds associated with the physical and biological resources of the parks (for example, the sounds of waves breaking on the shore or the call of shore birds). Activities causing excessive or unnecessary unnatural sounds in and adjacent to parks, including low-elevation aircraft overflights, will be monitored, and action will be taken to prevent or minimize unnatural sounds that adversely affect park resources or values or visitors' enjoyment of them. In accordance with 36 CFR 2.12, the operation or motorized equipment or sound devices that create unreasonable audio disturbances will be prohibited. (NPS 1988, 4:18).

Performance Standard: Preserve the natural quiet and the natural sounds associated with the physical and biological resources of Padre Island National Seashore.

Operating Standard: Oil and gas operations shall be planned to prevent or minimize unnatural sounds that adversely affect park resources or values or visitors' enjoyment of them.

Protection of Night Sky

Performance Standard: To minimize the intrusion of artificial light into the night scene in areas of the park with natural dark, in recognition that darkness and the night sky contribute in the overall visitor experience.

Operating Standard: In natural areas, artificial outdoor lighting will be limited to basic safety requirements and will be shielded when possible. (NPS 1988, 4:19).

Protection of Park Developments and Survey Monuments

Performance Standard: To avoid impacts to existing or future park structures, development, and survey markers.

Operating Standards:

- Surface operations may not be conducted within 500 feet of any structure or facility, excluding roads, used for unit interpretation, public recreation, or administration, unless specifically authorized by the regional director (36 CFR §9.41(a)).

- All NPS survey monuments, witness corners, reference monuments, and bearing trees shall be protected against damage, destruction, or obliteration (36 CFR §9.41(b)).

Plugging and Abandonment Operations Requirements

Performance Standard: To protect groundwater quality, and return operations sites to natural conditions.

Operating Standard:

- When plugging wells in National Park System units, operators must comply with both state and NPS regulations. The NPS uses the standards of the Department of the Interior's Onshore Oil and Gas Order Number 2, Section III. G., Drilling Abandonment Requirements, when prescribing plugging requirements. A copy is in Appendix G.

Reclamation and Revegetation Performance Standards

The regulations in 36 CFR §9.39 specify reclamation standards applicable to all nonfederal oil and gas operations conducted under a Plan of Operations in National Park System units.

All operators subject to the Plan of Operations requirement must initiate reclamation actions within the time specified in an approved Plan of Operations, regardless of surface ownership. Reclamation actions must begin as soon as possible, and no later than 6 months following completion of operations, unless a longer period of time is authorized by the regional director (36 CFR §9.39(a)).

All proposed Plans of Operations submitted by operators must adequately describe specific actions that will be taken to achieve compliance with the applicable reclamation requirements (36 CFR §9.39(a)(12)).

A proposed Plan of Operations must state when reclamation of the disturbed area will begin, and anticipated time required to complete reclamation. Although a specific date may be difficult to predict, the Plan of Operations must state that reclamation actions will be initiated within a specified amount of time following completion of the proposed operation.
The reclamation section of a proposed Plan of Operations must also present a detailed breakdown of the estimated costs that the operator will incur to properly reclaim all disturbed lands or waters (36 CFR §9.36(a)(13)). Itemized cost estimates must be provided for all materials, equipment, supplies, and personnel necessary to complete all specified reclamation actions. The projected cost to complete all reclamation tasks is the basis for the regional director's determination of the appropriate performance bond amount.

Reclamation Standards: Federally Owned or Controlled Surface Estate:

Operators must take the following actions, at a minimum, to reclaim all federally-owned or controlled surface estate disturbed during the conduct of nonfederal oil and gas operations (36 CFR §9.39(a)(2)):

- All aboveground structures, equipment, and roads used for operations must be removed from the unit (unless such structures, equipment, or roads are the subject of another approved Plan of Operations or of a plan which has been submitted for approval, or unless otherwise authorized by the regional director consistent with unit purposes and management objectives as defined in the unit's General Management Plan or Development Concept Plan).

- Man-made debris must be removed from the unit.

- All contaminating substances must be removed from the unit (or neutralized if technologically possible).

- All nonproductive wells must be properly plugged.

- Topographic contour of the operations area must be restored to reasonably conform to the contour that existed prior to the operations.

- Natural topsoil must be replaced to promote the restoration of vegetation.

- Native vegetation communities must be reestablished on all sites disturbed by the operations.

These actions are based upon the requirement that natural conditions and processes be restored on federally-owned or controlled surface estate (36 CFR §9.39(a)(2)). ***Restoration of natural conditions and processes*** means that the reclaimed area must be returned to conditions and processes representing the ecological zone in which the operation lies.

Natural processes for a given area are dynamic, representing a series of successional stages over time. Therefore, restoration of natural conditions and processes may not always demand that a disturbed area be reclaimed to the exact vegetation conditions that existed prior to disturbance. However, reclamation must stabilize a disturbed site through re-establishment of a specific vegetative successional stage that will promote development of conditions that existed prior to disturbance.

Reclamation could thus provide for natural invasion of woody species through successional stages following establishment of natural herbaceous species. Reclamation that converts the disturbed area to some other use, or establishes an ecological zone that did not previously exist, or would not exist, is unsuccessful reclamation under the regulations precisely because the reclamation has not restored natural conditions and processes.

The regulations at 36 CFR §9.39(b) stipulate that reclamation of federally-owned or controlled surface estate must also provide for:

- safe movement of native wildlife,
- re-establishment of native vegetative communities (Refer to 1988 NPS Management Policies, Chapter 4:8, for detailed guidance on vegetation management),
- re-establishment of normal surface water flows,
- re-establishment of reasonable subsurface water flow, and
- public health and safety.
- The operator must notify the superintendent, Padre Island National Seashore, or his/her designated representative, the date that reclamation operations commence and are completed.
- All surface areas disturbed during drilling activities and not needed for production activities will be recontoured to natural grade and reseeded with natural seed material. For optimum results, seeding should be conducted prior to the first spring or fall rainfall periods after the location is abandoned. For producing locations, imported fill material will be removed from all surface areas disturbed during production activities; the area will be contoured and reseeded after the surface is reclaimed, which should take place within the first 6 months after drilling is completed.
- If, upon abandonment of wells, the retention of access road is not considered necessary for the management of Padre Island National Seashore, fill material will be removed (99.9 percent) and replaced with native Mustang/Galveston sand for contouring to its previous natural contours. The area will be mulched with native seed material.
- Native seed mix for use in revegetating operations sites at Padre Island are not generally available from commercial sources. The operator is encouraged to work with Padre Island National Seashore to locate suitable road corridors to mow and bale seed and mulch for subsequent reclamation/revegetation requirements. With proper timing of proposed operations, before clearing or developing the site, mowing and baling should be done to collect native seed.
- Revegetation shall be deemed successful when 70 percent of the pre-impact plant cover density and diversity is attained.

- If, in the opinion of the NPS, the seeding is unsuccessful, the operator may be required to make subsequent seedings.

Protection of Soils Resources

The NPS will actively seek to understand and preserve the soil resources of parks and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources. (NPS 1988, 4:20).

Performance Standard: Preserve soil resources to minimize unnatural erosion, physical removal, or contamination.

Operating Standards:

- Avoid or minimize soil erosion, and soil disturbance (removal).

- Use of herbicides and pesticides requires NPS approval (see Integrated Pest Management).

- Ground-disturbing activities will be timed and type of equipment selected to prevent or minimize rutting of soils.

- All surface disturbance, such as rutting caused by offroad equipment, greater than 1 inch, will be repaired to prior elevation and contours, and revegetated according to NPS reclamation recommendations.

- Compaction of wind-tidal flat soils will be avoided, and where avoidance is unavoidable, will be minimized and reclaimed.

- Proper siting of oil and gas operations will avoid impacting dune elevations and wetlands.

- Imported material will be used to construct drilling pads, access roads, and berms around production operations. Therefore, no surface soil material will be stripped and stockpiled for future reclamation. Imported material will be removed when the operations site is reclaimed, to return the surface to grade.

- Restrict sources for sand fill material to areas outside the park, preferably Padre Island and Mustang Island.

- The operator shall avoid any operations requiring offroad vehicle access when the ground is muddy and/or wet in order to minimize rutting. The superintendent may prohibit exploration, drilling, or other activities during periods of precipitation.

- A berm, to contain 1.5 times largest tank capacity, will be constructed around the perimeter of the production tank battery with imported suitable fill material. The berm/liner shall provide temporary containment of spills and fires and prevent the downward movement of fluids through the soil to the groundwater.

- Drilling operations shall provide for protection of soils by utilizing a liner system beneath the drilling rig and associated equipment that will direct spilled materials, including fuels and lubricants, rig wash, and contaminated rainwater, to a collection point for recycling or disposal.

- For exploratory drilling operations and workovers, drilling muds will be circulated within a closed-loop containment system.

- Secondary containment systems will be utilized to prevent the introduction of oil andgas, and other contaminating or hazardous substances to soils. Secondary containment systems shall be used. These include drip pans, 55-gallon drum "coffin" containment systems, etc.

- Restore topographic, chemical, and biological properties of soils to pre-impact conditions.

Protection of Threatened and Endangered Wildlife

Consistent with the purposes of the Endangered Species Act (16 U.S.C. 1531 et seq.), the National Park Service will identify and promote the conservation of all federally-listed threatened, endangered, or candidate species within park boundaries and their critical habitats. . . . Active management programs will be conducted as necessary to perpetuate the natural distribution and abundance of threatened or endangered species and the ecosystems on which they depend. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service are the lead agencies in matters pertaining to federally-listed threatened and endangered species. The National Park Service will cooperate with those agencies in activities such as the delineation of critical habitat and recovery zones on park lands, and will participate on recovery teams. The National Park Service also will identify all state and locally listed threatened, endangered, rare, declining, sensitive, or candidate species that are native to and present in the parks, and their critical habitats. These species and their critical habitats will be considered in NPS planning activities. The National Park Service will cooperate with the agencies responsible for state or locally listed species. (NPS 1988, 4:11).

Performance Standard: To ensure the continued existence of Federal- and state-listed threatened and endangered species, and to ensure actions permitted aid in the recovery and continuing existence of Federal and state-listed threatened and endangered species by conserving and avoiding threats to threatened and endangered species and their habitat.

The Endangered Species Act of 1973 and National Park Service Organic Act direct the National Park Service to protect and preserve wildlife habitat. The ESA and regulations in 50 CFR Parts 17 and 402 specifically require all federal agencies to use their authorities in furtherance of ESA to carry out programs for the conservation of listed species, and to ensure that any agency action will not jeopardize the continued existence of a listed species or adversely modify critical habitat.

The NPS cooperates with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, the lead agencies in matters pertaining to federally-listed threatened and endangered animals. The NPS also cooperates with the Texas Parks and Wildlife Department, responsible for state-listed species, on a project-specific basis, to evaluate potential impacts to state-listed species and determine appropriate mitigation measures.

The NPS shall identify all state and locally listed threatened, endangered, rare, declining, sensitive, or candidate species that are native to and present in the parks, and their critical habitats. These species and their critical habitats will be considered in NPS permitting of nonfederal oil and gas operations. Based on an analysis of the status of state and locally listed species throughout their native ranges and through the National Park System, the NPS may choose to control access to critical habitats or to conduct active management programs similar to activities conducted to perpetuate the natural distribution and abundance of federally-listed species.

Operating Standards:

- Operators shall include in proposed Plans of Operations a biological survey of the proposed project area, performed by a qualified biologist. A "qualified biologist" is one with local experience in species and habitat identification. Surveys conducted of operations areas shall be performed at the times when the species of concern are present and identifiable by an experienced surveyor.

- All proposed Plans of Operations will be evaluated for potential impacts to special-status species. If the evaluation indicates a "may affect" situation (includes both beneficial and adverse impacts) on a federally-listed or proposed species, and the adverse impacts cannot be eliminated, consultation or conference with the U.S. Fish and Wildlife Service (FWS) and/or National Marine Fisheries Service must be conducted. The NPS does not have the authority to make a "no effect" finding if a "may affect" situation exists.

- In the event that formal consultation is initiated with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service on a federally-listed species in accordance with Section 7(d) of the ESA, the NPS cannot make any irreversible or irretrievable commitment of resources that would preclude the formulation and execution of reasonable alternatives to resolve the conflict. In general, it is the NPS's responsibility to manage all programs for the conservation of endangered species to the extent that a jeopardy opinion need never be issued by the FWS. The NPS will consult with the Texas Parks and Wildlife Department when adverse impacts to state-listed species are anticipated.

- The results of NPS consultation with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Texas Parks and Wildlife Department will be integrated into the NPS decisionmaking process at the conclusion of public and agency review of a proposed Plan of Operations and Environmental Assessment.

- All open-vent exhaust stacks on production vessels designed to heat the product using an open flame (as opposed to electrically heated) shall be constructed, modified, and/or otherwise equipped and maintained to prevent birds and bats from entering, and to discourage perching and nesting. Such production vessels include, but may not be limited to, heater-treaters, separators, dehydrators, and in-line units. This requirement does not apply to compression-type equipment.

- All open topped (non-earthen) tanks will be effectively netted or otherwise covered and maintained so as to minimize the likelihood of accidental deaths of migratory birds. This netting or cover shall be installed no later than four (4) days after the setting of the production casing string or completion of plugging as a dry hole. All tanks installed for production purposes will be immediately netted or covered. All tanks shall remain netted or covered until such time as they are removed from the location. The granting of a four (4) day interim period for completion of covering or netting tanks associated with the drilling process in no way limits the operator's responsibility should migratory birds be found dead in the tanks within the interim period or during the actual drilling phase.

- Prior to initiating approved operations, operators and their subcontractors shall participate in an orientation training provided by the National Seashore on endangered and threatened species identification, based on habitat type in the area of operations. If approved operations involve beach access during the sea turtle nesting season, operators and subcontractors will receive information pertaining to safe vehicle access and speed limits on the beach, sea turtle protection issues, species identification, adult crawl recognition, adult and hatchling protection measures, and observation reporting protocols.

- When proposed operations, utilizing least damaging methods, may adversely affect threatened and endangered species and their habitat, appropriate mitigation measures would be required to avoid impacts. Mitigation measures would include actions specified in species recovery plans developed by the USF&WS and NMFS in coordination with the NPS, including prompt reclamation of disturbed habitat for threatened and endangered species within 6 months following completion of an approved operation. The identification of least damaging methods would be determined through an evaluation of the proposed Plan of Operations by the NPS through consultation with the USF&WS and NMFS.

- Heavy equipment associated with oil and gas operations, such as drilling rigs, that may have reduced maneuverability or have low visibility to monitor the beach driving area would be required to use appropriate mitigation techniques to avoid adverse impacts to sea turtles, nests and hatchlings. Mitigation techniques could include timing limitations, reduced speed limits, or the requirement for a monitor on an all-terrain vehicle in advance of heavy equipment to monitor the beach for sea turtles and nesting sites. The need for mitigation measures will be identified and developed on a project-specific basis by the NPS in consultation with the USF&WS.

- Artificial outdoor lighting on operations conducted near the Gulf beach area will meet human safety requirements and will be designed and shielded to minimize impacts to adult and hatchling sea turtles.

- Mitigation necessary to avoid or minimize impacts to marine mammals would involve a variety of techniques including timing/seasonal restrictions to avoid marine mammals during key times, employing scare tactics, and using least-damaging methods during the conduct of geophysical exploration, and for construction of pipelines from proposed exploratory wells located outside the National Seashore to production sites behind the foredunes.

- In the event of an incidental take or deliberate mortality of an individual of a threatened or endangered species, nonfederal oil and gas operators shall immediately notify the Superintendent of Padre Island National Seashore, or his designated representative, and will cease work until permission to proceed with activities, as described in an approved Plan of Operations, has been granted by the Superintendent.

- Certain operating standards shall be taken on the Gulf Beach and in nearshore waters to protect adult and hatchling Kemp's ridley sea turtles, and to preserve nesting habitat for all threatened and endangered sea turtle species that seasonally frequent the area on an annual basis. These include the following restrictions:

- During March-August, there will be no drilling of shotholes, detonation of explosive charges, or use of air guns in association with geophysical exploration, except that surveying and placement of receiver lines could be permitted.

- No board roads will be constructed on the beach, except where Park Road 22 terminates on South Beach or to provide access through the foredunes.

- No surface occupancy will be permitted for drilling, production, or pipeline operations on the Gulf Beach or in nearshore waters.

- Activities in or near sea turtle egg incubation sites will be restricted to protect threatened and endangered sea turtle eggs from vibration-induced mortality during incubation. These sites include the Sea Turtle Egg Incubation Laboratory and a beach area incubation facility, if such a facility is necessary in the future. These restrictions include the following:

  - A seasonal (approximately March-August) distance offset from the Sea Turtle Incubation Laboratory and a beach area incubation facility, if such a facility is necessary in the future, would be required for geophysical exploration blasting operations to avoid the possibility of vibration-induced mortality to developing sea turtle embryos. Blasting distance offsets would be determined based on the type of operation proposed and in consultation with the USF&WS.

  - Surveying for geophysical operations may occur during the seasonal closure period, subject to Current Legal and Policy Requirements.

  - No surface occupancy for drilling, production, and pipeline operations will be permitted within a minimum 500 feet of the Sea Turtle Egg Incubation Laboratory and a beach area incubation facility, if such a facility is necessary in the future.

- There will be certain restrictions on activities near the Mansfield Channel Jetties to protect juvenile green sea turtles and to preserve important marine habitat for all threatened and endangered sea turtle species that frequent the area. These restrictions include the following:

  - Geophysical exploration may be permitted under Current Legal and Policy Requirements, except that no explosive charge or air guns may be detonated within 500 feet of the jetties.

  - No Surface Occupancy for drilling, production, or pipeline operations will be permitted near the jetties.

A list of State and Federally-listed species that are known to occur in the park is shown on Table 3.7. The seasons in which these species use specified habitats are described in the accompanying text, and Table 3.8 provides General Dates and Locations of Turtle Nesting and Tracks, and Probable Nesting Seasons. The NPS will comply with the Endangered Species Act to avoid adverse impacts to these species and their habitats. Where adverse impacts from proposed oil and gas operations cannot be eliminated, the NPS will undertake consultation with the U.S. Fish and Wildlife Service and National Marine Fisheries Service pursuant the ESA. Depending on consultation with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Texas Parks and Wildlife Department, proposed Plans of Operations requesting approval for nonfederal oil and gas operations may be modified to avoid impacts to species or their habitats.

Protection of Vegetation

The National Park Service will strive to restore native species to parks. To the maximum extent possible, plantings in all zones will consist of species that are native to the park. Only native species will be allowed in natural zones. (NPS 1988, 4:8).

Performance Standard:

- Avoid or minimize damage to or removal of vegetative communities.
- Reclaim all disturbed areas in a manner that re-establishes native vegetative communities.

Operating Standards:

- Use existing access roads and the use of construction equipment and/or techniques designed to minimize vegetative disturbance.

- Shotholes shall not be drilled within 500 feet of the two relict oak mottes.

- Surface soil shall be used to re-plug the hole.

- Any rutting caused by the offroad equipment, greater than 1 inch, shall be contoured, filled, and revegetated according to NPS reclamation recommendations.

- Drill cuttings matching soil surrounding the shothole may be used to replug the hole and fill in any rutting.

- Minimize loss of vegetation by proper road and drilling pad design/siting.

- Avoid uprooting of vegetation during seismic operations.

- Driving off established routes is prohibited.

- Cut and store vegetation prior to ground-disturbing activities for use in later mulching and collection of native seed for reclamation/revegetation.

- Minimize vegetative clearing.

- Control the introduction of exotic species.

- Seismic operations shall employ a one-way method allowing multiple passes along the same route in order to minimize cumulative impacts.

Protection of Visual Quality

Because of the low, horizontal character of the landscape, vertical features are extremely conspicuous and tend to focus an observer's view. The landscape character of the island is most vulnerable to elements that oppose its horizontality (GMP, p. 5).

Performance Standard: Protect the visual quality of the park.

Operating Standards:

- Protect the visual quality of the park by avoiding permanent structures that can be seen from locations that are commonly utilized by the public. Where this is not practicable, utilize technically feasible methods to minimize the visual impact on the natural and historic scene.

- Exploratory wells and production operations proposed to bottomhole locations in the Gulf of Mexico will be offset 2 statute miles from the shoreline, during September 15 through March 15; and 3 miles offshore from the 2-fathom line during March 15 through September 15, or directionally drilled from behind the high dune line, so as to minimize visual impacts to Gulf beach visitors.

- Production facilities located on the island will be designed to minimize the visual intrusion on the natural scenery, utilizing equipment that will conform compatibly with the island topography and painted to blend with the surrounding environment.

- Paint permanent oil and gas facilities a color that blends with the surrounding environment. Selection of paint color shall be approved by the NPS before being used.

- Utilize low-profile structures for all permanent production facilities located within 3 miles of the Gulf shoreline.

Protection of Water Resources

The National Park Service will seek to perpetuate surface and ground waters as integral components of park aquatic and terrestrial ecosystems. Park waters, either surface waters or ground waters, will be withdrawn for consumptive use only where such withdrawal is absolutely necessary for the use and management of the park, and when studies show that it will not significantly alter natural processes and ecosystems. The National Park Service will seek to restore, maintain, or enhance the quality of all surface and ground waters within the parks consistent with the Clean Water Act (33 U.S.C. 1251, et seq.) and other applicable federal, state, and local laws and regulations. (NPS 1988, 4:15).

The Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1977, is the basic authority for in-stream water quality standards and maximum permissible pollutant discharges. The Safe Drinking Water Act of 1974 authorizes domestic water quality standards.

Performance Standard: Maintain existing conditions for surface and ground water resources (includes quality, quantity, and circulation).

Operating Standards to Avoid or Minimize Impacts to Water Quality:

- Surface operations may not be conducted within 500 feet of the banks of perennial, intermittent, or ephemeral watercourses, unless specifically authorized by the regional director (36 CFR §9.41(a)).
- Surface operations may not be conducted within 500 feet of the high-pool shoreline of any natural or man-made impoundment, unless specifically authorized by the regional director (36 CFR §9.41(a)).
- Surface operations may not be conducted within 500 feet of the mean high tide-line, unless specifically authorized by the regional director (36 CFR §9.41(a)).
- No earthen pits will be permitted.
- Ensure proper hydrologic circulation of surface waters by installing bridges, culverts, low-water crossings, reducing rutting, etc.
- Use of herbicides and pesticides will require NPS approval (see Integrated Pest Management).
- Use secondary containment such as drip pans, impermeable liners, berms, etc.
- Ensure rapid spill response and removal.
- Properly site and design operations.
- Use approved wastewater systems.
- Dispose of stormwater in accordance with federal and state law.
- Ensure proper saltwater injection and disposal.
- For drilling operations, drilling pad shall be sloped towards the drilling cellar to capture any spilled hazardous or contaminating substances.
- Vacuum accumulations of any spilled hazardous and contaminating substances from the well cellar and drilling area for disposal in a state-approved disposal facility.
- Monitor surface water if sub-surface water is removed.
- Collection and laboratory analyses of soil, sediment, surface water or groundwater samples before and after well drilling or production (or a change of ownership or leasing rights) shall follow the NPS's "Guideline for the Detection and Quantification of Contamination at Oil and Gas Operations" contained in Appendix F.

Operating Standards to Protect Water Quantity:

- Use of water from a point of diversion in any National Park System unit for the conduct of nonfederal oil and gas operations subject to the Plan of Operations requirement is not allowed, except as authorized by the regional director in an approved Plan of Operations (36 CFR §9.35). A ***point of diversion*** is a partial or total alteration of a surface water course or subsurface aquifer away from the natural course.

The regional director can authorize the use of water from a point of diversion in a unit for the conduct of nonfederal oil and gas operations only if the operator:

- holds a superior claim to the water than held by the United States; or

- holds a subordinate claim to the water than held by the United states, and the operator can conclusively show that removal of the requested water will not damage unit resources and values.

In either case, operators proposing to use water from a point of diversion must comply with appropriate state water laws. An operator's proposed Plan of Operations must adequately address all legal and environmental issues associated with water diversion and use if the conduct of operations will require diverting water in a unit.

Optional water supply sources may include drilling of water wells and tanking.

Protection of Wetlands

Performance Standard: The occupancy and modification of wetlands will be avoided wherever possible. Where no practicable alternatives exist, mitigating measures will be implemented to minimize potential harm to natural values of wetlands.

Management of wetlands is subject to the provisions of Executive Order 11990, "Protection of Wetlands" (42 U.S.C. 4321); the Rivers and Harbors Act (33 U.S.C. 401, et seq.); and Section 404 of the Clean Water Act (33 U.S.C. 1344). (NPS 1988, 4:16).

Director's Order 77-1 and Procedural Manual 77.1 (Wetlands Protection) establish policies, requirements, and standards for protection of NPS wetlands.

Operating Standards:

- Where wetlands resources may potentially be directly or indirectly impacted, oil and gas operators are required to perform and submit wetlands delineation surveys in the Plan of Operations. The wetlands delineation should cover the project area if wetlands are present, and adjacent lands if wetlands are adjacent to the proposed operations site for the purpose of identifying potential direct and indirect wetlands impacts. The wetlands delineation shall be approved by the U.S. Army Corps of Engineers and by the Water Resources Division of the NPS in conjunction with the Statement of Findings.

- NPS mitigation requirements for direct and indirect adverse impacts to wetlands requires a minimum compensation 1:1. In some situations, a higher ratio for compensation may be required. Final compensation ratios may need to be greater than 1:1 in cases where: (1) the functional values of the site being impacted are determined to be high and the restored wetlands will be of lower functional value; (2) it will take a number of years for the restored site to become fully functional; (3) the likelihood of full restoration success is unclear. If the adverse impact on wetlands (direct plus indirect impacts) from the entire project totals less than 0.1 acres, then wetlands compensation is strongly encouraged, but may be waived if the loss of wetlands functions is considered to be minimal.

- The compensation site shall be located in the park. Compensation shall be performed prior to or at the time impacts associated with proposed nonfederal oil and gas operations are anticipated to occur. On completion of operations that have impacted wetlands (directly and/or indirectly), restoration of the site shall be conducted to return the impacted wetlands to their pre-impact condition.

- Areas within Padre Island National Seashore that will be restored in connection with compensation for potential impacts associated with new surface uses, in priority order, are:

    1. poorly restored abandoned oil access roads and drilling locations near Yarborough Pass;

    2. wetland restoration in areas that were adversely affected from past actions, such as vehicular impacts in the mud flats and surface water circulation at Bird Island Basin;

    3. in situations when potential wetlands impacts from proposed nonfederal oil and gas operations would result in wetlands compensation ratios greater than 1:1, operators would be required to perform the initial 1:1 compensation by restoring disturbed wetlands areas described in items 1 and 2 above; however, operators would then have two options to perform the remaining wetlands compensation ratio:

        a. perform the remaining compensation ratio by restoring the disturbed wetlands areas described in items 1 and 2 above; or,

        b. perform a commensurate portion of an "in-lieu" project by constructing segments of educational and interpretive elevated boardwalks to be located across from the Malaquite Visitor Center, at Novillo Line Camp, or other sites designated by the superintendent. These wetlands projects shall be planned and designed by Padre Island National Seashore, and all environmental compliance performed by the NPS. A commensurate portion would be based on the costs for the initial 1:1 compensation described above.

    4. When the minimum 1:1 wetlands compensation ratio can not be performed in Padre Island because no remaining impacted wetlands areas remain to be restored, operators shall be required by the NPS to perform the minimum 1:1 wetlands compensation ratio in another NPS unit.

Protection of Wildlife Biodiversity

Performance Standard: Minimize human impacts on wildlife populations.

Protection of Native Animals Performance Standard: To perpetuate the native animal life as part of the natural ecosystems of parks. Emphasis will be on minimizing human impacts on natural animal population dynamics. The native animal life is defined as all animal species that as a result of natural processes occur or occurred on lands now designated as a park. Native animal populations will be protected against harvest, removal, destruction, harassment, or harm through human action. (NPS 1988, 4:5).

Management of Migratory Animals Performance Standard: Padre Island National Seashore has several native migratory species (marine turtles, geese, peregrine falcons, piping plover, to name a few). The NPS will ensure the preservation of their populations and their habitats inside the park and will cooperate wherever possible with others to ensure the preservation of their populations and habitats outside the park. (Management Policies, Chapter 4:7).

Many species of vertebrates and invertebrates regularly travel from one location to another at yearly or other intervals. Such species have at least two significant habitat areas, and those that spend time enroute may have three or more. Where those species occur in a park, park habitats provide only one of the major habitat needs, and the survival of the species in the park is also dependent on the existence and quality of habitats outside the park.

Operating Standards:

- Operators shall include in proposed Plans of Operations a biological survey of the proposed project area, performed by a qualified biologist.
- Operations shall abide by speed limits on access routes, particularly at night, to reduce the potential for collisions with wildlife.
- Worker shift changes could occur during daylight hours to the maximum extent possible to reduce traffic during night hours.
- Nets shall be placed over open water tanks and secondary containment where stormwater could collect.
- Acceptable fences for the protection of visitors and wildlife shall be constructed around, but not limited to, exploratory drilling locations, production wells, high pressure equipment, hazardous equipment, and storage tanks, unless otherwise authorized by the superintendent (36 CFR §9.41(e)).
- Restricted access to rookery islands will protect wildlife using the islands.
- Operators are not allowed to carry firearms.
- No hunting is permitted.
- Utilize proper waste disposal.

- Minimum altitude requirements for aircraft flight over the National Seashore, particularly over the rookery islands, the Gulf of Mexico shoreline, and over wind-tidal flats, during specified times of the year when shorebirds, including T/E species, are using these areas for nesting, feeding and resting, will protect wildlife.

Liability for Damage to Park Resources

Under the Park System Resource Protection Act (16 U.S.C. §19jj as amended), "any person who destroys, causes the loss of, or injures any park system resource is liable to the United States for response costs and damages resulting from such destruction, loss, or injury." Park system resource means "any living or non-living resource that is located within the boundaries of a unit of the National Park System, except for resources owned by a non-federal entity." At Padre Island, with the exception of non-federal oil and gas rights, the federal government owns all the resources in the park. This includes both surface and subsurface resources.

The noted Act provides comprehensive definitions for both response costs and damages.

Response costs "means the costs of actions taken by the Secretary of the Interior to prevent or minimize destruction or loss of or injury to park system resources; or to abate or minimize the imminent risk of such destruction, loss, or injury; or to monitor ongoing effects of incidents causing such destruction, loss or injury."

Damages "includes the following:

1. Compensation for -

   A(i). the cost of replacing, restoring, or acquiring the equivalent of a park system resource; and

   A(ii). the value of any significant loss of use of a park system resource pending its restoration or replacement or the acquisition of an equivalent resource; or

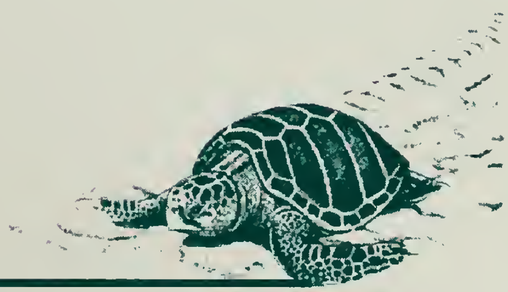
   B. the value of the park system resource in the event the resource cannot be replaced or restored.

2. The cost of damage assessments under" the Act.

The above provisions embody a very broad articulation of the scope of liability that attaches to private activities in parks. In addition, under §19jj-1(d), Congress makes clear that the provisions of the Act are "in addition to any other liability which may arise under federal or state law." With respect to nonfederal oil and gas activities in parks in general and Padre Island in particular, an operator's liability for damages to park resources may easily exceed the amount of the bonds set under 36 CFR §9.48(d) [see discussion earlier in this chapter on "Bond Requirement"]. Under 16 U.S.C. §19jj, the NPS can recover the costs associated with such damages.

CHAPTER 3

AFFECTED ENVIRONMENT



CHAPTER 3
AFFECTED ENVIRONMENT

INTRODUCTION

The purpose of this chapter is to describe the existing condition of the environment that may be affected by the implementation of any of the alternatives. The information presented in this chapter serves as the "baseline" by which to measure the potential effects of the alternatives discussed in Chapter 4 (Environmental Consequences) identified through the scoping process and interdisciplinary field analysis. The issues in this chapter and Chapter 4 are those that were identified by the EIS team and through public comment as requiring more detailed analysis. The other issues that were considered and evaluated, but not carried forward for more detailed analysis, are described in the last portion of Chapter 1.

The following are the issues discussed in Chapters 3 and 4 in order of presentation:

Activity that may be affected by resource protection measures under the various alternatives:

- Oil and Gas Exploration and Development

Important resources and values for Padre Island that may be affected by oil and gas operations:

- Air Quality
- Soil and Water Resources
- Floodplains
- Vegetation
- Wetlands
- Fish and Wildlife
- Threatened and Endangered Species and Their Habitats
- Cultural Resources
- Visitor Experience

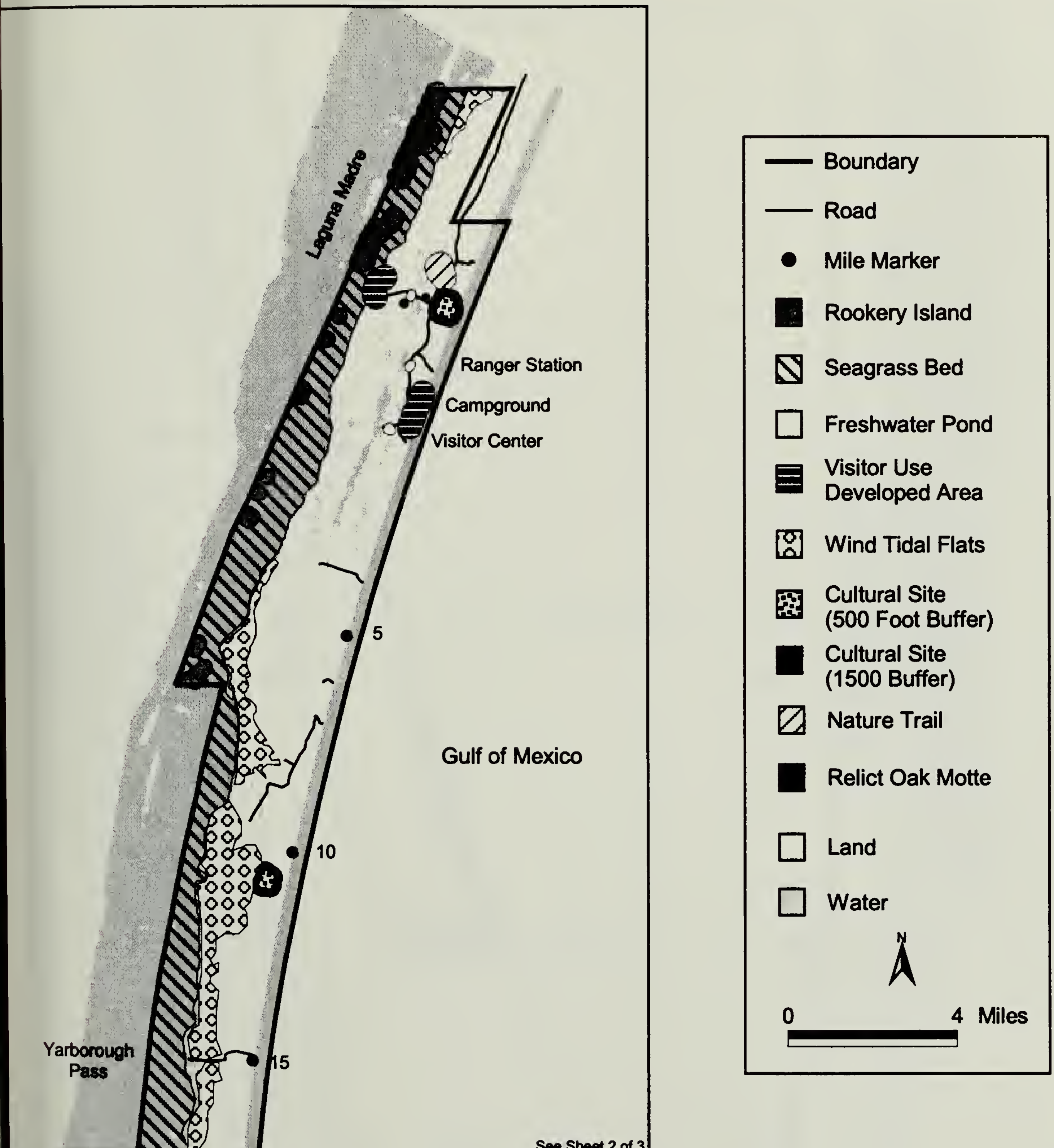
Many of the issues listed above involve certain resources or sites that were identified as Sensitive Resource Areas (SRAs). These SRAs are listed in Table 3.1 and are discussed under the topic indicated in the last column of the table. The acreages for each SRA shown in the tables include the largest protective buffer. Figures 3.1, 3.2, and 3.3 present a Sensitive Resources Areas map that shows the locations of the SRAs.

Description of resources in this chapter also provides a basis for the mitigation measures described in the proposed action and alternatives, and Current Legal and Policy Requirements, which are common to all alternatives described in Chapter 2.

Table 3.1. Sensitive Resource Areas in Acres and Percent of Park

Sensitive Resource Area	Acres (w/buffers)	Percent of Park	Discussed Under this Topic in EIS
Cultural Sites:			Cultural Resources
-Novillo Line Camp	377 acres	0.29%	
-Green Hill Line Camp	311 acres	0.24%	
-Black Hill Line Camp	313 acres	0.24%	
-Mansfield Cut Archeological District	2,702 acres	2.07%	
Freshwater Ponds:			Soil and Water Resources
-Pond A	33 acres	0.03%	
-Pond B	33 acres	0.03%	
-Pond C	42 acres	0.03%	
Laguna Madre	30,503 acres	23.39%	Wetlands (and Water Resources)
Wind-Tidal Flats	28,287 acres	21.69%	Wetlands
Visitor Use Areas:			Visitor Use
-Malaquite Visitor Center and RV Campground	470 acres	0.36%	
-Bird Island Basin	380 acres	0.29%	
-Grasslands Nature Trail	318 acres	0.24%	
Foredunes	3,200 acres	2.45%	Floodplains (and Vegetation)
Washover Channels	1,192 acres	0.91%	Floodplains
Rookery Islands	530 acres	0.41%	Fish and Wildlife
Relict Live Oak Mottes:			Vegetation
-Live Oak Motte 1	22 acres	0.02%	
-Live Oak Motte 2	18 acres	0.01%	
Totals:	**68,731 acres**	**52.70.%**	

Padre Island National Seashore Sensitive Resource Areas



igure 3.1. Padre Island National Seashore – Sensitive Resource Areas

heet 1 of 3

NS-PAIS	613-60003
Jan 2000	PAIS

Padre Island National Seashore
Sensitive Resource Areas

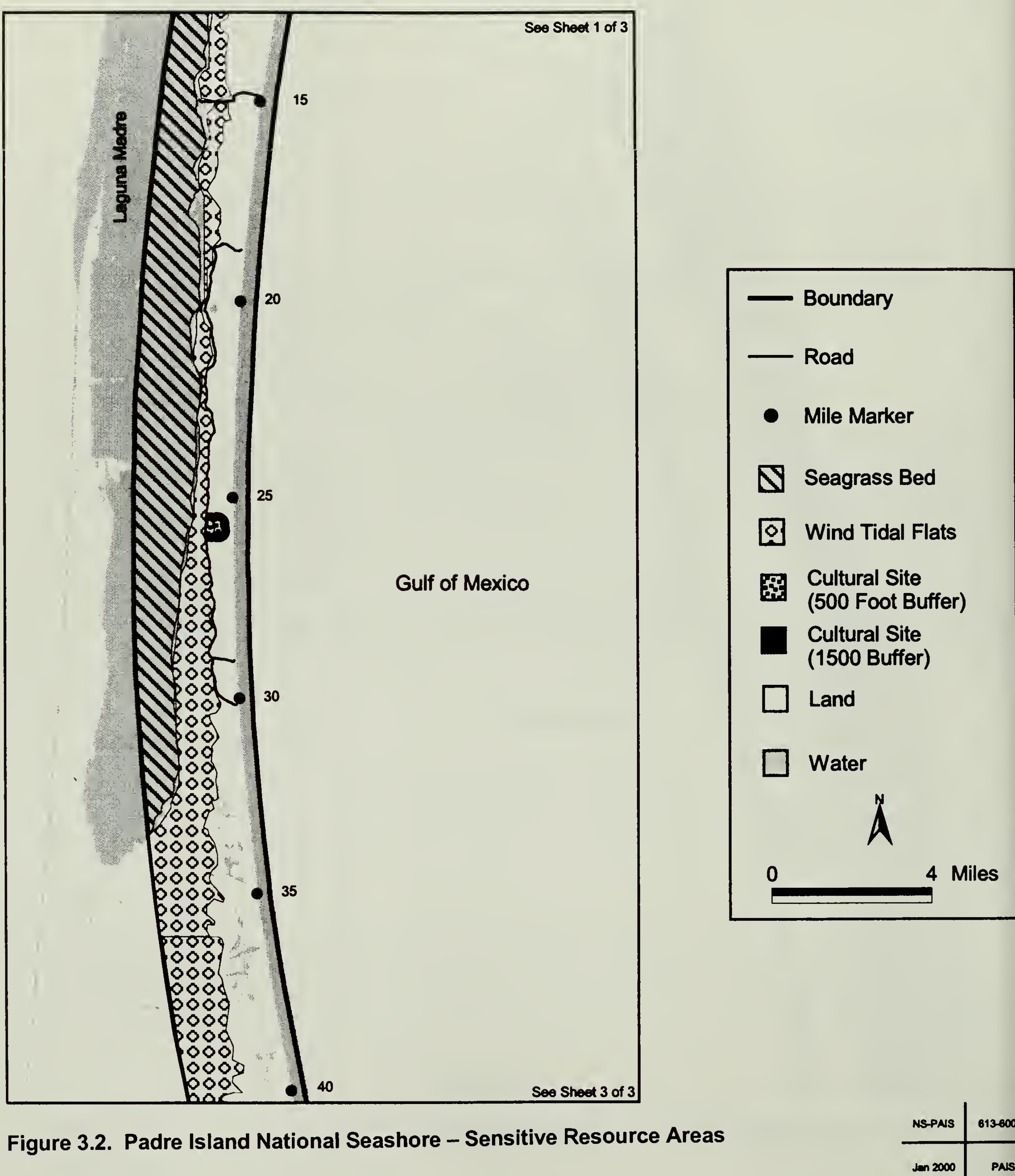
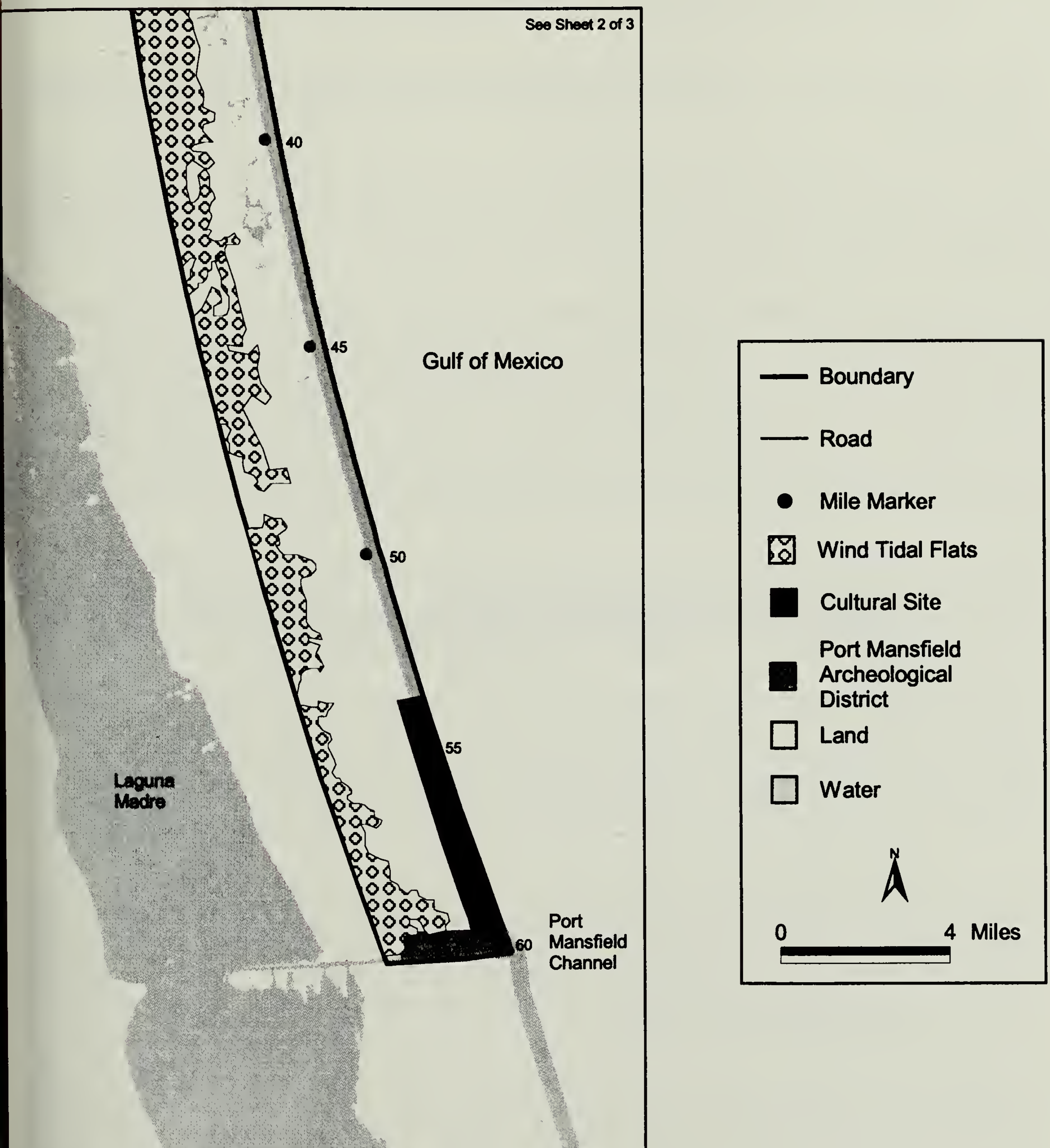


Figure 3.2. Padre Island National Seashore – Sensitive Resource Areas

Sheet 2 of 3

Padre Island National Seashore
Sensitive Resource Areas



igure 3.3. Padre Island National Seashore – Sensitive Resource Areas

heet 3 of 3

NS-PAIS	613-60005
Jan 2000	PAIS

OVERVIEW OF PADRE ISLAND NATIONAL SEASHORE

Padre Island National Seashore was established by Congress on September 28, 1962 (16 U.S.C. §459d *et seq.*):

> "in order to save and preserve, for purposes of public recreation, benefit, and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped. . . ."

Padre Island National Seashore encompasses 68 miles of the 113-mile long barrier island located in the Coastal Bend region of South Texas, within Kleberg, Kenedy, and Willacy Counties. It contains 130,355 acres.

Padre Island is separated from the mainland by Laguna Madre, a shallow body of hypersaline water that is navigable through the Gulf Intracoastal Waterway maintained by the U.S. Army Corps of Engineers. The lagoon, which is 10 miles wide at its widest point, is connected to the Gulf by the Mansfield Channel, which forms the southern boundary of the park.

Padre Island National Seashore preserves the longest undeveloped barrier island in the United States. It is a dynamic ecosystem with significant resources. From the Gulf to the lagoon, a width that varies along the island from 1/2 to 3 miles, the island's landscape changes from broad sandy beaches, or in places beaches comprised almost entirely of shells, to ridges of fore-island dunes, then to grassy flats broken here and there by smaller dunes and ponds, and finally to vaguely defined back-island dunes and mudflats that merge with the waters of the lagoon. These land and water environments provide rich habitat for marine and terrestrial plants and animals, including 15 federal and state-listed threatened and endangered species of birds, sea turtles, and marine mammals.

Figure 3.4 is a cross-sectional diagram that depicts the varying topography of Padre Island. The majority of the park is less than 20 feet above mean sea level, and the highest points are approximately 50 feet above sea level. Table 3.2 summarizes the landcover classification types on Padre Island, while Figures 3.5, 3.6, and 3.7, provide a Landcover Classes map of the island.

The barrier island is continuously being reshaped by the day-to-day action of winds, currents, waves, and tides. During storms, change is dramatic. The barrier island takes the full force of a hurricane's high-energy assault. As observed after Hurricane Allen in August 1980, and Hurricane Bret in August 1999, beaches were eroded, dunes were breached, overwash passes were cut, and property was damaged or destroyed. Where the fore-island dune ridge is well developed, the barrier island blocks the storm tidal surge and dissipates wave energy, providing a major defense for the mainland.

Padre Island remains a relatively natural landscape. The island's visual resources serve as an amenity for the region's residents and many visitors. Extensive panoramas and vistas may be viewed from higher elevations, such as ridges, foredunes, and especially the view tower at Malaquite Beach. Because of the low, horizontal character of the landscape, vertical features are extremely conspicuous and tend to focus an observer's view. The landscape character of the island is most vulnerable to elements that oppose its horizontal nature.

Cultural resource surveys have recorded 42 sites on Padre Island, 20 of which are within the boundaries of the National Seashore. Because the shifting sands of Padre Island constantly cover and reveal archeological sites--and because survey coverage is not yet complete--the presence of additional sites is likely. Three historic archeological sites within the park boundary are associated with at least three Spanish colonial shipwrecks that occurred in 1554. These sites comprise the Mansfield Cut underwater archeological district, which is listed on the National Register of Historic Places. One associated site is located onshore and could be the survivors' and/or salvagers' camp related to the 1554 wrecks. Other historic sites include the Zachary Taylor campsite (Mexican-American War); and three sites known as Black Hill, Green Hill, and Novillo Line Camps, built for the cattle operations of the Dunn Ranch. The Novillo Line Camp, the most intact remaining structural expression of open-range ranching on the island, is listed in the National Register of Historic Places. Black Hill and Green Hill Line Camps have been evaluated and recommended by NPS cultural resource specialists to be eligible for listing on the National Register of Historic Places.

Figure 3.4. Cross-Section of Environments of North Padre Island. (After Weise and White, 1980.)

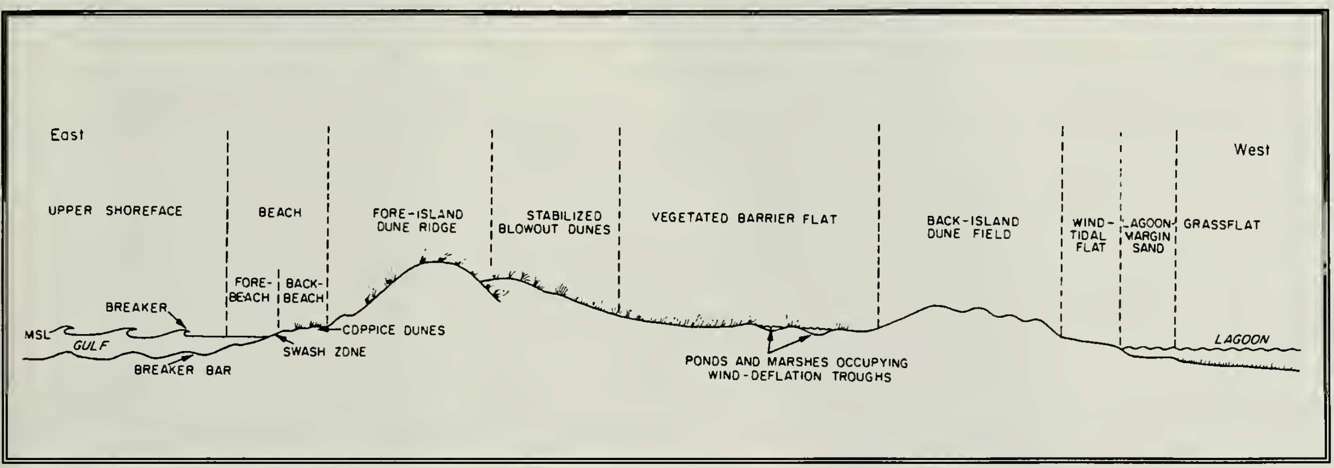


Table 3.2. Landcover Classification Type in Acres and Percent of Park

Land Classification Type	Acres	% Park
Inland Waters (ephemeral and permanent freshwater ponds)	2,346	1.8%
Laguna Madre	30,503	23.4%
Gulf of Mexico	12,775	9.8%
Wind-Tidal Flats	28,287	21.7%
Sparse Vegetation	6,075	4.6%
Emergent Vegetation	19,273	14.8%
Grassland	13,427	10.3%
Beach/Sand	3,259	2.5%
Urban (park development)	391	0.3%
Dunes (foredunes and back island dunes)	6,127	4.7%
Unconsolidated Shore	6,518	5.0%
Washover Channels	1,192	0.9%
Rookery Islands	261	0.2%
Total	130,434	100.00%

Padre Island National Seashore
Landcover Classes

Figure 3.5. Landcover Classes Map of Padre Island National Seashore

Sheet 1 of 3

NS-PAIS	613-600
Jan 2000	PAIS

Padre Island National Seashore
Landcover Classes

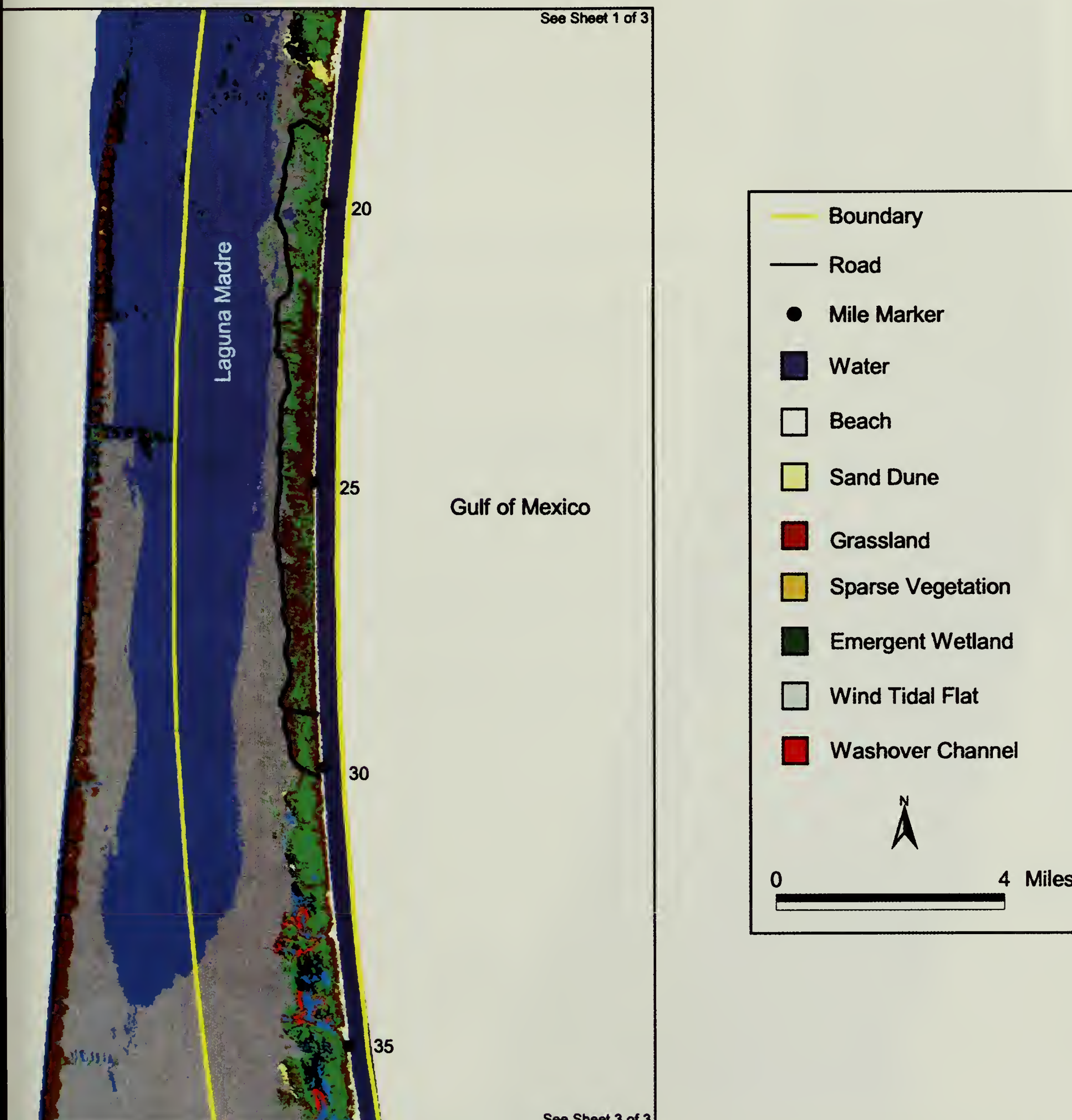


Figure 3.6. Landcover Classes Map of Padre Island National Seashore

Sheet 2 of 3

NS-PAIS	613-60007
Jan 2000	PAIS

Padre Island National Seashore
Landcover Classes

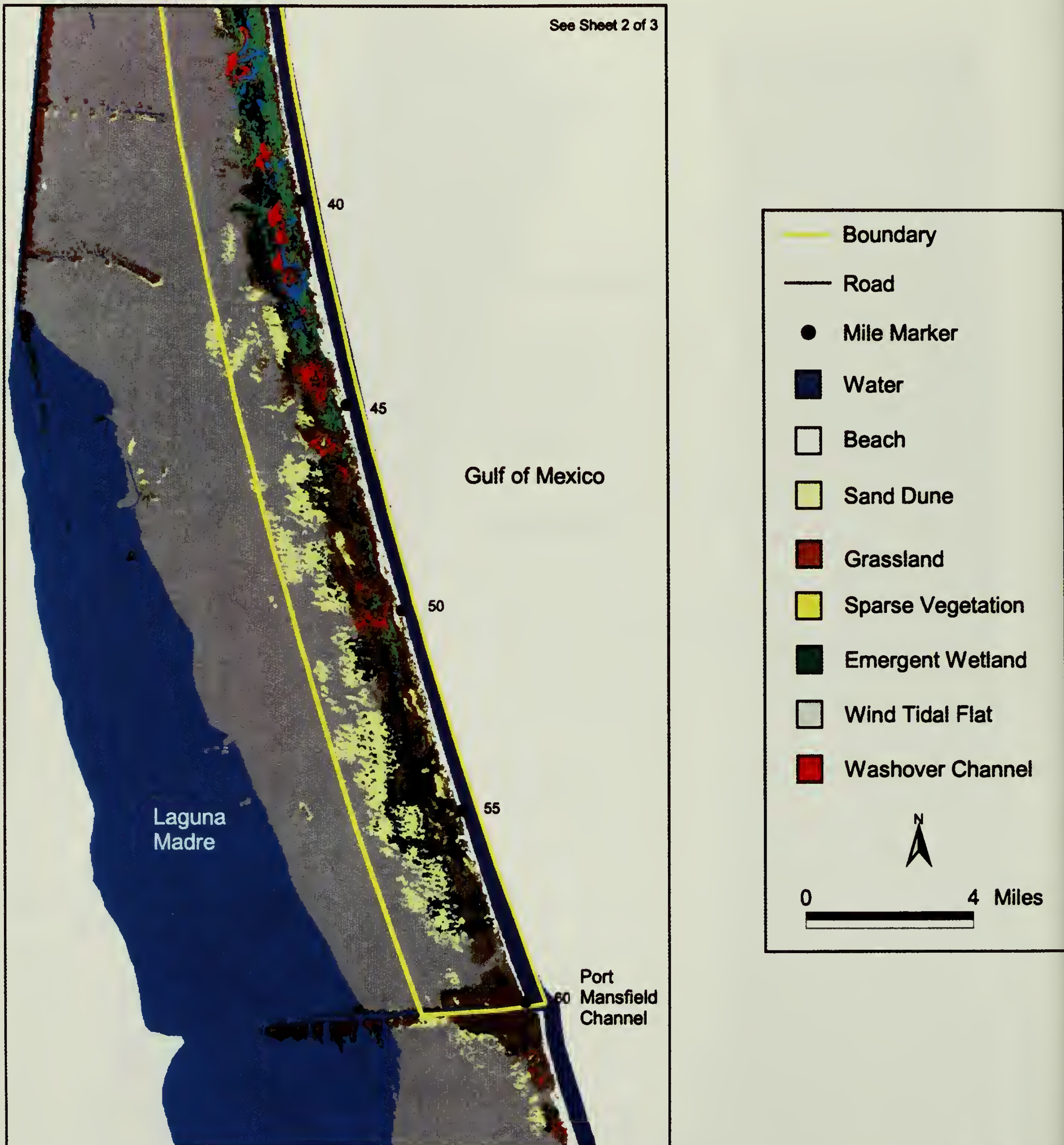


Figure 3.7. Landcover Classes Map of Padre Island National Seashore

Sheet 3 of 3

NS-PAIS	613-60008
Jan 2000	PAIS

With the longest stretch of undeveloped ocean beaches in the United States, Padre Island is a major regional recreation destination. It offers visitor developments within 5 miles of the entrance, and 56 miles of undeveloped beach stretching to the south. The National Seashore provides a rare opportunity for primitive beach recreation, natural history study, and contemplation of past and present uses of the coastline. Visitor use is concentrated on the broad Gulf beaches, where beach driving and beachcombing, shelling, birdwatching, swimming, wading, sunbathing, fishing, camping, picnicking, and strolling are popular activities. Beach use is densest near the Malaquite Visitor Center and RV campground. The visitor center provides a visitor interpretive center, showers, restrooms, and limited food services, making Malaquite an attractive beach destination. Many other visitors, however, seek a more solitary experience by driving down the beach, relying on their own 4WD vehicles for support. The lagoon is another destination for visitors. At Bird Island Basin and Yarborough Pass, there are minor facilities to support boating, sailboarding, fishing, wading, bird-watching and nature study, and camping.

NONFEDERAL OIL AND GAS EXPLORATION AND DEVELOPMENT

All subsurface mineral interests underlying the park are retained by private owners; and those underlying the submerged lands under the Laguna Madre and Gulf of Mexico are retained by the State of Texas. Lease of state-owned oil and gas is administered by the General Land Office.

Oil and gas exploration and production have been actively pursued on Padre Island since the early 1950's. A total of 71 operations have occurred within the current boundaries of the park since Sun Oil drilled the first well on March 23, 1951. It was a dry hole. Since that time, 58 additional oil and gas wells were drilled, six 2-D seismic operations conducted, and 6 pipelines constructed. The majority of operations took place during the period 1951 through 1981. Currently, there are five natural gas wells and one saltwater disposal well occurring in the park. A sixth natural gas well is located in the Gulf of Mexico, outside the park, and ties into a production facility in the park. Four of the natural gas wells are shut in, pending workover or plugging and abandonment. Direct surface disturbances associated with oil and gas operations affect approximately 411 acres.

Figure 3.8 is a map of Oil and Gas Development. Table 3.3 lists the oil and gas wells that have been drilled within or adjacent to the boundary of Padre Island National Seashore.

Padre Island National Seashore
Oil and Gas Development

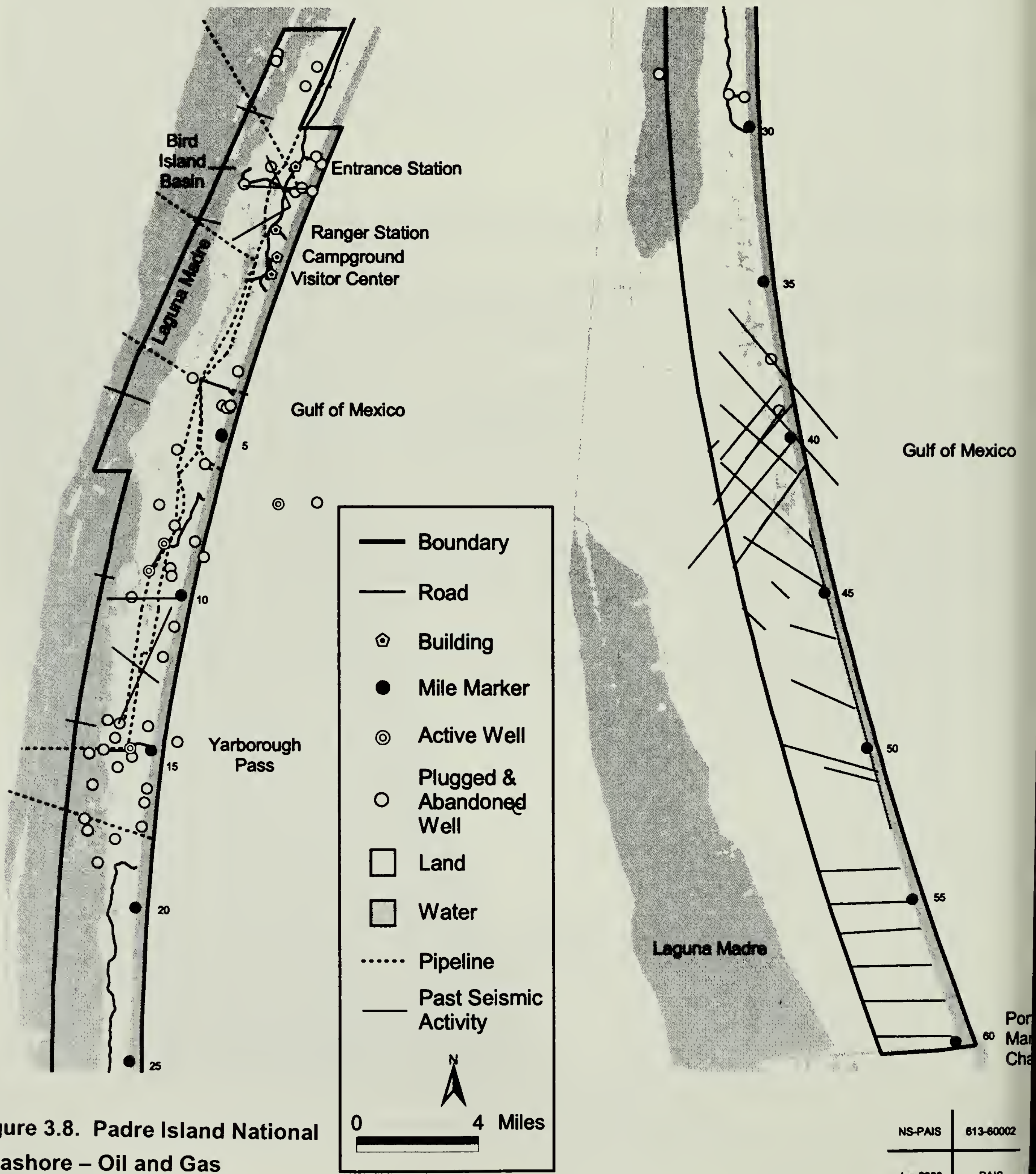


Figure 3.8. Padre Island National Seashore – Oil and Gas Development

Table 3.3. Nonfederal Oil and Gas Wells Drilled within Padre Island National Seashore

Operator/Well Name	Completion Date	Status Active/P&A	36 CFR 9B	Surface Disturbance	Remarks
Sun 4-B	03/27/62	P&A	No	No	Surface location outside of park, bottomhole location within the park. Dry hole.
Colorado Henderson	08/26/58	P&A	Yes	Yes	Oil well. Subsequent operators: Lamb, Zgen, Vantage Point Energy, Convest Energy. Reclamation in progress. Laguna Madre spoil island location.
Sun 5B	12/25/63	P&A	Yes	No	Surface location outside of park, bottomhole location within the park. Dry hole.
Sun No. 1	06/23/54	P&A	No	No	Dry hole.
Standard Oil of Texas State Tract 945 No.7	Unknown	P&A	No	No	Directional well from beach location.
Sunmark No. 2	Unknown	P&A	Yes	Yes	Some scattered debris and remnants of caliche pad remain. Dry Hole.
Standard Oil of Texas No. 1	01/13/65	P&A	No	No	Dry hole.
Standard Oil of Texas State Tract 949 Nos. 42 and 63	Unknown	P&A	No	No	Well 42 natural gas well, Well 63 an oil well, both wells drilled from same location.
McMoran Exploration Co.	Unknown	P&A	No	No	Records for the location of this well contradict each other. Exact surface location is unknown.
ENSERCH Dunn-McCampbell 17	11/30/94	P&A	Yes	No	Reclamation complete. Dry hole.

Operator/Well Name	Completion Date	Status Active/P&A	36 CFR 9B	Surface Disturbance	Remarks
Chevron Oil of Calif.	Unknown	P&A	No	Yes	Soil contamination at pit - may be at saltwater disposal well. NPS released Chevron in 1986 based on initial but temporary vegetative cover.
Standard Oil of Texas State Tract 949, No. 87 & State Tract 951, No. 22	Unknown	P&A	No	No	Two directional wells from same location.
Sun Oil State Tract 975 Well No. 1	Unknown	P&A	No	No	Dry hole.
Coral No. 1	Unknown	P&A	No	No	Some oyster shell remnants of pad.
Sun A-2	09/24/54	P&A	No	No	Dry hole.
Sun Oil State Tract 976 No. 1	Unknown	P&A	No	No	Dry hole.
Sun Oil State Tract 976 No. 2	Unknown	P&A	No	No	Gas well thought to have been drilled from same location as Sun Oil ST 976-1.
Sun A-1	06/12/54	P&A	No	No	Dry hole plugged back and permitted as a water well. P&A as water well 12/15/91.
Bright & Company Dunn-Campbell No. 1	08/10/95	P&A	Yes	No	Dry hole. Reclamation complete.
Enron Oil and Gas South Sprint No. 1	08/23/68	Active	Yes	Yes	Well drilled and developed by Amoco Production Company.
McMoran Exploration State Tract 985 No. 10	07/17/75	P&A	No	No	Dry hole.

Operator/Well Name	Completion Date	Status Active/P&A	36 CFR 9B	Surface Disturbance	Remarks
Sun A-6	Unknown	P&A	No	No	Northwest of A-3, A-5 on margin of Laguna Madre shoreline.
Sun Oil Dunn-McCampbell A-6	12/16/68	Active	Yes	Yes	Saltwater disposal well utilized for disposal of produced water from A-3, A-4 and A-8. Texas Energy & Env. (transferred from Sun and American Exp.)
Sun A-5	Unknown	P&A	No	No	Gas well.
Sun Oil Dunn-McCampbell 2-CT	07/06/59	P&A	No	No	
Sun Oil Dunn-McCampbell A-3	10/21/68	Active	Yes	Yes	Gas well currently operated by Texas Energy & Environmental. Transferred from Sun Oil and American Exploration.
Sun Oil Dunn-McCampbell A-8	05/15/85	Active	Yes	Yes	Gas well currently operated by Texas Energy & Environmental. Located on same pad as A-3.
Pelto State Tract 986 No. 1	06/18/82	P&A	No	No	Dry hole.
Sun Oil Dunn-McCampbell A-7	07/12/71	P&A	No	Yes	Remnants of pad and possible old pit.
Sun Oil Dunn-McCampbell A-4	11/13/68	Active	Yes	Yes	Gas well operated by Tex. Energy & Env.
Sun Oil Dunn-McCampbell 3-CT	08/13/61	P&A	No	Yes	Gas well. Remnants of shell pad.
Sun Oil Dunn-McCampbell CT-1	06/27/59	P&A	No	No	Dry hole.

Operator/Well Name	Completion Date	Status Active/P&A	36 CFR 9B	Surface Disturbance	Remarks
Sun Oil Dunn-McCampbell 5-A	12/15/68	P&A	No	No	Gas well location was removed when Texaco reclaimed location of Tana well in 1990.
Samedan Oil, et al., State Tract 1000 (1)	Unknown	P&A	No	No	Dry hole.
Samedan Oil Dunn No. 1	07/13/75	P&A	No	No	Dry hole.
Carrl Oil Dunn, et al., No. 3	05/14/65	P&A	No	No	Dry hole.
Carrl Oil Dunn, et al., No. 1	11/26/64	P&A	No	No	Gas well.
Carrl Oil Dunn, et al., No. 4	07/14/65	P&A	No	No	Dry hole.
McCormick Oil and Gas State Tract 1009, No. 1	Unknown	P&A	No	No	Gas well.
Carrl Oil Dunn, et al., No. 2	05/02/65	P&A	No	No	Gas well.
Union Oil Co. of CA No. 1	1985	P&A	Yes	No	Gas well.
Sun Oil Compound	Unknown	P&A	Yes	Yes	Production location for Sun Wells that were located in Laguna Madre. Currently associated with Laguna State 233-1. Contamination
Sun Oil well No. 8	Unknown	P&A	No	No	Gas well.
Sun Oil well No. 1	03/23/51	P&A	No	No	Dry hole.
Sun Oil well No. 9	Unknown	P&A	No	No	Dry hole.
Sun Oil State Gulf No. 1	Unknown	P&A	No	No	Unknown.
Sun Oil Dunn-McCampbell No. 6	12/24/55	P&A	No	No	Dry hole.

Operator/Well Name	Completion Date	Status Active/P&A	36 CFR 9B	Surface Disturbance	Remarks
Sun Oil Dunn-McCampbell No. 10	11/18/68	P&A	No	No	Dry hole.
Sun Oil Dunn-McCampbell No. 7	07/08/58	P&A	No	No	Dry hole.
Sun Oil well No. 2	12/10/52	P&A	No	No	Oil well.
Sun Oil well No. 5	02/04/54	P&A	No	No	Dry hole.
Sun Oil well No. 3	05/10/53	P&A	No	No	Unknown whether oil or gas well.
Sun Oil well No. 12	Unknown	P&A	No	No	Dry hole.
Sun Oil State Tract 1048 (10E)	Unknown	P&A	No	No	Dry hole.
Sun Oil Dunn-McCampbell No. 11	12/17/77	P&A	No	No	Dry hole.
Union Oil of CA, W.V. Jones, et al., 30036	06/08/75	P&A	No	No	Dry hole.
McMoran Exploration	07/15/75	P&A	No	No	Dry hole.

In 1995, Padre Island National Seashore contracted a survey to identify the abandoned oil and gas sites occurring within the park. The investigators were able to positively identify 31 sites, but were unable to locate the remaining 26 sites that had been identified in an earlier survey. Current surface disturbance is evident in 10 of the 31 sites, and is quantified in the following table. The remaining sites have little or no surface disturbance.

Existing Well Operations

Table 3.4. Surface Disturbance in Acres Associated with Existing Well Operations

Operator/Well Name	Production or Drilling Location	Access Road
Vector Energy Corporation (4 wells: A-3, A-4, A-6 (salt water disposal well), and A-8)	2.67 acres	5.85 acres
Enron Oil and Gas (2 wells: South Sprint #1 and #2 gas wells)	1.61 acres	0 acre
Louis Dreyfus Natural Gas (1 well: ST 233-1)	6.21 acres	0 acre
Fina Oil and Chemical (1 oil well: ST 181-1)	0.25 acre	0 acre
Chevron U.S.A. (hydrocarbon contamination remains at the abandoned shorebase production facility)	0.50 acre	0 acre
Sunmark No. 2 (plugged and abandoned well; debris and remnants of a caliche pad remain)	0.25 acre	0 acre
Total	11.49 acres	5.85 acres

1. **Vector Energy Corporation** acquired wells A-3, A-4, A-6, and A-8 on November 4, 1998 from Texas Energy and Environmental Inc., who had acquired the wells on March 27, 1997, from American Exploration Company. These wells are located on the Dunn-McCampbell "A" Lease located along the Pan Am road. These wells were originally drilled by Sun Exploration Company.

   Dunn-McCampbell A-3 was completed on October 21, 1968. The well was drilled to a total depth of 10,827 feet in the Oligocene Frio Formation. A cement plug was set at 7,927 feet. The well was perforated at 7,266 feet. It is currently shut in.

   Dunn-McCampbell A-4 is currently the only producing well being operated by Texas Energy and Environmental, Inc. The well was drilled to a total depth of 7,620 feet and completed November 13, 1968. The well is producing from perforations at 7,276-7,280 feet; at 7,288-7,298 feet; and at 7,295-7,303 feet.

   Dunn-McCampbell A-6 is a saltwater disposal well plugged back to a total depth of 2,298 feet and permitted as a saltwater disposal well September 25, 1981. The perforations are located at 2,090- 2,150 feet. The well was originally drilled to a total depth of 7,588 feet and completed December 16, 1968.

   Dunn-McCampbell A-8 is currently shut in. The well was directionally drilled to a total depth of 11,593 (10,503 feet Total Vertical Depth), March 1985, from the A-3 surface location.

2. **ENRON Oil and Gas Company** is operating a natural gas facility for the gathering of natural gas from state tracts in the Gulf of Mexico. Access to the South Sprint facility is through the primary dune line, approximately 6 miles south of the end of the paved road (Park Road 22). The facility is currently being used to produce two wells. Free-phase hydrocarbons perched on the freshwater aquifer are being removed, as discussed below under the heading "Contamination."

   South Sprint Well #1 is a directional natural gas well drilled from a location on Padre Island National Seashore. The bottomhole location is in State Tract 980S in the Gulf of Mexico and was completed on September 1, 1968. The well was drilled to a depth of 10,978 feet (8,684 feet true vertical depth). The well is currently perforated in the Frio "A" sand at 9,915 feet to 9,930 feet.

   South Sprint Well #2 is a straight hole natural gas well producing from a marine location in State Tract 981S. The well was completed on January 10, 1969. The wellhead is located on an unmanned platform approximately 9,000 feet offshore from Padre Island, in the Gulf of Mexico. The well was drilled to a total depth of 10,825 feet and is currently perforated in the Frio "A" sand at 7,880 feet to 7,886 feet. The production from the well is delivered to the surface facilities at the South Sprint natural gas facility through a 3-1/2-inch OD flowline.

3. **Louis Dreyfus Natural Gas Corporation** acquired a shut-in gas well, ST-233-1, located in the Laguna Madre from Oryx Energy Company in December 1989. Louis Dreyfus also acquired the Murdock Pass gas production facility located at Yarborough Pass, and an associated water well. Hydrocarbon and mercury-contaminated soils are being removed, as discussed below under the heading "Contamination."

4. **Fina Oil and Chemical Company** operates the only oil well in the park. The well (ST 181-1) is located in State Tract 181, in the Laguna Madre. The well was drilled February 1985 to a total vertical depth of 8,000 feet. Equipment at the well location consists of a well with a production Christmas tree and a metal platform with cage protecting the wellhead. Production of liquid hydrocarbons is by means of gas lift. The produced hydrocarbons are transferred by a 2-1/2 inch O.D. flowline to a location beyond the boundary of the park, in State Tract 155.

5. **Chevron U.S.A.** plugged all of its wells located in the Gulf of Mexico, outside the boundaries of the park by the mid-1980's. The shorebase production facility, which was located in the park, was abandoned in 1986. Despite initial reclamation efforts, hydrocarbon contamination persists at the site, as discussed below under the heading "Contamination."

6. **Sunmark No. 2.** This well was a dry hole and was plugged and abandoned; however, some scattered debris and remnants of a caliche pad remain as surface disturbances.

Past Seismic Exploration Operations

Six two-dimensional seismic exploration operations have been performed under approved Plans of Operations at Padre Island National Seashore. There have been few measurable impacts from these seismic exploration activities. There is some rutting on the wind-tidal flats and mud flats on the west side of the island. Some, but not all, can be attributed to seismic exploration. Rutting impacts would be mitigated in future seismic activities.

On April 7, 1999, the NPS approved the first 3-D seismic survey Plan of Operations submitted by Western Geophysical Company. The Plan of Operations was supplemented in May 1999 to include four tracts located in the Laguna Madre, located within the original project boundaries. The 3-D seismic survey area included the northern 10 miles of Padre Island National Seashore. By using least-damaging methods, including offsets and timing restrictions from sensitive areas and a third party monitor, there were little to no adverse impacts from the 3-D seismic survey on resources and public health and safety.

Table 3.5. Past Seismic Exploration Operations

Operator	Year	Length in Miles	Location	Surface Impacts
Cities Service Company	1982	63.0 miles	Between Mile Markers 35 and 50	None
GEO Seismic Service Inc.	1982	16.0 miles	Near Mansfield Channel	None
Amoco Production Company	1984	2.5 miles	Near 10-mile marker	None
CGG Land Seismic	1985	19.4 miles	Laguna Madre throughout park	None
Trafalgar House Oil and Gas	1985	10.3 miles	Near Novillo Line Camp and Yarborough Pass	None
LeMarco, Ltd.	1982	2.5 miles	Near Novillo Line Camp	None
Western Geophysical	1999	Area encompassing northern 10 miles of park	From north boundary south approximately 10 miles	None
Total:		**113.7 miles**		**None**

Pipelines

There are six pipelines currently in operation within the park. These are located in the northern half of the park. Each pipeline has a 50-foot maintenance corridor that allows for pipeline placement and maintenance. A list of existing pipelines is in Table 3.6.

Table 3.6. Existing Pipelines

Operator	Pipeline Size in Inches	Length	Location
Petrotex Engineering Company (Chartex Petroleum Company)	20	1.50 miles	Near Six-Pigs facility
Duke Energy (Texas Eastern Transmission)	12	3.25 miles	From near Novillo Line Camp to Laguna Madre
Duke Energy (PanEnergy Services, Inc.)	10	26.00 miles	Along center of island from Malaquite to Yarborough Pass
Houston Pipeline Company (Valley Pipeline)	20	8.50 miles	From Laguna Madre west of Six-Pigs to 6.5 mile marker
Houston Pipeline Company	12	12.00 miles	Along center of island from Yarborough Pass to Six-Pigs facility
Williams Field Services (Transco Pipeline Company)	20	3.00 miles	Across the island near the 18-mile marker
Total:	**6 pipelines**	**54.25 miles**	

The total surface permitted for nonfederal oil and gas pipeline corridor maintenance for a 50-foot-wide corridor for 66.25 miles is 400 acres. In the event of a pipeline rupture or spill, operators would be permitted to temporarily use up to a 100-foot-wide corridor for rapid response and cleanup activities.

1. **Petrotex Engineering Company (Chartex Petroleum Company)** operates a 20-inch pipeline and a pig receiver in the park. The pipeline gathers natural gas from Gulf of Mexico State Tract 818. The segment of the pipeline located in the park is approximately 8,052 feet in length.

2. **Duke Energy (Texas Eastern Transmission)** operates a 12-inch pipeline that extends from a location near Novillo Line Camp northwest to a location on King Ranch located on the mainland. The segment of pipeline in the park is 16,463 feet long. Currently there is no gas gathered from the portion of the line located in the park.

3. **Duke Energy (PanEnergy Services, Inc.)** acquired the Florida Gas Pipeline on August 1, 1996, from ENRON Operating Corporation. The pipeline enters the park at Yarborough Pass and extends north for approximately 26 miles. The pipeline exits the park north of Malaquite Visitor Center to the King Ranch, located on the mainland.

4. **Houston Pipeline Company**, a company of Enron Operations Corporation, operates 10-inch, 12-inch, and 24-inch pipelines in the park, along with a pigging facility known as "Six-Pigs." The 10-inch pipeline extends north from Six-pigs to prior gas leases approximately 3 miles north of the park. The 10-inch line has been purged and filled with nitrogen. The 12- inch pipeline extends from Yarborough Pass to the Six-pigs location, gathering natural gas from Enron Oil and Gas Company facilities and the Texas Energy and Environmental, Inc., facilities. The 24-inch pipeline gathers natural gas from operations in the Gulf of Mexico approximately 77 miles south in state waters. The pigging facility occupies an area of less than 1 acre.

5. **Williams Field Services (Transco Pipeline)** operates a pipeline that crosses the park from a point on the Gulf of Mexico approximately 17 miles below the end of Park Road 22, to the Laguna Madre, entering the Kenedy Ranch on the south side of Baffin Bay. The length of the pipeline inside the park is 16,050 feet.

Contamination

The National Park Service discovered hydrocarbon contamination at three nonfederal oil and gas operations sites within a short time span in 1993. The locations where contamination was discovered were the Amoco South Sprint production facility (now owned by ENRON), the American Exploration Company Yarborough Pass Natural Gas production facility (Louis Dreyfus Natural Gas Corporation), and the Chevron U.S.A. former shorebase production location.

During environmental quality control monitoring, the Amoco Production Company discovered free phase hydrocarbon upon a perched shallow freshwater aquifer around the production unit. Amoco performed a site characterization to determine the type and extent of contamination. A vacuum extraction technology was employed to remove the free-phase hydrocarbon without removing ground water. Early results indicate that removal of the free-phase hydrocarbon is working successfully to remove the hydrocarbons. Amoco sold the South Sprint facility to Enron Oil and Gas Company in 1996. Enron Oil and Gas is continuing the free-phase removal of the hydrocarbon.

Free-floating oil was recently documented (March and May 1998) on flood-level ponding at the former Chevron U.S.A. location. Also, strong hydrocarbon odor was documented nearby at Novillo Line Camp, a historic site listed on the National Register of Historic Places. Hydrocarbon matting and oil staining remains visible in areas where a pit and tank battery had been located at the Chevron site. Contamination had been discovered when Chevron was closing out and removing the facility in 1986. Chevron had utilized the latest technology for the time related to soil washing for hydrocarbon removal. After testing and presentation of the results, the NPS released Chevron from its obligation.

In 1993, the NPS requested Chevron to return and remediate the site. Chevron responded by performing total petroleum hydrocarbon sampling, which indicated that hydrocarbons were present in the pit and tank battery areas. Based on the initial confirmation of hydrocarbon contamination, the NPS asked Chevron to perform sampling and analysis beyond the total petroleum hydrocarbon analysis to determine the specific types and extent of specific polycyclic aromatic hydrocarbons. Chevron has committed to perform remediation to meet NPS objectives.

In December 1989, American Exploration Company acquired nonfederal oil and gas operations from Oryx Energy Company. Included in the acquisition was the Murdock Pass gas production facility at Yarborough Pass. The well that had produced gas through the plant was shut in. The well was worked over and never brought into production by American Exploration. In 1993, the NPS documented visible oil staining of surface soils near a bulkhead at the Murdock facility. At the request of the NPS, American Exploration performed a Site Characterization. The Site Characterization confirmed the presence of petroleum hydrocarbon contamination in excess of 10,000 milligrams per Kilograms (mg/Kg) in a small area near the compressor bulkhead. Groundwater results indicated low levels of total petroleum hydrocarbons and individual components of oil, including volatile compounds and semi-volatile compounds. Additionally, mercury was discovered in two areas of meter runs in concentrations from nondetect up to 504 mg/Kg.

American Exploration Company merged with Louis Dreyfus Natural Gas Corporation on October 14, 1997. Late in 1998, Louis Dreyfus appealed to the NPS to reconsider the NPS's decision to approve Louis Dreyfus' Plan of Operations to reclaim the site and remediate contamination, subject to NPS conditions of approval. The NPS's conditions of approval included holding Louis Dreyfus Natural Gas Corporation wholly responsible for reclamation and remediation of the operations site, including the requirement to remove approximately 600 cubic yards of mercury-contaminated soils for disposal in a state-approved facility, as necessary to reach the clean-up attainment level of 0.2 mg/Kg (toxicity concentration to restore the site to a state in which native vegetation will flourish). On December 11, 1998, the NPS upheld its decision to hold the company wholly responsible for reclamation and remediation of contaminants, but reduced the mercury attainment level from 0.2 mg/Kg to 0.3 mg/Kg. Louis Dreyfus Natural Gas Corporation has committed to perform remediation to meet NPS objectives.

In 1995, the NPS located abandoned oil and gas locations and conducted an electromagnetic survey to determine if contamination exists at these sites (Hay, 1995). Twenty-three (23) locations were positively identified, and eight suspected locations were identified. There was documentation that 57 oil and gas operations had occurred at Padre Island National Seashore. Those locations that were not found were due to poor records, or were located in areas that have experienced dune movement. Of the locations that were identified as having some measure of contamination by the electromagnetic survey, 10 were selected to have soil sampled and tested for Total Petroleum Hydrocarbons (TPH) and a metal scan. Five of the 10 that were the most contaminated were selected to have a monitoring well installed. A water sample was taken and sampled. All contamination that was identified was in such small quantities that cleanup is not economically feasible.

AIR QUALITY

Air quality is a general issue of regional and national concern and is an indication of human influence on the natural environment.

Padre Island National Seashore is designated a Class II air quality area under the Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act. As such,the National Seashore's air quality is protected by allowing limited increases (i.e., allowable increments) over baseline concentrations of pollution for the pollutants sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter (PM). The PSD permitting program is administered by the Texas Natural Resource Conservation Commission (TNRCC) and applies to defined categories of new or modified sources of air pollution with emissions greater than 100 tons per year and all other sources greater than 250 tons per year. Oil and gas operations may or may not be subject to the permitting program depending on the level of emissions, but emission increases from these and other pollution sources affecting the National Seashore will be considered in the assessment of air quality impacts allowed under the PSD increment system on a project-by-project basis.

According to the Texas Natural Conservation Commission (TNRCC), all of Kleberg, Kenedy, and Willacy Counties are attainment areas for regulated pollutants. No violations of ambient air standards have been recorded. Although air quality and visibility in the region are threatened by increases in the number and extent of petrochemical industries and related increases of emissions in the Houston and Corpus Christi areas, the prevailing winds are likely to dissipate any pollutants quickly from remaining in the park. From October through February, north-northeasterly winds occur, and from March through September prevailing southeasterly winds are from the Gulf of Mexico.

SOILS AND WATER RESOURCES

Soils

Padre Island consists of Pleistocene and Holocene sands, silts, clays, and shell fragments, which were transported by water and wind.

The soils of the Padre Island belong to the Galveston-Mustang-Tidal Flats Association. The park also contains important sediment groups that have not developed into soils. They include coastal beach, sand dune, and wind-tidal flat sediments. The soil-sediment groups are described below, and are taken from the United States Department of Agriculture's *Soil Survey of Nueces County, Texas*. The large amount of well-rounded sand in these unconsolidated soil-sediment groups makes them both porous and permeable. Any contaminants that are spilled or released onto these soil-sediment sands are therefore infiltrated quickly to the shallow, perched aquifer underlying the northern region of Padre Island.

The Galveston soil series consists of deep, hummocky, light-colored, loose sands. The taxonomic class is mixed, hyperthermic Typic Udipsamments. The soils are more than 5 feet above mean sea level. The nearly white to grayish-brown surface layer, normally less than 1 foot thick, contains little humus. It is underlain by fine, light gray sand that is 3 or 4 feet thick and is moist most of the time. The parent material is fine white sand, which is found at a depth of 4 to 10 feet. It is usually saturated with subsurface waters. Rain moves through these soils rapidly. The soil remains moist in its lower layers most of the time.

The Mustang soil series consists of nearly level, deep, sandy soils that are wet and, in some places, salty. The taxonomic class is mixed, hyperthermic Typic Psammaquents. They are generally less than 5 feet above sea level. The light-gray surface layer is about 6 inches thick and contains little humus. Below this is a 2-foot thick layer of moist, white sandy soil. The parent material is similar to the 2-foot layer. The water table lies 3 to 4 feet or less below the surface. Mustang soils are mainly in shallow depressions between coastal dunes and on nearly level to gently sloping coastal flats. They are periodically flooded with salt water, and poorly drained.

The coastal beach sediment group consists of shores that have been washed and rewashed by waves. It is partly or completely covered by water at high tides during storms. The soil material is predominantly fine sand that is almost white. In some areas like Little and Big Shell Beaches, there is a large percentage of shell material incorporated into the coastal sand.

The coastal dunes sediment group is made up of sand dunes that are partly stable and partly active. The dunes are a series of steep-sided ridges consisting of fine sand that has been deposited on the beach by wave action and moved into the dune field by the wind. The surface layer is light-gray, loose, fine sand about 4 feet thick. It is underlain by a white, loose, fine sand about 1 to several feet thick. The top of the dunes are 5 to 50 feet above sea level. The coastal dune sediments are steeper, more choppy, and less stable than the Galveston soils. They are not subject to flooding at high tide as the Mustang soils are.

The wind-tidal flats sediment group is made up of mainly barren, nearly level areas that are predominantly above water. They are made up of layers of sand, shells, and clay which are not consistent in texture, thickness, or stratigraphic position. A sparse growth of grasses and weeds tolerant of salt water borders the edges of these flats that are above water most often. They are overlain in places by clusters of algal mats of varying densities.

Stratigraphy

Little information is available to describe the subsurface stratigraphy of Padre Island National Seashore. Boylan (1986) describes the sedimentary formations of North Padre Island as having 60 feet of holocene silt and sand (unnamed) overlying 700 feet of the Pleistocene Beaumont Clay (Formation) which in turn overlies 400 feet of the Lissie Sand (Formation). It should be noted that the 400-foot thickness that Boylan ascribes to the Beaumont Unit is derived from measurements made on the mainland. Its true thickness in the subsurface of the park is not known. It is possible that the Beaumont Clay appreciably thins as it approaches the Gulf. Boylan describes the Beaumont Unit as being consolidated, and reflecting a depositional environment of coalescing stream levees and stream deltas. It is composed of 60 percent clay, 20 percent silt, and 20 percent sand. The Lissie Sand, an aquifer in the interior of Texas, is composed of 60 percent sand, 20 percent sandy clay, 10 percent gravel, and 10 percent clay.

Boylan believes that the Beaumont Unit underlies the entire length of Padre Island (modern transgressive barrier). However, Morton and Price (1987) disagree with this interpretation and suggest that the Holocene Rio Grande Delta complex underlies the modern transgressive barrier in South Padre Island, measured south of the Mansfield Cut. The Rio Grande Delta complex was deposited because the Rio Grande River had, during the Late Wisconsinan sea-level lowstand, eroded its valley below the coastal plain. This valley was then aggraded (filled up) with delta plain mud and fluvial sand. The sand content is much higher than it is in the Beaumont Unit. The Holocene Rio Grande Delta complex may, according to Morton and Price's cross-section, pinch out after it crosses into the southern boundary of Padre Island. The actual distance that it can be traced in the subsurface in the park is unknown. The unit is very close to sea level in southern Padre Island and the modern transgressive barrier island is built on it. Its maximum thickness is about 50 feet in Morton's cross-section, and it is underlain by Late Pleistocene Rio Grande Delta distributary channel and delta front sand, which is about 40 feet thick.

The thin, modern transgressive barrier sands, the Holocene Rio Grande Delta complex mixed muds, sands, and caliche layers, and the Upper Pleistocene Rio Grande Delta complex sands could serve as the shallow unconfined aquifer of southern Padre Island, similar to the Beaumont Clay serving as the supporting aquitard underlying the northern portion of Padre Island. The lower portion of the Late Pleistocene Rio Grande Delta complex is muddy and could serve as a supporting aquitard. It is possible that the mixture of lithologies (mud, sand, and caliche) of the shallow stratigraphy of southern Padre Island makes it a less effective aquifer than its northern counterpart, and lessens its capacity to support a heavily vegetative cover, which both creates and stabilizes the northern Padre Island foredune and barrier flat environments. The lack of information about subsurface stratigraphy at Padre Island National Seashore requires the application and interpretation of available information collected outside the park.

Surface Waters

Laguna Madre: The Laguna Madre formed nearly 6,000 years ago as the sea began to retreat and Padre Island began to develop (Amdurer and Land, 1982). As the barrier island grew, the water became isolated, forming a shallow lagoon.

The Laguna Madre is a narrow, hypersaline lagoon that extends from Corpus Christi Bay south to the Rio Grande, covering approximately 320 km^2. The Laguna Madre is one of the few hypersaline bodies of water in the world, and one of the most productive estuarine systems in the United States.

High salinity content is typically higher than Gulf waters, and is attributed to high evaporation, low freshwater infusion (due to limited runoff and scarcity of freshwater systems emptying into the Laguna Madre), and to the damming of waterways and rivers. Salinity values can vary annually between 22 and 54 parts per thousand (ppt), and rarely exceed 75 ppt, usually during a drought condition.

The Saltillo Flats subdivide the Laguna Madre into the upper and lower Laguna. The upper Laguna Madre is bordered on the west by the King Ranch and the City of Corpus Christi, and on the east by Padre Island. The Gulf Intracoastal Waterway extends from Texas to Florida and passing through the Laguna Madre. The Laguna Madre contains numerous manmade and natural islands, which have become productive colonial waterbird rookery islands. The Fish and Wildlife section provides more information on these islands. The Laguna Madre averages 3 feet in depth, and ranges from 1/2 to 10 miles in width, depending on wind-generated tides. It contains several species of seagrasses, which create extensive nursery habitat for finfish and shellfish. Seagrasses include shoalgrass (*Halodule wrightii)*, widgeongrass (*Ruppia maritima)*, and manatee grass (*Syringodium testudium)*. The Wetlands section provides more information on seagrass beds in the Laguna Madre and its designation as a Sensitive Resource Area.

Daily water-level fluctuations in the Laguna Madre are primarily wind-driven. There is no observable astronomical tide in the Laguna Madre and water circulation is primarily wind driven (Rusnak, 1960). Wind tides may produce a rise or fall of water levels by as much as 1 or 2 feet, if water is pushed onto low-lying marginal areas. Maximum water fluctuations typically occur in October, April, and May, during times of strong onshore winds (Weise and White, 1980). Water level variations, present for several weeks, are caused by regional atmospheric differences, and precipitate water exchange between the shelf and Intracoastal Waterway areas. Seasonal runoff, combined with the expansion and contraction of shelf waters as they warm and cool, cause a semi-annual tide in the Laguna Madre.

Water temperatures may range between 44° and 81°F in open areas, with more extremes in shallow near-shore waters. Sediments of the upper Laguna Madre consist of predominately quartzose sand, with some small areas of clayey sand (Chaney, 1988).

Numerous federal and state agencies gather water quality data throughout the upper Laguna Madre. Monitored parameters include salinity, chlorophyll-a, volatile solids, total suspended solids, total dissolved solids, total organic carbon, and total zinc. Many additional parameters have been sampled including turbidity, temperature, alkalinity, pH, phosphate, copper, arsenic, and mercury. Dissolved metal values do not exceed the marine chronic or acute criteria, and no spatial or temporal trends have been detected.

Permanent Freshwater and Ephemeral Ponds: Permanent freshwater ponds only occur within three locations in the park. They are located along the south side of the Bird Island Basin road, adjacent to the main road behind the ranger station, and near the sewage lagoon road. The three permanent freshwater ponds are designated as Sensitive Resource Areas and are shown on Figures 3.1, 3.2, and 3.3. They were formed by excavation of fill to build the park road and are therefore deeper than naturally occurring ephemeral ponds. Because they have greater water-holding capacity, they tend to hold water longer and provide a valuable freshwater source for wildlife during drought periods.

Ephemeral ponds are large, shallow bodies of water that are created when water is deposited from rain events or tidal inundations. Ephemeral ponds occur throughout the park, but tend to evaporate quickly. They are variable in size and occurrence depending on rain levels. They are shown on the Landcover Classes Map, Figures 3.5, 3.6, and 3.7.

Numerous water quality parameters have been analyzed for the three permanent freshwater ponds (Sissom, 1990; Serota, 1971; Perez, 1971). These parameters include: (1) general parameters, which include temperature, turbidity, salinity, dissolved oxygen, pH, and alkalinity; (2) inorganic nutrients, such as nitrate, total nitrogen, and phosphates; and (3) heavy metals, including arsenic, cadmium, chromium, copper, zinc, lead, strontium, iron, and mercury.

Chemical parameters of pond water change with a change in seasons. During the spring and summer months, high temperatures, high nitrates, low turbidity, low oxygen, high pH, and alkalinity occur. In general, the opposite occurs during the winter and fall months. These seasonal changes correspond to changes in rainfall, air temperatures, and wind. No pesticides or PCB contaminants are found in these ponds, and levels of heavy metals are well below the standards set by the Texas Department of Health (Sissom, 1990). Hydrocarbons in the form of grease and oil occur in all three ponds; however, the amounts are considered to not be significant to the health of the ponds. This occurrence may be due to the ponds' close proximity to well-traveled roads.

Water quality in ephemeral ponds is highly influenced by evaporation, ocean spray, and waterfowl. Considerable quantities of sodium, chlorine, and potassium are deposited in ephemeral ponds (Hannan et al., 1978). Due to evaporation and continual input of the aforementioned elements, ephemeral ponds tend to have higher conductivity. Despite a high conductivity, ephemeral ponds have less than 30 percent of the conductivity of seawater. Ephemeral ponds tend to have high organic nitrogen and high pH due to increased photosynthesis and input from animals. These ponds have an abundance of blue-green algae and therefore high particulate organic matter. Generally, no manmade pollutants are found in the ephemeral ponds.

Permanent and ephemeral ponds provide essential habitat, sources of water, food, and protection to many wildlife species. Many forms of wildlife including mammals, reptiles, fish, invertebrates, and birds have become dependent on these ponds. Mammal species include deer (*Odocoileus virginianus*), badgers (*Taxidea taxus berlandieri*), coyotes (*Canis latrans*), raccoons (*Procyon lotor*), jackrabbits (*Lepus californicus merriami*), and bobcats (*Felis rufus*). Fish species include mosquito fish (*Gambusia affinis*), sheepshead minnow (*Cyprinodon veriegatus*), and gulf killifish (*Fundulus grandis*). Many bird species utilize the ponds and include bobwhite quail (*Colinus virginianus*), northern harrier (*Circus cyaneus*), sandhill crane (*Grus canadensis*), American egret (*Casmerodius albus*), great blue heron (*Ardea herodias*), long-billed curlew (*Numenius americanus*), sanderling (*Crocetheia alba*), killdeer (*Charadrius vociferus*), terns, ducks, and grebes. Several species of snakes, turtles, and frogs also find ephemeral ponds important sources of water.

In addition to wildlife, over 50 species of plants, 28 species of fungi, and approximately 66 species of plankton can be found in ephemeral and permanent ponds (Sissom, 1990). Vascular plant species occurring within and adjacent to ponds include pennywort (*Hydrocotyle bonariensis*), frog fruit (*Phyla nodiflora*), fleabane (*Erigeron procumbens*), spike sedge (*Eleocharis montevidensis*), and narrow-leaf cattail (*Typha domingensis*), American bulrush (*Scirpus americanus)*, marsh hay cordgrass (*Spartina patens)*, fleabane (*Erigeron procumbens)*, and little bluestem (*Schizachyrium littoralis)* (Drawe, 1992). Plankton genera included *Spirogyra*, *Polycystis*, *Gonium*, *Ostracoda*, *Diatoma*, *Copepoda*, and others. Some of the fungi species include *Aspergillus*, *Cladosporium*, *Penicillium*, *Nigrospora*, and *Alternaria*.

Gulf of Mexico: Water quality parameters are typical for large bodies of ocean water. Salinity ranges from 28 ppt to 35 ppt, and temperatures near shore occur between the low 50's to mid 80's. Turbidity varies with the amount of wave activity.

Groundwater

The groundwater at Padre Island is not used as a drinking water source for the park. The nature of the shallow groundwater system of northern Padre Island National Seashore is better understood than that of the southern section. Boylan (1986) states that the depth to the water table in northern Padre Island ranges between a low of 4 feet and a high of 1 foot (excluding dune systems). He describes a lens of freshwater (approximately 30 feet thick, near the Gulf of Mexico) overlying the saltwater.

The total thickness of the freshwater-saltwater unconfined aquifer is 50 feet. It is underlain by the Beaumont Formation, which is believed to be the aquitard that supports the freshwater-saltwater aquifer. Berkebile and Hay (1997) constructed a subsurface cross section from the mainland to the Gulf of Mexico and through northern Padre Island in order to illustrate their interpretation of the relationships existing among the various water types in the shallow unconfined aquifer. Their illustration emphasizes their uncertainty as to the subsurface boundary conditions existing amongst the hypersaline, fresh, and seawaters. They show continental water (presumably fresh) underlying and in contact with the saltwater. Berkebile and Hay state that they are uncertain as to the thickness of the freshwater lens under northern Padre Island despite the fact that they had 12 monitoring wells across the Island between June 12, 1993, and December 16, 1993. Little is known about the subsurface water of southern Padre Island. There is evidence to indicate that the Beaumont Formation and the Holocene sand complex that support the modern transgressive barrier are not present in southern Padre Island where they are replaced by the Holocene Rio Grande Delta complex and the Late Pleistocene Rio Grande Delta complex. It is possible that the mixture of lithologies of the shallow stratigraphy of southern Padre Island, makes it a less effective aquifer than its northern counterpart and reduces its capacity to support a heavy vegetative cover, which both creates and stabilizes the northern Padre Island foredune and barrier flat environments.

The aquifer is composed of Holocene eolian/marine sands deposited over the Pleistocene age Beaumont Formation, and appears to run the length of the park. The water table aquifer contains three distinct zones of water quality: the hypersaline zone, the freshwater zone, and the seawater zone. The freshwater zone rests above the seawater zone to the east, where it abuts the Gulf of Mexico, then thickens rapidly toward the center of the island, and finally tapers to a thin layer resting on the hypersaline zone to the west (Berkebile and Hay, 1994).

The freshwater zone in the aquifer is recharged from precipitation over the island and is not directly connected to the mainland aquifer system. The groundwater is discharged through evapo-transpiration, biologic activities, and through springs and seeps into the Gulf of Mexico and the Laguna Madre. Water quality data for park groundwater includes temperature, total hardness, salinity, pH, and sulfides. Water chemistry values vary significantly due to dissolved solids.

Salinity measurements range from 1 part per thousand (ppt) to 95 ppt. The groundwater adjacent to the Gulf of Mexico is consistently below 3 ppt, while the groundwater along the center of the island rarely exceeds 5 ppt. However, salinity of the groundwater along the Laguna Madre is highly concentrated and many times exceeds the salinity in the Laguna Madre.

Sulfides range from 20.00 milligrams/liter (mg/L) to less than 0.20 mg/L. The average sulfide level found in groundwater is 5.75 mg/L. Sulfide levels vary in average between the Gulf of Mexico beach is consistently less than 0.20 mg/L, and the Laguna Madre averages 13.74 mg/L.

Total hardness varies from 100 mg/L to 19,670 mg/L. The average total hardness found in park ground water is 4,260 mg/L. The Gulf beach groundwater tends to average 381 mg/L, while the center of the island averages 1,552 mg/L. The Laguna Madre groundwater produces high readings between 5,000 mg/L to near 20,000 mg/L, due to the high concentration of dissolved solids.

The hydrogen ion concentration, or pH, for groundwater within the park averages 7.48. It ranges between 6.50 and 8.10, remaining fairly stable with only minor variations. The freshwater zone generally contains water with salinity less than 2 ppt, pH of 7.5; hardness less than 500 mg/L; and total dissolved solids of roughly 700 mg/L. Because total dissolved solids are less than the 1,000 mg/L, this zone has been classified as being suitable for most domestic, agricultural, and industrial applications.

FLOODPLAINS

Barrier islands are a primary defensive mechanism against erosive activities that tend to denude coastal regions. This includes normal wave action and all the different activities associated with hurricane events.

Most of the park, except for high dune ridges along the Gulf beach where major structural development is confined, lies within the 100-year coastal floodplain. A formal designation of the floodplain status of Padre Island National Seashore was initially conducted by the Federal Emergency Management Agency's National Flood Insurance Program, August 17, 1971; the latest revision was done on March 1, 1984.

With the exception of the dunes, almost all of Padre Island National Seashore is subject to periodic flooding as a result of hurricanes or prolonged rain events. Because of the very shallow perched freshwater lens, which is located from 1 to 4 feet below ground level, heavy or sustained rains quickly inundate the sand and begin ponding on the surface. Only evaporation lowers flood waters. It can be assumed that all developed areas are subject to some flooding every 10-20 years. All areas, including camping areas at Bird Island Basin and the Malaquite campground, are covered by the park's emergency contingency plan.

The hurricane season begins June 1 and continues through November 30. The probability of tropical storms or hurricanes occurring along the Texas coast is 34 percent, with an average of 5-10 years between storms. The most recent hurricane to hit the park was Hurricane Bret in August 1999. It struck the island in the area from the 32.5 mile marker south to the 56.8 mile marker. Storm surge created 21 washover channels from the Gulf of Mexico to the Laguna Madre. Before this, Hurricane Allen hit Padre Island on August 8, 1980. With Hurricane Allen, storm tides rose to elevations of 10-20 feet. Coupled with this tidal surge were treacherous wave crests, which combined with the surge, brought the flood level up to 20-30 feet. After the hurricane hit, there were 30 washover passes/cuts across the island from the 35 mile marker to the Mansfield Channel.
Hurricane tidal surges push ashore onto the island, erode the beach, and cut into the foredunes, which dissipate the storm's energy. Storm surge is either blocked by the dune ridge, or it opens washover channels across the island. After a storm's passage, water drains from the mainland and the lagoon back across the island to the Gulf through these same channels.

Washover channels provide a conduit for the Gulf waters to freshen the hypersaline waters of the Laguna Madre. These channels are also used by numerous shorebirds, such as the piping plover *(Charadius melodus)* and the snowy plover *(Charadius alexandrinus)*, for resting, foraging, and nesting.

The foredunes of Padre Island National Seashore provide protection from hurricanes and tropical storms for the island's backcountry and the Texas mainland. The dunes are extremely fragile and, once impacted, can easily be destroyed through erosion and wind action. Dunes are created when vegetation stabilizes blowing sands that are moved across the beach. Small coppice dunes form first and become primary dunes as vegetation stabilizes more sand. A line of dunes form parallel to the beach and vary in height from less than 6 feet to approximately 50 feet above sea level. The primary dune line extends the entire length of Padre Island National Seashore, broken only in a few places where hurricane washover channels have occurred. Foredunes provide protection and habitat for wildlife, including kangaroo rats, squirrels, and a moderate number of reptiles.

Both foredunes and washover channels have been designated as SRAs. More discussion about the dune community can be found in the Vegetation section, below. The foredunes and washover channels are shown as Sensitive Resource Areas on Figure 3.2, Sensitive Resource Areas Map.

VEGETATION

Park vegetation is dominated by species and forms that are adapted to rapid colonization and extremes of salinity and sun. Dominants are largely grasses and forbs. There are few woody species on the island, and trees are rare. Many plants are adapted to high salinities and harsh temperatures. A large part of the island is vegetated by wetlands, plants adapted to growing in saturated soils.

Padre Island National Seashore has a total of 140 flora species, including 27 grasses, 15 grasslike species, 92 forbs, 3 cacti, and 3 woody species. In general, there are more species of vegetation occurring on the northern end of the park than on the middle or southern end (Drawe, 1992). In addition, dominant plant species change between the northern and southern areas. Bitter panicum (*Panicum amarum*) is the dominant plant species in the northern section of the park, while seacoast bluestem (*Schizachyrium littoralis*) is the dominant southern species. The primary indicator of differing vegetation types is elevation. Vegetation communities within Padre Island are divided into three major (dunes, low coastal sands, and marsh) and two minor (salty sands and shoregrass flats) plant communities. These are described in more detail below.

Dunes

Depending on its stage of development, this community either has a dense vegetative cover with few bare areas of sand, or has many bare areas with little or no vegetative cover. The vegetation that occurs here helps stabilize dune movement by holding the sand in its root structure. Dune vegetation includes a variety of halophilic plant species such as railroad vine (*Ipomoea pes-caprae*), beach croton (*Croton punctatus*), sea purslane *(Sesuvium portulacastrum),* beach evening primrose *(Oenothera drummondii)*, and beach and partridge pea *(Cassia fasciculata)*, and over 30 other species. Dominant species covering this community include sea oats (*Uniola paniculata*) and camphorweed (*Heterotheca subaxillaris*). As discussed under the Floodplains topic (above), the foredunes play an important role in controlling flooding and are therefore recognized as SRAs.

Dune vegetation density varies throughout the park, generally ranging between from 22.4 percent to 52.8 percent coverage on the windward side of the dunes and up to 70 percent on the leeward side (Blum and Jones, 1985). Rates of sand accumulation increased with an increase in vegetation density, therefore directly affecting dune height. This equates to, the higher the density the taller the dune.

Low Coastal Sands Including Grasslands, Live Oaks, and Willows

This community occurs west of the foredune ridge and generally consists of a level topography or may include small rolling dunes up to 10 feet in height (Rechenthin and Passey, 1967). This community may be mixed with the dunes or intermixed with marsh community. Vegetation is generally very dense and includes camphorweed (*Heterotheca subaxillaris*), partridge pea (*Cassia fasiculata*), marsh hay cordgrass (*Spartina patens*), and purple loosestrife (*Lythrum californicum*). Dominant species include seacoast bluestem (*Schizachyrium littoralis*) and roundstem *(Paspallum monostachyum*). Two woody species, Virginia live oak (*Quercus virginiana*) and black willow (*Salix nigra*) are found in this vegetative community. These two tree species provide essential foraging and protection habitat for neotropical migratory songbirds.

The Virginia live oak *(Quercus virginiana)* is the species of remnant tree that is reported by Spanish explorers to have covered most of North Padre Island. There are few remaining stands of the live oak in the park. These oak mottes provide cover, forage, and shelter for neo-tropical migrant songbirds; shelter and forage for the white-tailed deer *(Odocoileus virginianus)*; and a seed source for the continuation of the species at Padre Island National Seashore. They also add to the visual quality of the island, providing a different landscape element. For these reasons, the two relict live oak mottes are recognized as Sensitive Resource Areas.

Marsh

The marsh community typically includes the ephemeral ponds and wetlands and is characterized by low depressions that fill with water from rainfall events. Vegetation occurring in this community is generally tolerant of both fresh and saltwater. This community grades into shoregrass flats or salty sands. Vegetation includes seacoast bluestem (*Schizachyrium littoralis*), fleabane (*Erigeron procumbens*), roundstem (*Paspalum monostachyum*), narrowleaf sumpweed (*Iva angustifolia*), and marsh hay cordgrass (*Spartina patens*). The dominant species is swordgrass (*Scirpus americanus*).

Salty Sands and Algal Mats

This community generally is located near the Laguna Madre and receives periodic inundation of salt water; therefore, plant species are salt-tolerant. Vascular plants are scarce. Vegetation occurring here is generally found on small hummocks ranging in size from several inches to 2 feet. Algal mats are dominated by blue-green algae in thin mats on the soil surface. Vegetation species include shoregrass (*Monanthochloe littoralis*), blue-green algae, (*Plantago* sp.), whorled dropseed (*Sporobolus pyramidatus*), and sea ox-eye daisy (*Borrichia frutescens*). The dominant species is glasswort (*Salicornia bigelovii).*

Shoregrass Flats

This community consists of low-lying flats along the western edge of the island. Like the salty-sands community, it receives periodic inundation from salt water, but differs in elevation. Typical elevation is a few inches and consists of primarily shoregrass (*Monanthochloe littoralis*).

Exotic Species

Plant species occurring on Padre Island are typical of vegetation seen on Texas barrier islands and on the adjacent mainland. Because of this, no exotic species occur on the barrier island, but several do occur on the spoil islands in the Laguna Madre. These exotics were brought to the spoil islands by campers who built fishing cabins on the islands prior to the establishment of the park. These exotics have not been removed, since these are man-made environments and produce nesting habitat for colonial nesting waterbirds. Exotic species include oleander *(Nerim oleander)* and Brazilian pepper *(Schinus terebinthifolius).*

WETLANDS

Wetland categories occurring in the park include marine, estuarine, and palustrine wetlands. Marine wetlands include beaches and the splash zone of the open Gulf of Mexico. Estuarine wetlands include intertidal aquatic beds such as seagrasses and unconsolidated shores such as wind-tidal flats. Palustrine wetlands include emergent wetlands and freshwater and ephemeral ponds. Wetlands are important in that they produce a large amount of primary production and provide important habitat for the rich wildlife resources of the park. Approximately 60 percent of the park is comprised of a rich variety of wetlands. These wetland communities are located behind the Gulf foredunes and extend west toward the Laguna Madre.

> "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year." (Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, et al., 1979))

The following provides more detail about the park's emergent wetlands, seagrass beds in the Laguna Madre, and wind-tidal flats.

Emergent Wetlands

Emergent wetlands occur throughout the park between the Laguna Madre and the foredune ridge. Halophytic succulents in the lower areas and shoregrass in the upper elevation areas dominate them. Palustrine wetland vegetation includes seacoast bluestem (*Schizachyrium littoralis*), fleabane (*Erigeron procumbens*), roundstem (*Paspalum monostachyum*), narrowleaf sumpweed (*Iva angustifolia*), and marsh hay cordgrass (*Spartina patens*). The dominant species is swordgrass (*Scirpus americanus*). Estuarine wetland vegetation species include shoregrass (*Monanthochloe littoralis*), blue-green algae, plaintain (*Plantago sp.*), whorled dropseed (*Sporobolus pyramidatus*), and sea ox-eye daisy (*Borrichia frutescens*). The dominant marsh species is glasswort (*Salicornia bigelovii*).

Seagrass Beds

In shallow, quiet areas of the Laguna Madre are broad underwater flats vegetated with marine grasses. Seagrass beds are among the most productive of marine plant communities. These seagrasses create extensive nursery habitat for finfish and shellfish. Chambers (1992) estimated that 98 percent of the commercial landings in the Gulf of Mexico were estuarine-dependent. The seagrasses are generally covered by less than 4 feet of water, and the shallowest parts are exposed at low tidal levels. The water depth, as well as the salinity and turbidity, determines the types of seagrasses that grow in these areas. Shoalgrass (*Halodule wrightii*) is the dominant seagrass in Laguna Madre. It tolerates the highest salinity and turbidity and prefers the shallowest depths. Other seagrasses include widgeongrass (*Ruppia maritima*), turtlegrass (*Thalassia testudium*), clovergrass (*Halophila engelmanni*), and manatee grass (*Syringodium testudium*).

The seagrass beds support a large invertebrate population, predominantly a variety of snails and clams. The seagrass beds are spawning grounds or nurseries for many fish and crustaceans. This environment of high biological productivity, which is important in the coastal ecosystem and to the Gulf fishing industry, is maintained by a delicate balance of salinity, turbidity, and water depth (Brown, et al., 1977). In addition to providing habitat for invertebrate fauna and fishes, seagrasses also provide habitat for other wildlife. These include migratory waterfowl, two species of federally protected sea turtles, the Kemp's ridley (*Lepidochelys kempii*) and green turtle (*Chelonia mydas*), and a variety of wading and diving birds (mergansers, loons, cormorants, pelicans). Some of these animals consume seagrasses directly: redhead ducks feed on seagrass rhizomes; sea turtles eat seagrass leaves.

Seagrass cover in the upper Laguna Madre has decreased in the early 1990's as a consequence of the persistent brown tide algal bloom (Onuf, 1996). Light levels were reduced as much as 50 percent in response to the high, water column chlorophyll concentrations (Dunton, 1994). This loss has been partially attributed to increased turbidity caused by maintenance dredging. Light limitation, either as a consequence of increased levels of suspended solids or chlorophyll concentrations, is therefore a serious problem facing seagrass communities along the Texas coast. Dredging disrupts benthic communities during the removal, deposition, and re-distribution of fine materials; these activities ultimately result in higher turbidity. Furthermore, dredged material disposal areas are not always suitable for the colonization and growth of seagrasses (Zieman, 1975). The direct and immediate effect of dredging on submerged aquatic vegetation is seagrass mortality due to burial.

The main effects of industry are related to vessel operations, marine construction, and small localized oil spills. Vessel operations can have an impact on shallow seagrass beds through propeller scarring (Phillips, 1960; Zieman, 1976; Eleuterius, 1987). Vessel traffic causes direct damage to seagrasses through the physical destruction of seagrass leaves and below-ground tissues (roots and rhizomes) by propellers. Prop scars tend to occur in areas less than 3.28 feet (1 meter) deep at low tide (Zieman, 1976). Eleuterius (1987) indicated that once a propeller scar is created, wave action leads to erosion within the channel, resulting in scouring and deepening of the disturbed area. Similarly, Zieman (1976) reported a reduced proportion of fine sediments in areas with propeller scars.

Because of the importance of the seagrass beds, as well as the entire submerged environment, the Laguna Madre was designated as a Sensitive Resource Area, as shown on Figures 3.1, 3.2, and

3.3. While seagrass beds do not currently occupy the entire submerged bay bottoms of the Laguna Madre, the potential exists for all bay bottoms of the Laguna Madre to provide suitable habitat, with the exception of the deeper dredged channels. Therefore, the entire portion of the Laguna Madre located within the park has been identified as a Sensitive Resource Area.

Wind-Tidal Flats

Wind-tidal flats are low areas inundated when high water conditions are created by northerly winds, and left uncovered when low-water conditions are created by southerly winds (hence the term "wind-tidal flats"). These mudflats form an almost continuous band along the Laguna Madre side of the park.

Tidal flats begin at mean sea level and extend upward to at least mean high tide. In the southern areas of the park, wind-tidal flats may extend to the high wind-tide levels. They are generally covered with a blue-green algal mat that ranges between a thin layer to 0.4 inches (2 cm) thick.

Frequently inundated by Laguna Madre waters driven by wind, some parts of the flats support extensive mats of blue-green algae, and are essential habitat for the piping plover (Withers, 1993). Wind-tidal flats play a crucial role in the life history of some of Texas' most important commercial fish and shellfish industries, and offer significant feeding areas for aquatic bird life (Withers, 1993). They provide abundant amounts of blue-green microalgae, which contribute to the primary productivity of estuarine systems. Their productivity is comparable to seagrass beds and to 20-40 percent of a typical marshhay cordgrass (Spartina patens) marsh. The mats of blue-green algae are also essential habitat for the piping plover (Withers, 1993).

Macrobenthic invertebrates inhabit the wind-tidal flats in the Laguna Madre and create an abundant and diverse benthic community that exists throughout most of the year (Withers 1994). Detritus from other estuarine habitats such as seagrass beds is deposited in large quantities on the flats, and, combined with the large algal biomass, contribute to the high productivity found in this area. As a result of the high productivity, the wind-tidal flats are inhabited by a large number of benthic invertebrates, which are then preyed upon by demersal fish and crabs. These invertebrates include polychaetes (*Arenicola* sp., *Capitella* sp., and *Sabella* sp.), fly larvae (*Canaceidae*), springtail nymphs (*Entomobryidae*) and stonefly nymphs (*Leuctridae*), amphipods (*Corophium lousianum*), tanaids (*Leptochelia rapax*), and mollusks (*Mulinia lateralis*). In addition, shorebirds utilize these areas making them significant feeding areas during the winter and migration seasons along the Texas Gulf Coast (Withers, 1994), particularly the endangered and/or threatened piping and snowy plovers. Additionally, tidal flats are also important foraging habitat for Piping plovers (*Charadrius melodus*), reddish egrets (*Egretta rufescens*), and peregrine falcons (*Falco peregrinus ssp.*), and at least 19 other species of shorebirds, including western sandpiper (*Calidris mauri*), dunlin (*Calidris alpina*), killdeer (*Charadrius vociferus*), and willet (*Catoptrophorus semipalmatus*).

The addition of fill materials and soil compaction are anthropogenic disturbances that adversely affect blue-green algal mat production. Extensive blue-green algal mat production is dependent on flats that are alternately emergent and submerged in regular cycles. The use of fill in wind-tidal flat areas not only converts the flats to an elevated landform, it also disrupts the hydrological cycle. The filled area may act as a barrier to inundation or allow water to be retained behind the filled area. Irregular inundation and excessive water retention both adversely affect blue-green algal mat production. Soil compaction by vehicular traffic in wind-tidal flats disturbs the hydrological regime by allowing compacted areas to remain submerged. Wind-tidal flats that are submerged too frequently do not have extensive algal mats (Weise and White, 1980).

Because of their ecological importance, wind-tidal flats have been designated as SRAs.

FISH AND WILDLIFE

The native animal population found at Padre Island National Seashore includes an extensive diversity of both marine and terrestrial species. Wildlife known to occur in the park include: 266 species of neo-tropical migrants, migratory, coastal, and marine birds; 47 species of terrestrial and marine mammals; 100 species of fish; 56 species of reptiles and amphibians; 36 species of marine crabs; and numerous species of plankton and benthic organisms. Wildlife that are listed as federal and state threatened and endangered species are discussed in the section, Threatened and Endangered Species and Their Habitat.

Mammals

There are 47 species of terrestrial mammals listed on the park checklist which include: white-tailed deer (*Odocoileus virginianus*), coyotes (*Canis latrans*), bobcats (*Felis rufus*), striped skunks (*Mephitis mephitis*), badgers (*Taxidea taxus berlandieri*), raccoons (*Procyon lotor*), jackrabbits (*Lepus californicus merriami*), mice, rats, and bats. All marine mammals are considered species of special concern and will be discussed in the section on Threatened and Endangered Species and Their Habitat.

From recent small mammal population research, indications are that a change in habitat may have taken place over the past fifteen years. Baccus and Horton in 1979 indicated that cotton rats (*Sigmodon hispidus*) were abundant in the salty sand areas of the park. Yzaguirre in 1974 indicated white-footed mice (*Peromyscus leucopus*) were abundant in the foredune and low coastal sands. However, research conducted in 1997 by Goetze, Nelson, and French indicate that these species are no longer present in the park, since no specimens were caught. Populations of kangaroo rats (*Dipodomys compactus*) also seem to be less than in previous years. Possible causes of this may come from a change in vegetation cover and/or from an extended drought lasting numerous years. Any of these factors could cause a decline in the diversity of the small mammal populations.

Predator populations such as coyotes (*Canis latrans*) and bobcats (*Felis rufus*) are cyclic and prey dependent on jackrabbits (*Lepus californicus merriami*), mice and rats, and other small animals. White-tailed deer (*Odocoileus virginianus*) populations are noted to be increasing within the park, as foraging habitat has improved since the late 1970's.

Fish and Invertebrates

Laguna Madre: The Laguna Madre ecosystem ranks first in finfish production in Texas and contains over 85 percent of the seagrass cover in the state. Because the estuary does not receive significant inputs of nitrogen freshwater inflows, the majority of nitrogen entering the system is supplied by blue-green algal mats occurring on wind tidal flats. The Laguna Madre provides essential habitat for many species of vertebrates, invertebrates, and seagrasses. Marine vertebrates include two species of sea turtles, the Kemp's Ridley (*Lepidochelys kempii*) and green turtle (*Chelonia mydas*), and at least 31 species of fish such as the striped mullet (*Mugil cephalus*), redfish (*Sciaenops ocellata*), pinfish (*Lagodon rhomboides*), and black drum (*Pogonias cromis*).

Numerous invertebrate species are found in the Laguna Madre. Species of shrimp include brown shrimp (*Penaeus aztecus*), grass shrimp (*Paleomonetes intermedius*), and mantis shrimp (*Squilla empusa*). Crustacean species include blue crab (*Callinectes sapidus*), striped hermit crab (*Clibanarius vittatus*), longnose spider crab (*Libinia dubia),* and amphipod and isopod species. Bivalve species include bay scallop (*Argopecten irradians*), scorched mussel (*Brachidontes exustus)*, and dwarf surf clam (*Mulinia laterale*). Cnidarian species include anemones, moon jelly (*Aurelia sp.*), sea walnut (*Beroe* sp.) and hydromedusa (*Mnemiopsis* sp.).

Finfish in the Laguna Madre inhabit all areas of the lagoon which include seagrass beds, bare substrate, and the Intracoastal Waterway. Over 23 species of finfish occur in the Laguna Madre including dwarf seahorse (*Hippocampus zosterae)*, tidewater silverside (*Menidia peninsulae)*, sheepshead minnow (*Cyprinodon variegatus)*, longnose killifish (*Fundulus similis)*, and spotted sea trout (*Cynoscion nebulosus).* Population numbers of most fish species tend to decrease in the winter months, due to colder temperatures and shortage of food sources (Chaney, 1988). As with most species, finfish tend to spawn in spring and summer months.

Gulf of Mexico: At least 67 species of finfish occur in the Gulf of Mexico portions of the park. The greatest number and diversity of finfish species occur in the summer and fall months, while the fewest numbers and diversity are encountered in the spring and winter months. Some Gulf of Mexico species include scaled sardine (*Harengula jaguana*), longnose anchovy (*Anchoa nasuta*), striped mullet (M*ugil cephalus*), Atlantic threadfin (*Polydactylus octonemus*), and crevalle jack (*Caranx hippos*) (Shaver, 1984).

Freshwater Ponds: Fish species occur in large shallow bodies of freshwater within the park. They include mosquito fish (*Gambusia affinis*), sheepshead minnow (*Cyprinodon veriegatus*), and gulf killifish (*Fundulus grandis*).

Birds

Padre Island has 322 species, including migratory and resident waterfowl, shorebirds, neo-tropical songbirds, and raptors. During the fall and winter, sandhill cranes (*Grus canadensis*) frequent the west side of Padre Island, near Bird Island Basin. The cranes can be observed feeding in the wetlands, uplands, and shallow water of the Laguna Madre. Many bird species utilize the ephemeral and freshwater ponds. They include bobwhite quail (*Colinus virginianus*), northern harrier (*Circus cyaneus*), sandhill crane (*Grus canadensis*), American egret (*Casmerodius albus*), Great blue heron (*Ardea herodias*), long-billed curlew (*Numenius americanus*), sanderling (*Crocetheia alba*), killdeer (*Charadrius vociferus*), terns, ducks, and grebes.

The Peregrine falcon stages on Padre Island National Seashore during the spring and fall migration, with falcon numbers totaling more than 2,000. Larger numbers of falcons occur on the southern end of the park, making this particular park area the most important peregrine falcon habitat on the Gulf coast. This area is considered critical habitat by the Peregrine Fund. Peregrine falcons primarily utilize the wind-tidal flats from Yarborough Pass to Port Mansfield, but can be observed anywhere within the park. Falcons are also observed on the wind-tidal flats and sand dunes on the western side of the seashore. The falcons tend to avoid areas of intense recreational use and vehicular traffic. Padre Island is the only known locality in the Western Hemisphere where peregrine falcons are found in large concentrations during their spring migration. The Peregrine falcon was officially delisted by the U.S. Fish and Wildlife Service on August 25, 1999; therefore, it is no longer classified as either endangered or threatened.

Colonial Waterbird Rookery Islands: The Laguna Madre portion of the park contains two natural islands, North Bird Island and South Bird Island. Additionally, 27 man-made islands, referred to as spoil islands, were created by the U.S. Army Corps of Engineers (USACOE) during the establishment of the Gulf Intracoastal Waterway (GIWW). In order to maintain a proper depth, the USACOE must dredge the GIWW and the "spoil" generated from these dredging activities is placed in areas adjacent to the channel. Over the years, continued deposition has created small islands that have become vegetated by waterbirds who use them as nesting areas. Large rookeries for numerous species of waterbirds are established on these islands. Species include great blue heron (*Ardea herodias*), reddish egret (*Egretta rufescens*), caspian tern (*Sterna caspia*), royal tern (*Sterna maxima*), white pelican (*Pelecanus erythrorhynchos*), laughing gull (*Larus atricilla*), and white-faced ibis (*Plegadis chihi*). Any activity on these islands during nesting season will harm nesting birds, eggs, or hatchlings, therefore rookery islands are posted by sign as closed between April 1 and September 30. The U.S. Fish and Wildlife Service recommends a 1,000-foot buffer around these islands during nesting season.

These islands are located along the Gulf Intracoastal Waterway from the north boundary of the park to a point northeast of Point of Rocks. They range in size from less than one acre to 40 acres and have a flat topography with a small central elevation. Vegetation consists of prickly pear (*Opuntia lindheimeri*), sea ox-eye daisy (*Borrichia frutescens*), glasswort (*Salicornia bigelovii*), and salt-flat grass (*Monanthochloe littoralis*). No structures or developments are currently present on the islands. In addition, these islands provide some protection for the northern area of Bird Island Basin from wind waves, but the southern area is more exposed.

Because of their ecological value, rookery islands are classified as Sensitive Resource Areas.

Reptiles and Amphibians

Many species of snakes, turtles, and frogs are known to occur at Padre Island National Seashore. Reptiles and amphibians are considered as indicators of aquatic health, as they are sensitive to pollution and loss of habitat. They are also important in the food chain and make up a large portion of the vertebrate population in certain ecotypes. Many species of snakes, turtles, and frogs find ephemeral ponds important sources of water habitat. The Northern Leopard Frog (*Rana pipiens*), Green treefrog (*Hyla cinera*), Hurter's Spadefoot toad (*Scaphiopus holbrookii*), Diamondback water snake (*Nerodia rhombifer*), Texas coral snake (*Micrurus fulvis*), Checkered garter snake (*Thamnophis marcianus*), Red-eared turtle (*Trachemys scripta*), and Yellow mud turtle (*Kinosternon flavescens*) are species documented in aquatic areas. Western Coachwhip (*Masticophis flagellum*), Western Massasauga (*Sistrurus catenatus*), and Western Diamondback Rattlesnakes (*Crotalus atrox*) are found in grassland and riparian areas that support prey populations.

THREATENED AND ENDANGERED SPECIES AND THEIR HABITATS

No federally-listed threatened or endangered plant species are known to occur at Padre Island National Seashore (Drawe, 1992).

Several animals known to occur at Padre Island National Seashore are included on federal and state lists of threatened and endangered species. Table 3.7 lists federal- and state-listed Endangered (E), Threatened (T), or Candidate (C) species known to occur within Padre Island National Seashore. For a complete listing of federal and state threatened and endangered species that may possibly occur at Padre Island National Seashore, see Appendices H, I, and J.

Table 3.7. Listed Species Known to Occur Within the Park

	Federally Protected				State Protected	
SPECIES	E	T	C	TSA	E	T
BIRDS						
Eastern brown pelican *Pelecanus occidentalis*	X				X	
Reddish egret *Egretta rufescens*						X
Piping plover *Charadrius melodus*		X				X
Mountain plover *Chardius montanus*			X			
White-tailed hawk *Buteo albicaudatus*						X
Ferruginous hawk *Glaucidium brasilianum*						X
Black-capped vireo *Vireo atricapillus*	X				X	
White-faced ibis *Plegadis chihi*						X
REPTILES						
Loggerhead sea turtle *Caretta caretta*		X			X	
Green sea turtle *Chelonia mydas*		X				X
Atlantic hawksbill sea turtle *Eretmochelys imbricata*	X				X	
Kemp's Ridley sea turtle *Lepidochelys kempii*	X				X	
Leatherback sea turtle *Dermochelys coriacea*	X				X	
American alligator *Alligator mississippiensis*				X		

Key: E = Endangered T = Threatened C = Candidate TSA = Threatened by Similarity of Appearance

Birds

Protected shorebird species including piping plover, reddish egret, and snowy plover are present in the park during all seasons of the year (Chaney, et al., 1995). Piping and snowy plovers are generally observed throughout Padre Island during all months of the year (Chaney et al., 1993, 1995). They utilize the wind-tidal flats, the washover channels, and the Gulf beaches for feeding, foraging, and resting. Reddish egret, white-faced ibis, and interior least tern are seen feeding, foraging, and resting along the Gulf and Laguna Madre shoreline throughout the park. All of these species nest on park spoil islands. The white-faced ibis and least tern appear during the summer months, while the reddish egret is a resident species and can be seen during all months.

Brown pelicans utilize the Gulf of Mexico and the Laguna Madre shores for feeding, resting, and foraging. They do not nest within the park, but research indicates that they are expanding their southern nesting grounds northward towards the park.

The Laguna Madre provides the wintering habitat for approximately 90 percent of the Redhead duck population of North America.

The ferruginous hawk and white-tailed hawk, occurring as single individuals, are seen along the Laguna Madre and Gulf of Mexico throughout the park. Higher numbers are generally seen during the migration periods of spring and fall.

In 1990, Sissom mentioned the occurrence of a single whooping crane (*Grus americana*) that flew over the park during a research project. However, no other known sightings have occurred in the park to date. Appropriate habitat is not sufficient to support this species.

At least two species of protected songbirds occur during the spring and fall migration periods. The black-capped vireo and cerulean warbler inhabit areas of the park that offer vegetative structure for protection and sources of food. These areas include areas of the park that have live oaks, black willows, and other species of woody vegetation.

Sea Turtles

All five species of sea turtles inhabiting the Gulf of Mexico can nest, hatch, or strand along the Gulf beaches of the park and forage or rest in the waters of the Gulf of Mexico, Laguna Madre, and Port Mansfield Channel.

Nesting starts in April and continues until September. Nests can occur from the high tide line to the coppice dunes at the base of the primary dune line. The Texas coast averaged one sea turtle nest a year through 1994. It is unlikely that sea turtle nesting went undetected before and after that time. Since 1995, 50 sea turtle nests have been documented on the Texas coast, an average of 12.5 nests/year. Twenty-one nests were documented during the nesting season of 1998. Seventeen of the 21, including four species, were found at Padre Island National Seashore. During the last 50 years, more Kemp's ridley nests have been found in the United States of America. An increased number of Kemp's ridley nests have been found in the U.S. each year since 1995, and it is likely that Kemp's ridley nesting will increase in the future. It is expected that Padre Island will continue to be of utmost importance to Kemp's ridley nesting in the U.S., as nesting increases and other south Texas beaches north and south of Padre Island become more heavily developed.

All nests found within the park are removed from the beach and incubated in an incubation facility. However, some nests are not located and therefore incubate on the beach. Park staff locates and safely transfers an average of 10 stranded hatchlings washed in on the tide yearly. Seashore staff routinely transport stranded sea turtle hatchlings to the University of Texas Marine Science Institute, Port Aransas, for extended rehabilitation, as authorized by the U.S. Fish and Wildlife Service. Sea turtles strand throughout the Gulf beach portion of the park. The stranding peaks can be seen in winter months if cold stunnings occur and the late spring and summer months due to shrimping activities in the Gulf of Mexico (Shaver, 1997).

The Mansfield Channel Jetties support a large population of green turtles (particularly during the warmer months) and is likely one of the most important developmental habitats for green turtles in the northwestern Gulf of Mexico.

The following table lists the times of sea turtle activity in the South Texas coast.

Table 3.8. General Dates and Locations of Turtle Nesting and Tracks at Padre Island National Seashore and Probable Nesting Seasons for these Species.

Events	Dates	Probable Nesting Season
Kemp's ridley nesting/tracks	April – mid-July	Late March – August
Loggerhead nesting/tracks	May – August	Late April – early September
Green sea turtle nesting/tracks	June – July	May – September
Hawksbill nesting/tracks	June	April – August

The recovery plan for sea turtles specifically identifies a role for the National Seashore. That role is for the National Seashore to perform sea turtle patrols of the Gulf beach, which the National Seashore has actively undertaken since 1980. The NPS will meet the intent of recovery plans for all threatened and endangered species that occur in the National Seashore.

Specific restrictions or operating standards to provide for sea turtle protection have been developed and would be included as Current Legal and Policy Requirements for any proposed operation in certain areas that support sea turtles, such as the Gulf beach and nearshore waters, sea turtle egg incubation sites, and Mansfield Channel jetties. These standards are listed in Chapter 2, Part II, under Protection of Threatened and Endangered Wildlife.

Marine Mammals

All species of marine mammals are protected under the Marine Mammal Protection Act. The majority of listed marine mammals may occur in the park, but generally only appear when they wash ashore after being injured or have died. The majority of marine mammals in the Gulf of Mexico are typically found in deep waters (continental shelf and beyond), with the exception of the rough-nosed dolphin (*Steno bredanensis*) and Atlantic spotted dolphin (*Stenella frontalis*) (both Texas State Threatened) which commonly inhabit nearshore waters.

Atlantic spotted dolphin are commonly seen in the Gulf of Mexico and Laguna Madre, but little information is available on population sizes (Davis et al., 1995). The rough-toothed dolphin inhabits tropical and warm temperate waters but are sparsely distributed and rarely sighted in Padre Island coastal waters. Park habitats including wind tidal flats, seagrass beds and nearshore waters provide essential food sources for these species.

At Padre Island National Seashore, recovery efforts related to marine mammals have been associated with the Marine Mammal stranding network to determine the cause of stranded marine mammals, and rehabilitation is attempted on those marine mammals strong enough for transport to holding tanks.

Recovery Plan Actions for Federal and State Protected Species

Padre Island National Seashore has several state and federally-protected species that occur within the park. Federally-protected species are required to have recovery plans written for them by the USFWS. However, the state-protected species generally do not. The State of Texas defers to the USFWS to write recovery plans, despite the fact that some species may not be federally-listed. The recovery plans list general actions that are required to help each species recover. Specific actions for each species are listed below, along with actions being conducted by Padre Island National Seashore.

Federally-Protected Species

Eastern brown pelican

Recovery Plan Actions

1. Provide erosion control on nesting islands.
2. Conduct population and habitat surveys.
3. Increase level of patrolling and monitoring on existing nesting and loafing islands.
4. Form recovery team and revise Eastern brown pelican recovery plan.
5. Conduct island suitability study.
6. Conduct nest site selection and limiting factors study.
7. Conduct island modifications and study success.

Park Actions

1. Conduct yearly surveys of nesting populations of colonial waterbirds to document the occurrence of nesting brown pelicans in the park. There are no nesting brown pelicans occurring in the park; however, they are nesting just south of the park's boundary in the Laguna Madre and are progressing north.
2. Prohibit disturbance from visitors on nesting islands between February 15 and September 30. These rookery islands provide the necessary nesting habitat for all species of colonial waterbirds, including the brown pelican.
3. Protect the animals that are resting and foraging within the park by enforcing the Endangered Species Act, 36 CFR, and Migratory Bird Treaty Act, all of which provide legal protection for this species.

Piping Plover

Recovery Plan Actions

1. Manage breeding piping plovers and habitat to maximize survival and productivity.
2. Monitor and manage wintering and migration areas to maximize survival and recruitment into the breeding population.
3. Undertake scientific investigations that will facilitate recovery efforts.
4. Develop and implement public information and education programs.
5. Review progress towards recovery annually and revise recovery efforts as appropriate.

Park Actions

1. Protection of the wind-tidal flat habitat, which is used as resting and foraging habitat by minimizing activities such as off-road driving and development within and adjacent to the park.
2. Conduct inventorying and monitoring projects of bird populations.
3. Protect the animals that are resting and foraging within the park by enforcing the Endangered Species Act, 36 CFR, and Migratory Bird Treaty Act, all of which provide legal protection for this species.

Black-capped Vireo

Recovery Plan Actions

No recovery plan could be found for this species.

Park Actions

1. Protection of the wooded, upland habitats which are used as resting and foraging habitat during migration by minimizing activities such as off-road driving and development within the park.
2. Conduct inventorying and monitoring projects of bird populations.
3. Protect the animals that are resting and foraging within the park by enforcing the Endangered Species Act, 36 CFR, and Migratory Bird Treaty Act, all of which provide legal protection for this species.

Mountain Plover

Recovery Plan Actions

This is a candidate species, which is not yet listed. No recovery plan could be found for this species.

Park Actions

1. Protection of the wooded, upland habitats and wind-tidal flats, which are used as resting and foraging habitat throughout the year by minimizing activities such as off-road driving, development within and adjacent to the park.
2. Conduct inventorying and monitoring projects of bird populations.
3. Protect the animals that are resting and foraging within the park by enforcing the Endangered Species Act, 36 CFR, and Migratory Bird Treaty Act all, of which provide legal protection for this species.

Kemp's ridley Sea Turtle

Recovery Plan Actions

1. Provide long-term protection to important nesting beaches.
2. Ensure at least 60 percent hatch success on major nesting beaches within each state.
3. Implement effective lighting ordinances or lighting plans on all major nesting beaches within each state.
4. Determine distribution and seasonal movements for all life stages in marine environment.
5. Minimize mortality from commercial fisheries.
6. Reduce threat from marine pollution.
7. NPS should evaluate effect of vehicular traffic on nesting activities, including the need to relocate nests, and develop a plan to phase out beach driving on important local or regional nesting beaches (except emergency or permitted research vehicles).
8. Assist Mexico to ensure long-term protection of the major nesting beach and its environs, including the protection of the adult breeding stock and enhanced production/survival of hatchling turtles.
9. Continue Turtle Exclusion Device (TED) regulation enforcement in the United States waters, expanding the areas and seasonality of required TED use to reflect the distribution of the species; encourage and assist Mexico to incorporate TED's in their Gulf of Mexico shrimp fleet.
10. Fill in gaps in knowledge that will result in better management. In order to minimize threats and maximize recruitment we should: determine distribution and habitat use for all life stages, determine critical mating/reproductive behaviors and physiology, determine survivorship and recruitment.
11. Padre Island National Seashore should continue patrolling for nesting ridley's, in view of the large number of turtles that were experimentally imprinted.

Park Actions

1. Daily and camping patrols are conducted from mid-March until late July for nesting turtles covering 80 miles of beach each day. All turtle nests found are excavated and the eggs recovered and incubated in a park facility for protection against predators, tides, and vehicles.

2. Live stranded turtles are retrieved, examined, and rehabilitated prior to release back into the wild.
3. Conduct research utilizing satellite tags to monitor movement and nesting activities.
4. Conduct research to understand foraging patterns.
5. Work with federal and state agencies to protect the sea turtles migrating in the Gulf of Mexico by encouraging TED enforcement.
6. Enforce all laws and regulations that provide this species legal protection such as the Endangered Species Act and 36 CFR.

Loggerhead, Green, Leatherback, and Atlantic Hawksbill Sea Turtles

Recovery Plan Actions

1. Provide long-term protection to important nesting beaches.
2. Ensure at least 60 percent hatch success on major nesting beaches within each state.
3. Implement effective lighting ordinances or lighting plans on all major nesting beaches within each state.
4. Determine distribution and seasonal movements for all life stages in marine environment.
5. Minimize mortality from commercial fisheries.
6. Reduce threat from marine pollution.
7. NPS should evaluate effect of vehicular traffic on nesting activities including the need to relocate nests and develop a plan to phase out beach driving on important local or regional nesting beaches (except emergency or permitted research vehicles).

Park Actions

1. Daily and camping patrols are conducted from mid-March until late July for nesting turtles covering 80 miles of beach each day. All turtle nests found are excavated and the eggs recovered and incubated in a park facility for protection against predators, tides, and vehicles.
2. Live stranded turtles are retrieved, examined, and rehabilitated prior to release back into the wild.
3. Conduct research utilizing satellite tags to monitor movement and nesting activities.
4. Conduct research to understand foraging patterns.
5. Work with federal and state agencies to protect the sea turtles migrating in the Gulf of Mexico by encouraging TED enforcement.
6. Enforce all laws and regulations that provide this species legal protection such as the Endangered Species Act and 36 CFR.

State-Protected Species

Reddish egret, White-tailed hawk, Ferruginous hawk, and White-faced ibis

These species do not have recovery plans written for them, but several park actions take place to help protect these species.

Park Actions

1. Protection of various park habitats, such as the wind-tidal flats and rookery islands, which are used as nesting, resting, and foraging habitat by minimizing activities such as off-road driving, development within the park, as well as adjacent to the park, visitor disturbance from jet skis and boats.
2. Prohibit disturbance from visitors on nesting islands between February 15 and September 30. These rookery islands provide the necessary nesting habitat for all species of colonial waterbirds.
3. Conduct inventorying and monitoring projects of bird populations.
4. Protect the animals that are resting and foraging within the park by enforcing the Endangered Species Act, 36 CFR, and Migratory Bird Treaty Act, all of which provide legal protection for this species.

CULTURAL RESOURCES

Archeological Resources

Archeological resources consist of "any material remains or physical evidence of past human life or activities which are of archeological interest, including the record of the effects of human activities on the environment. They are capable of revealing scientific or humanistic information through archeological research" (NPS 1994:187).

A complete inventory of archeological resources within Padre Island has not yet been conducted, and a formal assessment of known archeological sites within the park has not been done since 1974. A few small surveys have added information to the inventory base since that time and more substantial work on the underwater components has also been completed. Of the at least 27 sites, only two are listed on the National Register of Historic Places (the Mansfield Cut Underwater Archeological District and the Novillo Line Camp). Two others are recommended as eligible to the National Register (Black Hill Line Camp and Green Hill Line Camp). These four sites have been identified as Sensitive Resource Areas. None of the remaining archeological sites have been evaluated for National Register significance.

Overview: The archeological resources of Padre Island can be divided into two primary categories, based on temporal periods: (1) prehistoric, and (2) historical. The first period includes all evidence related to the aboriginal use of the island prior to the arrival of Europeans (pre-1500); while the latter includes all remains related to both American Indian and Euroamerican activities on the island since 1500. Prehistoric sites are not known to be numerous but do occur over the length of the island. They represent the remains of human activity on the island from at least the late Archaic period (ca. 3000 BC) through the Neo-American period (A.D. 1400). Evidence from prehistoric sites within the park indicates that the island was used seasonally by people who lived primarily on the mainland, and had more permanent sites along the rivers and bays of the Texas coast. But use of the island for hunting, gathering, fishing, and shell fishing occurred throughout the centuries before the arrival of Europeans and continued as a lifeway into the late-1700's.

At least 15 prehistoric archeological sites are known within the boundaries of the park and almost all possess evidence of having been occupied during both the Archaic and Neo-American periods listed above. These archeological sites are composed mostly of scatters of stone tools and chipping debris, with limited evidence of ceramic sherds and animal bone, exposed in dune blowouts. Although not reported on sites within the park, evidence of hearths may occur in some instances. Other material culturally associated with these groups was perishable in nature and would not be preserved except under very extraordinary conditions. Site patterning suggests four areas of primary prehistoric occupation/use: (1) along the banks of channel cuts through the island; (2) along the west shore of the island between the Laguna Madre and the mid-island ephemeral ponds; (3) the east-central portion of the island between the foredunes and the mid-island ephemeral ponds; and (4) behind the large foredunes. Archaic sites tend to occur in locations 2 and 3 above, while Neo-American sites occur in all four locations.

Research in the mid-1980s located seven additional sites containing cultural material, including four of suspected prehistoric origin, but these were all determined to be minimal or suspect in nature and recommended as not significant. This information does point to the existence of "scatters" of archeological materials across the island. Although not recorded as archeological sites at the time, human remains of two individuals, assumed to be prehistoric in age, were exhumed from the foredune area about midway down island in the 1970s. Additionally, evidence of human burials was recorded at a prehistoric site about 2 miles southwest of the visitor center.

Historical sites are fewer in number across the island (a total of 8) and consist of two categories of sites: (1) those related to land-based activities on the island, and (2) those related to maritime activities. The first category includes four sites, three of which are line camps related to ranching activities by the Dunn family, while the fourth is the remnant of a Mexican-American War military campsite. Along with being historic structures and part of the cultural landscape of the island, the three line camps of Novillo, Black Hill, and Green Hill also are listed in the state archeological site files. No other features of the ranching aspects on the island have been recorded, although some of the more minor features probably still occur. Although ephemeral in nature, the campsite of American soldiers traveling down-island during the Mexican-American War represents the only known site of this period within the park.

Maritime activities associated with Padre Island began early in European history in the area. Three of the 1554 Spanish plate fleet vessels sank in or just outside the park boundary near the Mansfield Cut. A smaller vessel was also lost during attempts to salvage the cargo of the vessels. Remains of two of these wrecks have been confirmed within the park, as are the remains of the survivors'/salvors' camp established onshore during these events. Due to years of destruction by "treasure hunters," sites of this era have become extremely rare in U.S. waters and any remains in National Park Service areas make them extremely significant.

Additionally, magnetometer surveys along the southern portion of the island have resulted in a number of shipwreck possibilities yet to be confirmed. Research into the historical records indicates that the remnants of as many as 20 shipwrecks may occur within the park boundaries. In addition to the Spanish wrecks noted above, the remains of the *Colonel Cross, Gladiator, Nicaragua, Winthrop,* five unidentified ships, and possibly the *Palas* lay within the waters and sands of the park. Remains of a late nineteenth-century wreck were recorded in the foredune area of the island in 1994. Due to the currents and shipping routes along the coast, the majority of these wrecks occur along the southern half of the island.

Contrary to the general pattern of shipwrecks located at the southern end of the island, ranching remains and prehistoric sites occur primarily in the northern half of the island. This may be due, in part, to the fact that logistics make archeological survey difficult in the southern half of the island and, thus, fewer sites have been found there, but any proposed ground-disturbing activities in the northern half of the island may stand an increased chance of encountering prehistoric archeological deposits. This situation is complicated by the fact that vegetation has increased over the last 30 years and has stabilized many dunes that cover the known archeological sites. While this affords a certain amount of protection for the buried archeological resources, it also increases the chances of encountering unseen cultural deposits during development activities. Thus, any ground-disturbance activities should be preceded by appropriate compliance requirements.

Cultural Landscapes

Cultural landscapes are geographic areas where people have modified, interacted with, or given meaning to the land. They reveal fundamental ties between people and the land -- ties based on needs such as gathering or growing food, developing settlements, and developing recreational opportunities. The National Park Service is concerned with preserving and interpreting those cultural landscapes determined to be significant on a national, state, or local level. Individual cultural resources (e.g., archeological sites, structures) are located within cultural landscapes. Visible evidence of human manipulation does not need to be present for an area to be considered a significant cultural landscape. Cultural landscapes are systems where both natural elements (e.g., landform, flora, fauna) and cultural elements (e.g., patterns of circulation and spatial relationships between built elements, uses, and cultural traditions) interact. Cultural landscape resources include both physical elements present onsite (e.g., vegetation, structures, roads, and trails) and characteristic uses and functions.

Padre Island National Seashore as a whole can be thought of as a cultural landscape, with special natural areas, vegetation, visual resources, ethnographic resources, night sky visibility, relative quiet, and lack of unnatural odors all being part of the cultural landscape. These landscape elements are addressed in other sections of this document. This section focuses on the areas that have been identified thus far as significant (National Register listed or eligible) historic landscapes, namely, the three line camp areas associated with cattle ranching on the Island. Following a preliminary outline of landscape changes at Padre Island National Seashore, the line camp areas are discussed specifically, as landscape resources.

A Cultural Landscape Inventory (CLI) is the NPS tool used to determine character-defining (significant) cultural landscape resources, and is used to provide the information that can be used in a Determination of Eligibility. A CLI has not been completed at Padre Island National Seashore. Thus, the following descriptions and evaluations are preliminary, based on limited research, site visits, and discussions with park staff. Completion of the inventory may identify additional cultural landscape resources.

Overview of Landscape Changes over Time on Padre Island: Detailed descriptions of the history of human interactions with the island have been completed (e.g., Sheire, 1971) and are not repeated here. What follows is a broad overview of landscape changes within the seashore associated with different historic events and periods. While use of the seashore has varied, and while land ownership has been complex, there has been very little settlement on the seashore compared with surrounding areas outside the NPS boundary.

Pre-1519 use and seasonal occupation by the Coahuiltecans and Karankawas:
Seasonal, short-term hunting camps present (see archeology and ethnography sections). No references to large-scale landscape/vegetation modification (e.g., burning) have been found in the literature to date. The island environment was likely very similar to today's conditions, with dune, inland grasslands, wetlands, and tidal-flat areas.

1519 - 1805 - Spanish exploration and use:
Numerous shipwrecks result in ship and cargo remains washing on shore, and debris from Spanish settlements in other locations washed up on shore. Various exploring and shipwreck parties came through but no settlements were developed. The island environment was likely similar to the pre-1519 period.

1805 - 1846; Padre Nicolas Balli cattle operation:
Introduction of cattle onto the island would have resulted in some impact on and changes to island vegetation. Balli's Santa Cruz de Buena Vista Ranch was located outside the present-day seashore boundary. Other activities during this period included the 1828 Survey, and the continuation of material being washed up on shore from the Gulf.

1846 - 1879 - Mexican-American War; Americans take over the island; various cattle operations:
War-related activity had minimal impact on the landscape (e.g., Zachary-Taylor campsite). The cattle operations, now under American control, have similar types of impacts as the Balli operation.

1879 - 1920s; Dunn family cattle operation:
With larger numbers of cattle, and horses, on the island, changes to island vegetation were likely larger in scale than during the earlier period. To run the cattle operation, line camps (Novillo, Green Hill, and Black Hill) were developed, and various other modifications, such as cross-island fences and a fresh water seep tank, were developed between the line camps (see Historic Structures section). With the continuation of cattle grazing, the overall amount of vegetation on the island was reduced, resulting in more exposed sand, more active dunes, and more sand movement, and thus a greater degree of "migration" of the island's shores. Some non-native plant species (e.g., tamarisk) were introduced during this period. When large trucks were used to transport the cattle, roads to/from line camps were developed, which required breaks to be established in the foredune area. The Dunn family residence/ headquarters was located north of the present-day Seashore boundary.

1920s - 1962; Cattle operation continues; mineral exploration and extraction starts; growing interest in island as place for outdoor recreation/tourism:
Grazing-related changes to the island environment continued. Mineral activity resulted in the introduction of developments (e.g., structures, roads), the introduction of foreign materials such as oyster shells for construction, and the introduction of potential pollutant sources. Documents reviewed so far, that discuss early recreational/tourism development (e.g., that associated with Colonel Sam Robertson) do not indicate that this development occurred within the present seashore boundary.

1962 - present: Padre Island National Seashore established in 1962.
Establishment of the National Seashore formalized the preservation/recreation/education emphasis for the area. The Dunn cattle operations ran until 1971. Since then, vegetation has generally increased and dunes have stabilized to a large extent, resulting in less overall dune migration and sand movement. Recreational use has resulted in some social trails, dune blowouts, and the subsequent need for dune restoration projects. NPS developments have

been introduced at Bird Island Basin, Malaquite, North and South Beaches, and the area of the Gulf campground. NPS educational programs have resulted in more exposure to and experience of the seashore area by the general public than in previous times.

Identified Significant Cultural Landscape Resources: Cattle ranching activity on Padre Island National Seashore -- a relatively rare example of cattle ranching on a barrier island extending into recent times, which includes the Dunn family operation -- has been determined to be a historically significant activity (see also Historic Structures section for discussion of significance). While the cattle operation used the whole island, and so the historic vernacular landscape associated with the cattle operation can be thought of as including the whole island, the three line camps (Novillo, Green Hill, and Black Hill) are areas of relatively limited extent that represent key concentrated activity associated with the cattle operation, and have extant related resources. Novillo is the remaining Dunn operation line camp with the greatest degree of structural integrity and the one closest to the visitor use area at Padre Island. Green Hill and Black Hill sites are in more remote areas of the seashore, where the structural remains of the line camps are located within areas more representative of conditions during the early days of the Dunn operation (i.e., no mineral exploration activity evident, no NPS development visible). Without the active cattle operation, vegetation (mostly grasses) grow higher today than they would have when the cattle were present.

Sensitive resources in the three line camp areas consist of more than the visible structures alone. Vegetation, areas within corrals, in addition to the actual corral fencing, planted trees, roads and trails, cross-island fences, freshwater seep tanks, small-scale features such as hand pumps and hitching posts, views to and from the line camps, and the spatial arrangement of all line camp elements (characteristic of Dunn's camp configuration), are also important character-defining elements of the line camp landscapes. While the National Register form for Novillo identifies the boundary for the site as the area within the trap fences, the area to be preserved as a significant historic landscape is more accurately identified as the area within the 1,500-foot distances (see Table S.1 or 2.3). Evaluation of the Green Hill and Black Hill Line Camp landscapes has identified the areas within 2,000 feet of the outer-most corral fences north and south, and the area extending east and west to the Gulf and Laguna, as the boundaries of the historic landscapes. Evaluation has also determined that these landscapes have sufficient integrity to support the significance determination. It should be noted that the areas defined by the 1,500- and 2,000-foot distances are not "buffer" areas around the historic resources, but instead define the significant historic landscapes.

Historic Structures

The historic structures on Padre Island are the remnants of the Dunn Ranch operations. These include the Novillo, Green Hill, and Black Hill Line Camps. While the Novillo Line Camp may be the best candidate for interpretation of ranching history, the other components are integral to a whole system. The park proposes to develop a vehicle pullout and elevated boardwalk at the Novillo Line Camp to interpret the cattle ranching history in the park. Also to be included as historic structures are any extant features located in between the three line camps. These may include traces of cattle trails, freshwater seep tanks, traps, and cross-island fences that divided the island into distinct pasture areas.

The Novillo Line Camp was listed in the National Register in 1974 as an individual site. The NPS evaluated the Green and Black Hill Line Camps and recommended them as eligible for listing in the National Register in May 1998. The three sites are listed as Sensitive Resource Areas and shown on the Sensitive Resource Areas Map, Figures 3.1, 3.2, and 3.3.

The Dunn Ranch line camps are significant in the history of 19th- and 20th-century ranching in the state, and are the only remnants of ranching activity on the island. While the Novillo Line Camp was only one part of the whole Dunn ranching operation, it has the most integrity; it is the only one that still has a contained complex of buildings and corrals generally intact.

The ranching period on Padre Island extended from the turn of the century to 1971. The historic features representing this era of history include post and wire fencing, wood corrals and chutes, a bunk house, a cook house, and small features such as the water pump and hitching post installed for the last roundup. Although Patrick Dunn began the ranching operation in the 1880's, a hurricane in 1919 may have prompted the construction of the current line camp features in about 1920. Patrick's son, Burton Dunn, had the loading chutes, concrete water tanks, and a windmill added in 1948 when trucks began to be used to transport the cattle.

The extant features at Green Hill and Black Hill line camps include cross-island post and wire fences, traps, corrals, loading chutes, and remnants indicating the locations of line camp buildings. The extant features at the line camps represent the development of ranching on the island as the Dunn family adapted to technological changes. Together the three camps also illustrate the particular patterns of ranching adapted to the configuration of the barrier island.

Ethnographic Resources

National Park Service guidelines define an "ethnographic resource" as "a tangible or intangible aspect of a cultural system, past or present, that is identified as significant by a recognized ethnic group. Tangible resources include cultural resources that should be preserved primarily for their historic, technical, aesthetic, or scientific values, and other natural and material entities that should be specifically managed with awareness of their ideological, religious, or utilitarian associations with ongoing cultural practices. Intangible resources consist of cultural practices and their associated knowledge and beliefs" (NPS-28 Cultural Resources Management Guidelines, Appendix A).

The National Historic Preservation Act specifically recognizes that tangible "properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization may be determined to be eligible for the National Register" (NHPA 1966 as amended, Section 101(d)(6)(A). Most discussions of Padre Island's cultural history stress the ephemeral nature of human occupation and use from the times of pre-Spanish contact to its designation as a unit of the National Park Service (cf. National Park Service, 1971, 1974, 1996). Sheire (National Park Service 1971) and others identify successive periods of occupation and use of the island from a pre-Spanish contact period American Indian presence to Spanish occupants and Americans, including cattle ranchers, settlers, fishermen, vacationers, and finally, the National Park Service (see Cultural Landscape section for chronology). Many of these occupants are described as using the island only occasionally or seasonally, or as having permanent settlements that lasted only a few years. Other associations, however, lasted for several generations, such as those of the Balli and Dunn families -- or even centuries, such as those of the Coahuiltecans and Karankawas.

While the majority of these former occupants, users, and owners are gone, descendants of many of them retain interests in park lands in one way or another and may place particular cultural value on park resources. The importance of particular places in the perpetuation of a group's identity and cultural practices may be retained through oral tradition, even if the group has been physically separated from the place for a long time.

The federal government has specially mandated responsibilities toward American Indian interests, including but not limited to those required by the National Historic Preservation Act. For the purposes of this EIS, it was most crucial to determine if there are American Indian tribes that retain customary associations with park lands, and if so, if there are places on the island to which they may ascribe cultural significance and which require special management considerations.

American Indian Tribes: Among the cultural groups that might retain an association with park lands, the federal government has specially mandated responsibilities to the interests of American Indian tribes. The American Indian Religious Freedom Act, the National Historic Preservation Act, the Archeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, Executive Order 13007 on American Indian Sacred Sites, and other mandates, require the National Park Service to identify places of cultural significance to Indian tribes on park lands and to consult with tribal governments about management actions that may affect culturally significant resources.

Further, American Indian tribal identities are often rooted in the landscapes from which their origins derived and are intricately linked with tribal traditional history. These histories are common to the cultural group as a whole and are passed from generation to generation, making the physical places themselves an integral component of cultural continuity.

It is commonly held that the Coahuiltecan and Karankawa people whose ancestors once inhabited the island were long ago decimated by disease, conflict with other Indian tribes and non-Indians, migration, and other factors, and were absorbed into Mexican or other American Indian populations until, by the middle of the 19th-century, they became culturally extinct (cf. Campbell, 1979; Newcomb, 1979; Ricklis, 1996; National Park Service, 1971).

The Tonkawa Tribe of Oklahoma is a federally recognized tribe whose customary homeland before forced removal to Oklahoma in the mid-19th-century was the south Texas area just north of Corpus Christi to Waco, and between Austin and San Antonio. According to some accounts, the tribe retains among its membership people of Tonkawa, Lipan Apache, and Karankawa descent (Schilz, 1994). Further, the Tonkawa Tribe was recommended to the NPS by other southern plains tribes as the tribe with whom to consult regarding National Park lands in south and southwest Texas (see Chapter 1). A visit to Padre Island on May 5 and 6, 1998, by an officially designated representative of the Tonkawa tribe revealed that Padre Island is considered to be too far south of Tonkawa customary territory for the tribe to have specific concerns about potential impacts to culturally significant resources. Further, while tribal oral tradition includes references to relationships with the Karankawa people and stories about Padre Island, they, too, are too general to point to specific concerns about specific management actions. However, the tribe is concerned about the health of the island's ecosystem as a whole, and wishes to be kept informed about the oil and gas management plan as well as future park management plans in general.

Non-Indian-associated Groups: In addition to the American Indian traditional cultural values that may be placed on park lands and resources are those that may be placed on park resources by other park-associated families or communities. Descendants of the family of Padre Nicolas Balli, cattle rancher and owner of a Spanish grant to the island from 1805 to the 1846, are still living and maintain periodic correspondence with the park. Similarly, many members of the Dunn family -- cattle ranchers on the island from 1879 through the 1970's, and ongoing owners of mineral rights -- remain in the area and may attach cultural values to particular park lands and resources. Consultation with members of the Dunn family in Corpus Christi on May 6, 1998, indicated that Dunn family members retain significant family records and oral traditions about the island, and would be interested in participating in an oral history project to preserve their family history on the island in conjunction with the National Park Service.

Park User Groups: It is also possible that there are ongoing recreational uses of park lands or resources that have given significance or value to certain places by local residents and long-time park users. It is important to understand, for example, how local families have traditionally used the Malaquite area for family outings, and the values that are attached to this area for specific purposes as opposed to areas "down island." Similarly, the wind surfing community has attached a kind of "ownership" to the Bird Island Basin area, while shark fishers place similar values on areas of importance to them. Although these various park uses and the potential for areas of special significance to contemporary users have not been documented, overall, preliminary consultations with park-associated groups reveal no known ethnographic resources and no associated impacts from oil and gas activities.

VISITOR EXPERIENCE

Padre Island is known nationally and internationally for its recreation opportunities. The park provides excellent opportunities for a wide range of seashore recreation, with its stretches of undeveloped beaches, high-quality visual resources, and other significant resources. The north end of the park, from the north boundary south approximately 10 miles to the four-wheel-drive sign on the Gulf beach, is the most heavily used section.

The park is managed to retain its natural qualities and processes as a coastal barrier island. Development has followed a conservative approach. As a coastal high-hazard area, the park's management direction is to not commit the NPS to long-term economic and environmental costs of maintaining large-scale permanent facilities. Such facilities are not needed to support visitor uses, and the NPS is not required to duplicate opportunities provided elsewhere, or to accommodate all regional demand for public recreation.

Park developments are shown on Table 3.1, Landcover Classification Type in Acres and Percent of Park. Following are descriptions of visitor use areas and park developments. Figure 3.9 is a Map of Park Development. Visitor use areas including the Malaquite Visitor Center and RV Campground, Bird Island Basin, and Grasslands Nature Trail are recognized as Sensitive Resource Areas and shown on the Sensitive Resource Areas map, Figures 3.1, 3.2, and 3.3.

Malaquite Visitor Center/RV Campground

The current visitor center and concession facility was built in 1988 to replace the older pavilion structure damaged by Hurricane Allen. The visitor center serves as the focus of operations for park interpretive programs, which include roving interpretation programs during the summer months; formal programs, arranged in advance; orientation tours for new visitors; and interpretive displays. In addition to NPS interpretive facilities, a bookstore, gift shop, restrooms, auditorium, and first aid station are also available. A concessionaire, located adjacent to the visitor center, provides food, drinks, gifts, beach rentals, and other items. Near the parking lot, which has the capacity for 1,150 vehicles, are cold-water rinse-off showers. The visitor center complex also contains a boardwalk, which is handicapped-accessible, which connects the visitor center to a supervised swimming beach.

The Malaquite RV campground is a paved 40-site campground located along the primary dune ridge situated north of the Malaquite Visitor Center complex. This campground has restroom, shower facilities, and a dump station nearby, but there are no RV hook-ups available. A campfire circle, with bench seats, is located on the north end of the campground to provide evening and weekend interpretive programs.

Recreational Use Areas

Bird Island Basin: This area is one of the primary recreational use areas within the park. Approximately one-third of the park's visitors go to Bird Island Basin, on Laguna Madre, for boating, fishing, windsurfing, and camping. It is the only easily accessible developed recreation area within the park located on the Laguna Madre shore. (Yarborough Pass is accessible by boat or four-wheel-drive vehicle only.) The Bird Island Basin use area is a geographically small area, extending 2,000 feet along the shoreline and extending 40-125 feet in width, and bordered by wind-tidal flats and other valuable natural features. About 10 percent of Bird Island Basin visitors camp overnight along the shoreline, and the remaining visitors are either visitors wanting to windsurf for the day or boaters launching at the boat ramp. Of the Bird Island Basin campers, approximately 45 percent are tent campers, and 55 percent are recreational vehicle campers. During heavy use periods, Bird Island Basin receives more visitation than other areas of the park.

Boat Dock/Fish Cleaning Station and Channel at Bird Island Basin: Bird Island Basin provides an area that includes a boat ramp, parking area, fish cleaning station, and dredged channel for access to the Laguna Madre. The dredged channel was originally established to transport cattle to and from the island, and later used by the oil and gas industry for exploration and production operations on the island. Currently, this boat ramp is the southernmost launching facility available to area visitors, thereby minimizing travel times to popular Laguna Madre fishing sites.

Grasslands Nature Trail: The park has one interpretive trail, the Grasslands Nature Trail. This 3/4-mile self-guiding, unpaved nature trail and paved parking area are situated off the park road just south of, and in view of, the entrance station. This is the only designated trail for public use within the park, providing the only developed access to the interior grasslands. Signs are located at various locations along the trail to interpret the natural resources present in the dune and grassland habitats.

Padre Island National Seashore
Park Development

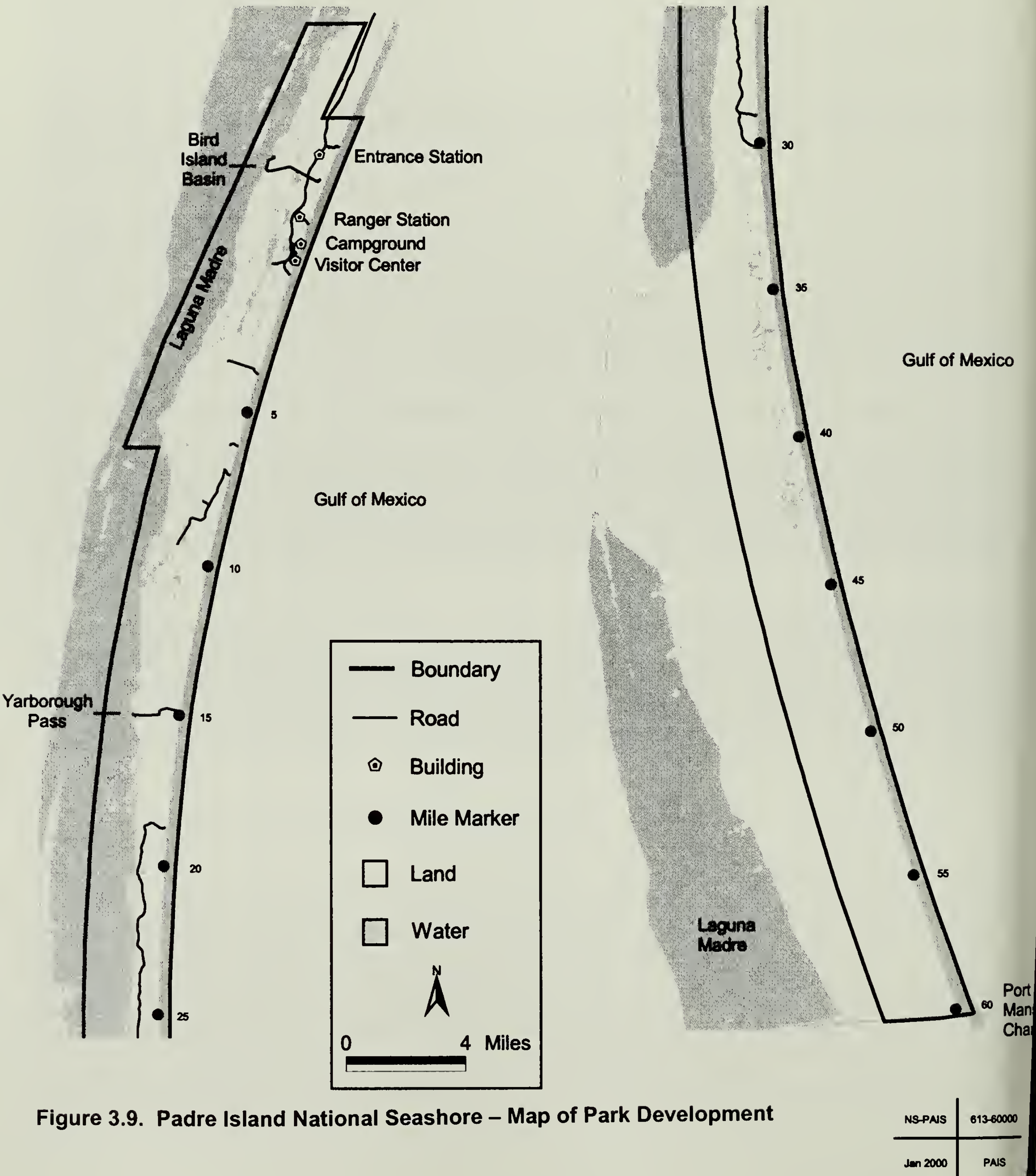


Figure 3.9. Padre Island National Seashore – Map of Park Development

Mansfield Channel: The Mansfield Channel is a popular down-island destination during the summer. Visitors set up four-wheel-drive vehicle camps and enjoy fishing and beachcombing activities.

Yarborough Pass Boat Dock/Channel: Yarborough Pass was the result of three failed attempts to establish an open pass to the Gulf of Mexico in the 1950's. There is a boat dock that was built for boat access to oil and gas wells in the Laguna Madre. This is an unimproved dirt ramp nfor launching small boats. Yarborough Pass was not established with jetties, and therefore silted in, due to the longshore currents transporting sand up and down the Texas coast. It is located 15 miles south of the Malaquite Visitor Center on South Beach. A four-wheel-drive road inland from the Gulf beach leads to Yarborough Pass, where primitive campsites are available. A boat ramp is available for launching small boats.

Gulf Beach: The beach provides the only means of getting down-island and is defined as a road in the State of Texas with all applicable road laws applying. The Gulf beach is generally 32 to 250 feet (10 to 75 meters) in width. During the summer months, sand is deposited on the beach by gentle waves and tides and the beach is characterized as depositional. Inversely, during the winter months, strong waves and high tides erode the sand, creating a narrower or erosional beach.

Visitor use is typically concentrated on the Gulf beaches, where beachcombing, swimming, wading, sunbathing, fishing, and picnicking are popular activities. Beach use is highest near the park's visitor center and campground at Malaquite Beach. However, many visitors seek a more solitary experience by utilizing less populated areas of the National Seashore. This requires relying on their own vehicles to drive down the beach. In general, use is concentrated in the northern third of the park, where driving is easiest and support facilities are available.

The park's Gulf beach is broken into three sections: North Beach, Closed Beach, and South Beach. North Beach is 1 mile in length and extends from the park's north boundary to a set of bollards marking the northern extent of Closed Beach. Driving and camping are permitted on this section of beach. Closed Beach is only a pedestrian beach and no motorized vehicles are allowed. Closed Beach extends south of North Beach for 4.5 miles to a set of bollards marking the beginning of South Beach. The campground and Malaquite Visitor Center beaches are included in the Closed Beach section. The last section, South Beach, is the longest of the beach sections. It extends for 60 miles south and can be accessed by two-wheel-drive vehicles for the first 5 miles. For the remaining 55 miles, soft sand requires that vehicles be four-wheel-drive in order to drive down island. South Beach contains two areas referred to as Little Shell and Big Shell, which are formed by currents that converge off the coast of Padre Island. As these currents converge, shells are broken into smaller and smaller fragments that become deposited on the beach. Little Shell is characterized by shell fragments about 1/2 inch wide from the four-wheel-drive sign to the 15-mile marker on South Beach and is located between the 6- and 8-mile marker on South Beach.

In contrast, Big Shell is composed of shell fragments between 1/2 and 2 inches wide and is located between the 18- and 30-mile markers. The beach profile of Big Shell changes between the summer and winter months. During the winter, the beach extends westward from the Gulf of Mexico to a berm approximately 3-5 feet in height. The summer months, with weaker wave intensity, create a berm that is 1-1/2 to 6 feet high. From the berm, the beach extends relatively flat until it reaches the foot of the primary dunes. Driving in Big Shell is slow and deliberate.

All beach sections contain various types of manmade garbage as well as natural debris such as the marine algae *Sargassum* and tropical woods. This debris can make driving hazardous.

Roads: The park road system provides a means of access for visitors and prime wildlife-viewing points. The road system includes several two-lane asphalt roads, with no improved shoulders, and unpaved roads, which are single-lane, caliche roads. The paved roads include the main road, North Beach Access road, Bird Island Basin road, campground road, and visitor center loop road. The unpaved roads include Novillo Line Camp road, a portion of the Bird Island Basin road going to the boat ramp, the ranger road, sewage lagoon roads, Yarborough Pass, and the Back Island road. Several oil and gas access roads are present and include the Pan Am road, Amoco road, and six pig facility roads. For safety reasons, all roads are accessible by visitors except the oil and gas roads, the sewage lagoon road, and the Novillo Line Camp road.

The Back Island road was created prior to the establishment of the park, and was utilized to avoid the deep ruts, bumps, and soft dry sand that is characteristic of the Big Shell area of the beach during the hot, dry months of summer. Beach conditions generally prevent a two-wheel-drive vehicle from reaching the Back Island road. Despite having a four-wheel-drive vehicle, this road is impassable if it has rained or during the times that the tides in the Laguna Madre are high.

The park road terminates just south of Malaquite Beach. From the road terminus to a point 5-1/2 miles south, the beach is hard and accessible by both two- and four-wheel-drive vehicles; beyond that point it is only accessible by four-wheel-drive vehicles.

Seasonal Visitor Use Patterns

Visitor profiles and use patterns vary greatly with the seasons, with the greatest use occurring in the spring and summer.

- **Spring.** During the months of March, April, and May, the weather becomes pleasant and the Gulf waters begin to warm, attracting higher weekend traffic and holiday crowds.

- **Summer.** The warm, sunny days of June, July, and August bring crowds of visitors to the beach for swimming and sunbathing. Schoolchildren are on vacation, and family groups make up the largest percentage of visitors. Use remains heaviest on weekends, indicative of heavy day use by residents of nearby communities. Summer evenings are hot and humid and when the Gulf breeze periodically dies away, the humidity can become stifling, and mosquitoes and flies appear. Few visitors remain overnight.

  People congregate at Malaquite Beach, where day use becomes extremely heavy. In spite of the heat, many families also use the campground. In all campsite settings, activities concentrate around that "home base," and do not radiate out much farther.

  Beach camping is also popular. Campsites may become dense immediately south of Malaquite, and have been known in previous years to fill the beach from the high-tide zone to the dune line. Interpretive programs offered in this high-density campsite setting are well attended, while programs away from this area do not draw as many visitors.

  Down-island activities also reach their peak for the year during the summer. Four-wheel drive vehicle camps are set up at Little Shell and Big Shell Beaches, and near the Mansfield Channel, where fishing and beach combing are popular activities. There is a very limited inland backcountry use.

- **Fall.** About the middle of August, park attendance drops off, even though September, October, and November are pleasant for camping and enjoying the coastal environment. Most Gulf-side use during this season occurs at Little Shell and Big Shell beaches, where fishing is more productive. With fishing interest high in late October and November, weekend visits by locals pick up, and camping on the beach increases. In the Malaquite campground, use is limited mainly to weekends during the fall. At Bird Island Basin, the most popular destination, sailboarding continues through November.

- **Winter.** In December, January, and February, the park attracts out-of-state visitors who travel from the Northern States to camp for extended periods on the beach and at Bird Island Basin. This group is made up generally of older, retired visitors who frequent the park each winter. Unlike spring and summer visitors, these winter visitors are very supportive of park interpretive programs, and have greater interest in nature walks, handicrafts, birding, photography, and hiking. Many of these people live in parks for much of the year, taking advantage of the low-cost campsites, emergency medical treatment, property protection, and entertainment, as well as a sense of community with other retired people pursuing the same way of life.

Visitor Use Statistics

Currently, the park records approximately 600,000 visitors annually (Table 3.9), with July being the busiest visitation month. It appears that Padre Island is becoming more of a regional destination. Although the 1983 Draft GMP/DCP/EA reports that only 15 percent of all visitors come from outside the Laguna Madre counties, a recent study reports that 61 percent of all visitation comes from outside the State. Even so, the great majority of use is day use. Although camping opportunities are available, less than 10 percent of all visitors stay overnight. Since 1981, tent camping has generally decreased, while recreational vehicle camping has increased; in 1990, about four times as many campers were using RVs than were camping in tents.

The total amount of visitor use at Bird Island Basin has increased more rapidly than the total visitation for the park as a whole. Over the last few years, the average increase in use at Bird Island Basin has been 35 percent, with a rate of 24-percent increase during 1992. This overall increase is due in large part to the rapidly increasing popularity of sailboarding.

Table 3.9. Yearly Visitation

Year	Annual Visitation
1991	973,825
1992	849,873
1993	768,191
1994	917,396
1995	757,617
1996	724,403
1997	657,703

Noise as a Component of Visitor Experience

Visitors come to Padre Island National Seashore for many different reasons. Surveys have been completed of down-island visitors (Ditton and Gramann, 1987) and visitors at Bird Island Basin (Gramann, 1989). Both surveys examined visitor motive for coming to Padre Island National Seashore, and the top motives included "to be outdoors," "to get away," "for relaxation and rest," "to be with friends," "to feel alive, alert, and active," "for excitement," and "to experience peace and quiet," (1989 survey). The 1987 survey found similar motives, with "to be outdoors" and "for relaxation and rest" as the top two reasons for visiting Padre Island.

The natural quiet of Padre Island National Seashore contributes heavily to a positive visitor experience and is a direct or indirect component of many of the top motives reported for park visitors. Therefore, noise was evaluated as an important component of visitor experience purposes.

Background noise measurements were taken at various locations on Padre Island National Seashore. A useful measure of background sounds is when the sound level exceeded 90 percent of the time, abbreviated L90. A standard measurement for sound is dBA, which stands for A-weighted decibels. Table 3.10 contains L90s obtained in January and March 1998. Comparisons of park sound levels to other natural and manmade sounds, including certain oil and gas operations are shown in Figure 3.10.

Table 3.10. Ambient L90 Sound Levels

Location	L90, dBA
Bird Island Basin boat ramp	30
Bird Island Basin wind surfing area	45
Grasslands Nature Trail	38
Malaquite Beach	59
North Beach	61-62
Pan Am Road (back-island)	44
South Beach	62-63
Malaquite Visitor Center	48-51

The potential effects of noise on visitor experience in the highly-used SRA visitor use areas (Malaquite Beach and campground, Bird Island Basin, Grasslands Nature Trail) was one of the main reasons for establishing 1,500-foot buffers as part of the SRAs under the various alternatives. The buffer widths were derived partly by using information about drilling rig noise levels from the Sound Level Comparison Chart in Figure 3.10, and assuming that the noise at sensitive areas should be kept as close as possible to ambient sound levels.

Visitor Perception of Oil and Gas Operations

There has been relatively little input received from visitors to Padre Island National Seashore on the existing oil and gas operations and their effect on visitor experience at the park. The 1987 survey of down-island users (Ditton and Gramann, 1987) included questions about perceived sources of beach debris. The survey results showed that the offshore oil platforms and rigs were perceived by many visitors to be the greatest source of beach litter. This is actually not the case, according to a 10-year marine debris project recently conducted by the park (Miller, Baker, and Echols, 1995). However, the 1987 survey did conclude that the public perceives oil and debris on the beach as a pervasive problem that adversely affects their visitor experience. Regarding noise impacts, there have been a few complaints about oil and gas operations registered (one written, one verbal, and several during seismic operations) over the years. Noise from oil and gas operations is an important consideration near high visitor use areas, as previously discussed.

No other specific survey information is available regarding visitor expectations about the oil and gas operations, but the reasons reported by visitors for coming to the park are primarily focused on the "outdoor, natural, rest and relaxation" motives. The extent to which the presence of oil and gas operations could limit visitor experience of the outdoors and relaxation is dependent on the visitor, the location of the operations in the park, and operational conditions. In general, however, it is recognized that viewing or experiencing oil and gas operations is not one of the primary reasons visitors come to Padre Island National Seashore, so that potential impacts should be mitigated whenever possible.

Figure 3.10. Sound Level Comparison Chart[1]

How it Feels	Equivalent Sounds	Decibels	Sound Levels at Various Locations in Padre Island National Seashore
Very loud	Air compressor @ 20 ft. Garbage trucks and City buses	100	
Conversation stops	Power lawnmower		
	Diesel truck @ 25 ft.		
Intolerable for phone use		90	
	Steady flow of freeway traffic 10 HP outboard motor Garbage disposal		
	Near drilling rig Automatic dishwasher Muffled jet ski @ 50 ft. Vacuum cleaner	80	
	Drilling rig @ 200 ft.	70	
	Window air conditioner outside @ 2 ft.		South Beach
			North Beach
	Window air conditioner in room	60	Malaquite Beach
	Normal conversation		
		50	Malaquite Visitor Center
	Quiet home in evening Drilling rig @ 800 ft.		Bird Island Basin - wind-surfing area
	Bird calls		PanAm Road (back-island)
	Drilling rig @ 1500 ft.	40	
	Library		Grasslands Nature Trail
	Soft whisper		
		30	Bird Island Basin boat ramp
	In a quiet house at midnight		
	Leaves rustling	20	

[1]Modified from Final Environmental Impact Statement, Miccosukee 3-1 Exploratory Well, Broward County, Florida, 1994, U.S. Department of the Interior.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the effects, or potential impacts, on the physical, biological, and cultural environment from implementation of the proposed action and alternatives considered in this EIS. The topics discussed are the same as those addressed in Chapter 3:

Activity that may be affected by the resource protection measures under the various alternatives:

- Oil and Gas Exploration and Development

Important resources and values for Padre Island that may be affected by oil and gas operations:

- Air Quality
- Soils and Water Resources
- Floodplains
- Vegetation
- Wetlands
- Fish and Wildlife
- Threatened and Endangered Species and Their Habitats
- Cultural Resources
- Visitor Experience

The other issues that were considered and evaluated, but not carried forward for more detailed analysis, are described in the last portion of Chapter 1. Reasons are provided as to why those issues were not analyzed in more detail, given the nature of the park, the proposed development, and/or the mitigation required under Current Legal and Policy Requirements.

Use of the Reasonably Foreseeable Development (RFD) Concept

It is important to understand the purpose for which the Reasonably Foreseeable Development Scenario (RFD) was developed. The purpose of the RFD is to test the site-specific effectiveness of mitigation measures (including operating standards, no-surface occupancy restrictions, and seasonal/time restrictions), and to provide the basis to compare alternatives and address cumulative effects.

The RFD theorizes that initially six exploratory wells would be drilled, of which two would be dry-holes and immediately plugged and abandoned. Of the remaining four wells, one exploratory well would produce one field, while the remaining three exploratory wells would be augmented with two additional wells each, to produce three other fields. Therefore, out of a total of 12 wells, 10 would be placed in production to produce 80 BCF over the next 30 years. Rather than try to choose which of the six RFD exploratory wells would be dry holes and which would be the single producer of a field, the interdisciplinary team assumed that all six RFD exploratory wells would be fully developed, and evaluated the potential for environmental impacts based on 18 producing wells. Further, the interdisciplinary team assumed that the 18 wells would be dispersed in six locations along the length of the island, and in all landcover classification types.

The projected surface disturbance of the theoretical RFD for 18 wells, with associated access roads, drilling and production pads, and pipelines is approximately 250 acres or 0.2 percent of the park. Projected surface disturbance associated with parkwide 3-D seismic exploration is estimated at 748 acres, or 0.88 percent of the terrestrial park land. It should be noted that no surface-disturbing activities would result directly from the management decisions made from this document. Any future nonfederal oil and gas operations causing surface disturbance would require further environmental analysis, in accordance with NEPA, prior to their authorization. Therefore, no approval of any access and surface use is being made through this analysis.

Under Alternatives A and C, restrictions that would be applied to Sensitive Resource Areas could potentially result in not all the wells identified in the RFD being drilled. Some locations would be precluded from occupancy by the application of a No Surface Occupancy Stipulation (Alternative A), or the area would be precluded from surface access (Alternative C). In using this analytical approach, it is assumed that if a particular location cannot be occupied, the operator would make exploration investments at locations outside the SRA but still within the park, or at locations adjacent to the SRA but outside the park to access subsurface locations under the SRA. Where the SRA is large, however, such as the Laguna Madre and wind-tidal flats, the RFD scenario could be reduced.

Impact Significance Criteria

Criteria are defined for each issue discussed in this chapter and are used to establish the threshold or magnitude at which an impact could be considered significant or major, thus warranting special attention such as additional mitigation or possibly triggering EIS requirements. Future nonfederal oil and gas operations that meet or exceed one or more of the major impact criteria described in this chapter might trigger the requirement for preparing an EIS, instead of an EA, to accompany the Plan of Operations. These criteria are derived from government regulatory standards, available scientific documentation, previously prepared environmental documents, and the professional judgment of resource specialists.

Organization of Impact Discussions

This chapter is organized by issue, the same as Chapter 3. Discussions may vary in format from issue to issue, but most proceed as follows: For each issue, there is an Introduction section that provides a brief overview. Criteria for determining major adverse impacts are identified. A discussion of general effects that could be attributed to nonfederal oil and gas activities follows. Potential consequences associated with oil and gas development are discussed without reference to any particular location. The projected amount of acreage disturbed per well or for seismic exploration is presented in Chapter 2. These numbers have been used for impact analysis. This is in recognition that activity could take place at any location, unless under Current Legal and Policy Requirements (for all alternatives) or under Sensitive Resource Area (SRA) restrictions (for Alternatives A and C), that activity is controlled or precluded. The following analysis takes into consideration the Current Legal and Policy Requirements that could avoid or reduce impacts as discussed in Chapter 2, and the specific protection measures for SRAs included in Plan Alternatives A and C, also discussed in Chapter 2.

For most resource topics, impact analyses are discussed in terms of standard types/phases of nonfederal oil and gas operations. These include geophysical exploration (3-D seismic surveys), construction activities, exploratory drilling, production operations, flowlines and pipelines, and plugging/abandonment/reclamation. Where appropriate, impacts are described in terms of increasing degrees of severity, i.e., negligible, minor, moderate, or major. Long-term impacts are projected to occur for 15 years or longer. Short-term impacts generally range from 1 to 3 years in duration.

This chapter also includes a comparative analysis of the proposed action and alternatives and analysis pertaining to the following topics:

- Cumulative Impacts;
- Relationship Between Local Short-term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity;
- Irreversible or Irretrievable Commitments of Resources; and,
- Unavoidable Adverse Impacts That Cannot be Avoided Should the Action be Implemented.

IMPACTS TO OIL AND GAS EXPLORATION AND DEVELOPMENT

Introduction

Impacts to oil and gas exploration and development are addressed as an important impact topic, because the oil and gas mineral rights are a nonfederal property interest, and there is the potential for controversy.

The effects for each of the alternatives on oil and gas exploration and development are expected to be primarily economic and limited to oil and gas operations in the park and persons or entities owning minerals underneath the park.

Impact Significance Criteria

Impacts to oil and gas exploration and development would be considered significant or major if they substantially impaired an owner's or lessee's right of access to the mineral estate, such that the owner or lessee would be effectively and economically precluded from developing the resource.

Impacts to Oil and Gas Exploration and Development Common to All Alternatives

Operating costs would be higher inside the park than in other areas because Congress mandated the park to be managed to minimize adverse environmental impacts. Increased costs to operators would be incurred to prepare Plans of Operations, implement extra resource protection measures for operations utilizing methods least damaging to park resources and values, reclaim sites to higher standards, and secure performance bonds.

The increased cost of operating inside the park could influence an operator's interest in bidding for State-owned mineral leases in the park. This cost, along with the availability of information about remaining reserves, would determine if a lease is economically prospective to pursue.

Operators would need to incorporate into their planning schedule NPS processing time to approve a Plan of Operations. The standard processing period for the NPS to approve a plan is 3 to 4 months. The NPS processing time could be integrated and run concurrently with other federal and state regulatory and permitting requirements; therefore the NPS processing time is not expected to result in unusual delays for operators.

Geological potential, logistical issues, and royalty rates are a few primary factors that determine whether a mineral tract would be explored and developed. Environmental constraints can affect oil and gas exploration and development decisions when comparing like properties. Where properties are subject to additional operating costs, they may be more difficult to lease (or may receive a lower bid price). Regulatory requirements are only one in a myriad of factors influencing decisions to explore for and develop oil and gas.

Conclusion

- Nonfederal oil and gas exploration and development costs would be higher inside the National Seashore than for similar properties outside its boundaries. Operators would experience additional costs to prepare Plans of Operations, to secure a performance bond, to implement resource protection measures, and to reclaim sites. The immediate and long-term effects could include lost production opportunities, increased costs of exploration and production, and a loss in royalties which could have a minor to moderate adverse impact on mineral owners, lessees, and operators.

- Operators would need to plan for the increased processing time to prepare and approve a NPS Plan of Operations. The increased processing time is not expected to cause lengthy delays for the operator.

- Mineral owners may find it more difficult to lease (or may receive a lower price for) properties with unproven or marginal oil and gas reserves, or properties burdened with extra environmental constraints.

- If the requirement to prepare a Plan of Operations is waived for directionally drilling from a surface location outside the park to a bottomhole target inside the park, operations could commence sooner than if they were conducted within the boundaries of the National Seashore. Drilling costs and operating time would increase for directionally drilled wells. These increased costs could result in a minor, adverse, financial impact on mineral owners and/or lessees but could be offset by reduced compliance and mitigation measures that are required inside the National Seashore.

Impacts to Oil and Gas Exploration and Development under Alternative A, Proposed Action

Under the Proposed Action, Alternative A, there could be increased costs for operators to design operations to avoid or reduce impacts to SRAs. In particular, directional drilling of exploratory wells or installing pipelines under SRAs may need to be used where No Surface Occupancy or No Surface Disturbance is specified. However, the SRA restriction for drilling affects relatively small areas (e.g., in the Laguna Madre and wind-tidal flats, drilling is not prohibited, but production must be located on upland locations). Also, the Gulf beach is very narrow and can be accessed via directional drilling.

Therefore, the maximum offset for directionally drilling exploratory wells is not expected to exceed 2,500 feet, and is not expected to preclude drilling or pipeline construction.

Cost savings are expected to be derived by operators in their preparation of a Plan of Operations as a result of having a planning framework available to them that identifies SRAs and operating standards. With an understanding of the regulatory framework, and through adequate planning, environmental impacts may be identified early so that project design provides for avoiding impacts or appropriate mitigation, thereby avoiding costly revision of Plans of Operations.

Under Alternative A, Proposed Action, implementation of this oil and gas management plan is expected to benefit operators by providing clearer direction and reducing confusion. The result would be fewer occurrences of unnecessary expenditures or time delays during the permitting process.

Efficiencies are expected to be gained in the timeliness of Plan of Operations preparation and approval. Operators would be able to more efficiently prepare Plans of Operations because surface resources and values especially sensitive to potential disturbance from oil and gas activities are identified as SRAs; and a defined regulatory framework and operating standards are provided to facilitate operators in their planning efforts to design operations and prepare Plans of Operations. For the NPS, the identification of SRAs and operating standards are expected to guide the NPS's management of oil and gas activities in a comprehensive and consistent manner so that it meets its primary objective to ensure that oil and gas activities are uniformly conducted to minimize damage to park resources and values.

Under Alternative A, geophysical exploration may occur under Current Legal and Policy Requirements in all areas of the park, with some restrictions for specific, small SRAs and some seasonal or specific locational restrictions.

Under Alternative A, all oil and gas would be accessible, and the Reasonably Foreseeable Development scenario is expected to be attainable.

Cumulative Impacts to Oil and Gas Exploration and Development under Alternative A, Proposed Action

Under Alternative A, all oil and gas reserves would be accessible for exploration and development; the level of oil and gas activity is not expected to change appreciably from past and current levels. As new discoveries are made and developed, older operations would move from production to reclamation. Thus, there are no anticipated cumulative impacts on oil and gas exploration and development under Alternative A, the Proposed Action.

Conclusion

- NPS anticipates that costs and time associated with preparing and approving Plans of Operations under Alternative A would be less than Alternative B, No-Action/Current Management, because the O&GMP would allow operators to know in advance specific locations in the park where access would likely be denied or severely restricted.

- Current Legal and Policy Requirements would allow for almost full geophysical characterization of the oil and gas prospects of the park. In some SRAs, resource protection and timing restrictions would limit some or all surface uses for geophysical exploration activities.

- All oil and gas reserves beneath the park would be accessible for extraction, although costs could be higher due to surface restrictions applied to Sensitive Resource Areas. This could have a minor to moderate adverse impact on mineral owners, operators, or lessees.

Impacts to Oil and Gas Exploration and Development under Alternative B, No-Action/Current Management

Under Alternative B, No-Action/Current Management, all areas of the park would be accessible for oil and gas exploration and development under Current Legal and Policy Requirements.

Identification of sensitive resource areas and development of appropriate operating standards would be made on a case-by-case basis, necessitating more consultations with park and other NPS resource specialists. This process would increase the time for operators to prepare a Plan of Operations. Interpretation and application of Current Legal and Policy Requirements on a case-by-case basis could result in a higher frequency of inconsistent interpretations; time delays as a result of consulting with resource specialists in other NPS offices outside the park, when technical specialists are not available in the park; and confusion, which would likely translate into increased costs in time and effort by the operator to prepare a Plan of Operations, increased operating costs, and delay in obtaining NPS approval of a Plan of Operations.

In some situations, directional drilling of exploratory wells or pipelines under an identified sensitive area may need to be used where the project-specific decision is to not allow surface occupancy or surface disturbances. Directional drilling offsets could exceed 2,000 feet.

Under Alternative B, No-Action/Current Management, lack of a clear regulatory framework, which would include identification of Sensitive Resource Areas and applicable operating standards, reduces the ability for the operator or the NPS to prepare and process Plans of Operations efficiently. The result would be increased occurrences of unnecessary expenditures, frustration, and time delays during the permitting process. There would be a higher potential for the NPS to modify or reject plans, resulting in a minor to moderate adverse impact to the owner/operator.

Under Alternative B, No-Action/Current Management, all oil and gas reserves beneath the park would be accessible for full geophysical characterization and development. All areas of the park could be explored using existing geophysical surveying technology. Operators would need to design surveys to minimize or avoid surface disturbance in any sensitive resource area identified during project planning. Drilling could occur in any area of the park, although directional drilling may be necessary to reach some bottomhole targets.

Cumulative Impacts to Oil and Gas Exploration and Development under Alternative B, No-Action/Current Management

Under Alternative B, all oil and gas reserves would be accessible for exploration and development; the level of oil and gas activity would not be expected to change appreciably from past and current levels. As new discoveries are made and developed, older operations would move from production to reclamation. Thus, there are no anticipated cumulative impacts on oil and gas exploration and development under Alternative B.

Conclusion

- The NPS anticipates that time requirements would be greater than for Alternative A or C, because the lack of a plan would not allow operators to know in advance the specific locations in the park where access would likely be denied or severely restricted. Inconsistencies are possible without a plan and this could cause frustration, longer negotiations, and unanticipated denials, resulting in a minor to moderate adverse impact to the owner/operators or lessees.

- Full geophysical characterization of the oil and gas prospects of the park would be allowed.

- All oil and gas reserves beneath the park would be accessible for extraction.

Impacts to Oil and Gas Exploration and Development under Alternative C, Maximum Resource Protection in all SRAs

Under Alternative C, all SRAs would be closed to surface activity associated with the conduct of oil and gas operations. The impact of such a closure on the costs associated with exploration and development of oil and gas would largely depend on the geographical extent of a particular SRA.

Under Alternative C, operators would need to design operations to avoid surface access in SRAs. No Surface Access in SRAs that have a relatively small geographical extent, such as relict live oak mottes and freshwater ponds, would result in minimal increased costs to explore for and develop oil and gas. Operators could likely meet exploration and development goals by designing operations to avoid these areas so that no additional costs are incurred.

Prohibiting oil and gas surface activity in larger SRAs, particularly the Laguna Madre and wind-tidal flats on the leeward margin of the island, would likely preclude an operator's use of exploration tools, such as seismic data acquisition, to develop drilling prospects beneath these areas. Operators could still use well and geophysical data existing at the time this Oil and Gas Management Plan/EIS is implemented for defining potential drilling prospects located beneath SRAs. If there is no existing data, there could be a moderate to major adverse impact to owner/operators attempting to develop prospects in these areas.

In terms of exploratory drilling and production, operators could use directional-drilling techniques from surface locations outside SRAs to reach most bottomhole targets beneath SRAs that have restrictions on drilling. The costs associated with directional drilling are appreciably higher than a vertical well, particularly as the offset extends beyond 2,500 feet. The NPS recognizes that some potential bottomhole targets may be technologically inaccessible. Therefore, under Alternative C, a portion of acreage beneath larger SRAs may be effectively unavailable for oil and gas development, and the potential exists for a portion of the RFD scenario to not be attainable. This would represent a major impact to owners/operators.

Under Alternative C, Maximum Resource Protection in all SRAs, implementation of this Oil and Gas Management Plan/EIS is expected to benefit operators by providing clearer direction and reducing confusion. The result would be fewer occurrences of unnecessary expenditures or time delays during the permitting process.

Efficiencies are expected to be gained in timeliness of Plan of Operations preparation and approval. Operators would be able to prepare Plans of Operations more efficiently because surface resources and values especially sensitive to potential disturbance from oil and gas activities are identified as SRAs; and a defined regulatory framework and general operating standards are provided to help operators in their planning efforts to design operations and prepare Plans of Operations. For the NPS, the identification of SRAs and specific operating standards are expected to facilitate the NPS's management of oil and gas activities in a comprehensive and consistent manner so that it meets its primary objective to ensure that oil and gas activities are uniformly conducted to minimize damage to park resources and values.

Cumulative Impacts to Oil and Gas Exploration and Development under Alternative C, Maximum Resource Protection in all SRAs

Under Alternative C, there would be a potential reduction in the acreage available for oil and gas exploration and development, primarily in seagrass beds and wind-tidal flats. A potential reduction in available acreage for exploration and production may lower the estimate of recoverable oil and gas reserves in the park. Because the presence or absence of commercial quantities of oil or gas in any specific area is highly speculative, any estimates of final impact to the oil and gas owners and operators would be largely conjectural.

Conclusion

- NPS anticipates that, similar to Alternative A, costs and time associated with preparing and approving Plans of Operations under Alternative C would be less than Alternative B, No-Action/Current Management, because the O&GMP would allow operators to know in advance specific locations in the park where access would likely be denied.

- No Surface Access to the 68,731 acres of SRAs would preclude these areas from geophysical exploration. While operators could use existing well and geophysical data available at the time this plan is implemented, the inability to conduct newer 3-D seismic surveys is likely to interfere with full characterization of the oil and gas prospects underlying these areas of the park and could result in moderate to major adverse impacts.

- Some oil and gas reserves beneath the park may not be accessible for extraction because a small portion of the Laguna Madre and wind-tidal flats may not be accessible by directional drilling. If commercial quantities of oil and gas occur within this area, these oil and gas reserves beneath the park would not be accessible for extraction, resulting in a moderate to major adverse impact to owner/operators or lessees.

IMPACTS TO AIR QUALITY

Introduction

Padre Island National Seashore is designated as a Class II area under the provisions of the Clean Air Act. Nonfederal oil and gas activities could affect air quality in the park or region, and air quality is an important component of the park's environmental character.

Impact Significance Criteria

The following criteria were used to determine the intensity of impacts to air quality that could result from project implementation. Impacts to air quality could be considered significant or major if:

- The accidental emission of H_2S, sulfur dioxide, or other harmful compounds occurred in sufficient concentrations and duration to affect the health and safety of workers at the site, or visitors in the vicinity.

- The emission of pollutants from any activities associated with the construction and operations from the proposed project exceeded any applicable significance emissions or ambient concentration threshold values set by the EPA PSD permitting rules, the Texas Natural Resources Conservation Commission Nonattainment rules or volatile organic compound (VOC) emissions, or any Ambient Air Quality Standard established by the TNRCC.

Impacts to Air Quality Common to All Alternatives

Geophysical Exploration (3-D Seismic Surveys): Geophysical exploration activities would affect air quality primarily because of vehicle use and drilling of shot-holes. Some fugitive dust may be present during shot-hole drilling and vehicular use off paved roads. Smoke from internal combustion engines, as well as emissions of sulfur dioxide, nitrogen dioxide, carbon monoxide, and hydrocarbons, would cause air quality impacts. These impacts would be temporary and site-specific, since geophysical activities are relatively short-lived (weeks or months).

Construction Activities: Particulate matter emissions (vehicle exhaust and dust) would be greatest during construction activities associated with building roads,wellpads, production pads, and flowlines/pipelines due to the higher number of vehicles and earthmoving activities. These impacts would be temporary and site-specific, since construction activities are relative short-lived (weeks or months).

Exploratory Drilling: Exploratory drilling activities would introduce, during the continuous operation of combustion engines over a 30 to 90-day drilling period, emissions of nitrogen oxides (NO_x), carbon oxides (CO_x), and sulfur oxides (SO_x). Large diesel engines which are used to power the drill rigs, pumps, and auxiliary equipment emit nitrogen oxide compounds (NOx) as primary pollutants of concern. These are formed in the high temperature, pressure, and excess-air environment of combustion diesel engines. Less amounts of carbon monoxide (CO) and hydrocarbons are also emitted. Some sulfur dioxide is emitted due to the burning of gasoline and diesel (which can contain minor amounts of sulfur). The amount of engine emissions depends on drilling rig size (horsepower), gallons of diesel fuel burned per hour, the hours per day, and number of days the diesel rigs operate. Additional impacts could occur from thick, black smoke due to well fires. Blowout preventers and contingency procedures could be used to mitigate these impacts. As a result of increased particulate emissions, visibility may be slightly impaired locally during construction and drilling.

There is a low probability for encountering hydrogen sulfide (H_2S) bearing zones during exploratory drilling operations. Hydrogen sulfide presents a serious air quality concern because it is extremely toxic at very small concentrations. Hydrogen sulfide also could contribute to metal fatigue in drilling equipment. Hydrogen sulfide is not expected to be encountered in the park, based on information from previous drilling operations.

If zones containing gas or fluids under pressure is encountered, the drilling mud system is adjusted to seal these zones. Drilling is discontinued until the pressure is stabilized and there is essentially no gas entering the hole. The small amount of gas that could reach the surface is vented from the system by use of a de-gasser unit and flared (burned). In this way, the H_2S is converted to sulfur dioxide (SO_2), thereby reducing health risks. Drilling and producing operations of hydrocarbons containing toxic gases can be performed safely and without incident if the necessary precautions are taken and appropriate safety procedures are followed.

Because an exploratory drilling operation lasts for only one to three months, impacts to air quality from emission of pollutants would be localized and short-term.

Production Operations: Emissions associated with production are usually considerably less than the emissions from well drilling. The amount of air pollution generated over the life of a gas or oil well depends on the characteristics of the product and the production practices used.Wells which do not produce hydrogen sulfide in the oil, natural gas, or associated gas products are less likely to cause air pollution than wells which do produce hydrogen sulfides. Oil and gas production activities would release gaseous pollutants such as carbon monoxide, hydrocarbons, nitrogen oxides, and sulphur oxides. These air pollutants would be released by separation facilities, disposal of liquid waste and unwanted gas, burning of waste petroleum products, routine emission of objectionable odors, and venting of noxious vapors from storage tanks.

Proper maintenance of gasoline and diesel-fueled engines could minimize exhaust emissions. Pollution control devices, such as catalytic converters, should be used on exhaust gas to reduce carbon monoxide emissions. Inspection and maintenance of wellsite equipment such as flares and treater facilities is necessary to ensure that deteriorated components and equipment are detected and replaced or repaired.

Flowlines and Pipelines: Construction of flowlines and pipelines would increase particulate matter emissions due to the higher number of vehicles and earthmoving activities. These impacts would be temporary and site-specific, since construction activities are relative short-lived (weeks or months). Greater use of motor vehicles would increase particulate matter from vehicle exhaust and dust from unpaved roads. Exhaust from machinery used during construction would also contribute to an increase in particulate matter. Combustion engine emissions from drilling activities include nitrogen oxides, carbon oxides, and sulfur oxides. As a result of increased particulate emissions, visibility may be slightly impaired locally during construction and drilling.

Since flowlines and pipelines would be on or close to the surface, a leak could adversely affect air quality. Escaping hydrocarbons and other materials in the pipeline would enter the atmosphere. In the vicinity of the leak, concentrations of gas and other constituents could present health hazards to animal and plant life. In addition, this could provide a source for explosion or fire. These impacts, while possibly major on a very local level, are expected to be short term and would be corrected once the leak was discovered, reducing impacts to minor or moderate levels.

Reactions between hydrocarbons and nitrogen oxide would produce ozone. Ozone, nitrogen dioxide, and sulfur dioxide are toxic to plants. While the concentrations of all these pollutants would increase as the fields are developed, the levels are predicted to be low and should be within federal standards. The extent of impacts caused by increases in pollutants is expected to be limited to areas in close proximity to each well. Human health and vegetation are not expected to be affected.

Plugging/Abandonment/Reclamation: Plugging, abandonment and reclamation activities would affect air quality by increasing particulate matter (PM) emissions during site construction activities. Earth-moving equipment and activities would increase vehicle exhaust and dust. These impacts would be temporary and site-specific, since abandonment and reclamation operations are relatively short-lived (weeks or months).

Conclusion

- Impacts to the Class II air quality of Padre Island National Seashore are expected to be negligible to moderate and localized where oil and gas operations exist or may occur in the future. The duration of impacts would depend on the type of operation proposed.

- Emissions of particulate matter (PM) would increase as a result of earthmoving activities from site construction, vehicle exhaust from use of vehicles during all types of operations, dust from traffic on unpaved roads, combustion of diesel-powered equipment, and the oil and gas itself. Increased particulate matter would cause slight impairment of visibility within localized areas of activity. Mitigation measures including road watering could prevent or minimize release of dust and suspended particulates from vehicle traffic and construction activities. Burning of vegetation, construction debris or site-produced wastes would not be allowed, and fire prevention and suppression equipment would be provided by the operator on site.

- Exploratory drilling activities would introduce emissions of nitrogen oxides (NO_x), carbon oxides (CO_x), and sulfur oxides (SO_x) during the continuous drilling activities of a 30 to 90-day period as a result of operating large diesel engines which power the drill rigs, pumps and auxiliary equipment. Precautions such as use of blow-out preventers should preclude the occurrence of major impacts resulting from well drilling.

- Emissions from production operations would be considerably less than during drilling activities, however, over the long life associated with production operations, emissions from production could exceed drilling operations. Emissions from production operations include release of gaseous pollutants such as carbon monoxide (CO), hydrocarbons, nitrogen oxides (NOx), and sulfur oxides (SOx) as a result of operating separation facilities, disposal of liquid waste and unwanted gas, burning of waste petroleum products, routine emission of objectionable odors, and venting of noxious vapors from storage tanks.

- Odor annoyance would be an effect of drilling and production activities, particularly if visitor uses or wildlife are affected.

- Emission of hydrocarbons from routine operations or leaks and spills could react with nitrogen oxide to produce ozone. Ozone, nitrogen dioxide, and sulfur dioxide are toxic to

- Emission of hydrocarbons from routine operations or leaks and spills could react with nitrogen oxide to produce ozone. Ozone, nitrogen dioxide, and sulfur dioxide are toxic to plants. Impacts are expected to be limited to areas in close proximity to each well. No significant impact to human health and vegetation are expected.

- In the future, impacts to air quality would be evaluated in project-specific plans of operations. Depending on the location and type of operations, mitigation could be required to meetNPS standards or PSD permitting under the State Implementation Plan.

Impacts to Air Quality under Alternative A, Proposed Action

The impacts expected under Alternative A would be similar to those described under Impacts to Air Quality Common to All Alternatives, except there would be fewer opportunities and occurrences of even short-term, minor impacts in SRAs from certain operations. In some SRAs, any surface disturbances would be prohibited, limiting particulate and other emissions. In other SRAs (e.g., Laguna Madre and wind-tidal flats), no production would be permitted. Indirect impacts could occur in SRAs if oil and gas operations are conducted on adjacent lands, but, again, these impacts are not expected to be major in any case.

Cumulative Impacts to Air Quality under Alternative A, Proposed Action

Cumulative impacts to air quality are expected to be negligible and within federal standards.

Conclusion

- Padre Island National Seashore has good natural wind dispersion. The prevailing southeasterly winds would carry contaminants away from the park, minimizing the potential for developing concentrations in excess of any applicable standards (Ambient and PSD standards and increments). Therefore, no major impacts to air quality would be expected from any oil and gas operations.

Impacts to Air Quality under Alternative B, No-Action/Current Management

The impacts expected under Alternative B would be as described under Impacts to Air Quality Common to All Alternatives, with no difference in the probability of location of impacts, except for restrictions found in Current Legal and Policy Requirements. In all cases, mitigation required by these requirements would result in minor to moderate impacts at most.

Cumulative Impacts to Air Quality under Alternative B, No-Action/Current Management

Cumulative impacts to air quality would be the same as described for Alternative A.

Conclusion

- Impacts would be the same as described for Alternative A, but with more opportunities for impacts to occur within SRAs.

Impacts to Air Quality under Alternative C, Maximum Resource Protection in all SRAs

Under the alternative, there would be less possibility of any air quality impacts, even minor ones, in SRAs and, as described previously, impacts in general would be expected to be localized and minor to moderate in nature.

Cumulative Impacts to Air Quality under Alternative C, Maximum Resource Protection in all SRAs

Cumulative impacts to air quality would be the same as described for Alternative A.

Conclusion

- Impacts would be the same as described for Alternative A, but with fewer opportunities for even minor impacts to occur within SRAs.

IMPACTS TO SOILS AND WATER RESOURCES

Introduction

The soils and water resources at Padre Island National Seashore are highly susceptible to impacts from oil and gas activities. Several incidents of hydrocarbon and heavy metals contamination resulting from oil and gas operations in the past have resulted in remediation that has been costly and controversial. Therefore, soils and water resources were selected as issues for analysis in this chapter.

Impact Significance Criteria

Impacts to soils and water resources that could result from project implementation would be considered significant or major if:

- The introduction of toxic contaminants into the soils and/or sediment groups would, in any way, endanger the biota of the park and contaminate its subsurface aquifers.

- The artificial manipulation of soils would result in their long-term removal, compaction, and erosion, so as to lessen their ability to support biota and alter their capacity to foster effective drainage.

- Exploration, drilling, production, and abandonment actions would contaminate either surface or subsurface waters.

Impacts to Soils and Water Resources Common to All Alternatives

The impacts of oil and gas exploration and development on soils and surface and subsurface waters that are common to all alternatives are summarized here, and discussed under specific topics below.

Impacts to soils and water resources could directly impact up to 250 acres or 0.2 percent of the park for construction of access roads, exploratory drilling and production pads, and pipelines. An additional 748 acres (0.88 percent of the terrestrial parklands) could be impacted by seismic operations. Careful siting and culverting would minimize impacts to soils and water resources. Most impacts would be minor and short-term because, as some operations are developed, other surface disturbances would be reclaimed; therefore, only a portion of the total estimated acreage is expected to experience impacts on soil and water resources over the long term. Long-term impacts associated with production pads and pipelines could last for the life of operations -- for 20 years or more.

Leaks and spills of contaminating and hazardous substances are the most serious impact identified. Spills are expected to be localized to access routes, well and production pads, and flowline/pipeline operations areas. Prompt identification of the type and extent of contamination, and timely removal and disposal to a State-approved facility is expected to result in no major impact on soils and water resources. Any contaminated soils removed would be required to be replaced with compatible soils from outside the park.

Over the long term, reclamation of oil and gas operations are expected to result in no major impact to soils and water resources.

Geophysical Exploration (3-D Seismic Surveys): The primary impacts from seismic operations on soils would result from off-road vehicle use. Vehicles are used in seismic operations to transport survey crews, to transport water for drilling shot holes, for carrying vehicle-mounted equipment for drilling shot holes, and transporting geophones and cables. Vehicles could compact and kill plants, resulting in increased soil exposure, which would allow for increased soil erosion. Vehicles could cause soil compaction, and thereby reduce the soil's water-holding and infiltration capacities. Soil compaction would reduce vegetation's root-penetration capabilities and therefore hinder plant growth and subsequent soil formation. Compacted soils increase runoff of surface waters. Increased runoff could then accelerate soil erosion. Vehicles could also cause deep rutting of soils if operations are conducted when soils are wet, which would also contribute to erosion and increased runoff through vehicle-made channels. The anticipated area of direct impact to soils is approximately 748 acres, or 0.88 percent of the park's land base.

The use of smaller, light-weight, or other low-impact vehicles would minimize these vehicular-caused impacts by reducing and distributing weight. A one-pass method, in which all vehicles travel in one direction, could also reduce vehicular impacts to soils.

Seismic crews' access to inland areas from the coast can either be over the foredunes, by creating trails over them, or by using existing roads. New road cuts through the foredunes could increase the erosion rate of the foredunes, particularly if steep unstable slopes are cut. Cuts through the foredunes would cause a loss of subsurface water from the dune area by providing a continuous depression (perpendicular to the coast) from which dune subsurface water can seep. Increased soil erosion could increase total dissolved solids in surface waters, reducing water quality.

Seismic operations are anticipated to have minor effects on subsurface water quantity or quality. Seismic shot holes drilled to as deep as 100 feet in which 2 to 10-pound explosive charges are detonated could introduce small quantities of drilling fluids, most likely water. Any contamination of groundwater would be localized to very near the shot hole. Because the shot holes are small, 3 to 4 inches in diameter, and spaced approximately 220 feet apart, contamination of groundwater from shot hole drilling fluids is not expected to appreciably change water chemistry.

The NPS does not anticipate adverse impacts from seismic blasting on the Beaumont Clay Unit that underlies sea water upon which the shallow unconfined aquifer of northern Padre Island is perched; therefore, seismic operations are not expected to impact the quantity or quality of the shallow perched freshwater aquifer.

Construction Activities: Under all alternatives, construction of roads, drill pads, production pads, and flowlines and pipelines would disturb soils and potentially impact surface water quality and circulation.

Primary impacts to soils from oil and gas construction operations would be clearing of vegetation, exposing soils to erosion, and then compacting and introducing nonnative fill materials to construct elevated access roads and exploratory drilling or production pads. These impacts would be localized to areas where access roads, wells, and production facilities are proposed, up to 250 acres or 0.2 percent of the park. Elevated pads for exploratory and production operations may disturb as much as 2 to 5 acres of soil and associated vegetation per site. Compaction of back-island wind-tidal flats would require careful re-engineering to reclaim the soil horizon at the right elevation to ensure inundation by waters necessary to support algal growth.

If there are no existing roads into the area, they would have to be constructed. If access to a drilling site is from the Gulf beach, a road cut through the foredunes could accelerate erosion of the foredunes and provide an avenue for the seepage of subsurface waters. A 20-foot-wide road constructed of caliche or shell material, 1 mile in length, would disturb 2.42 acres of soil and vegetation. This would increase to 5.71 acres if it includes shoulders and turnouts.

Improperly constructed roads could adversely affect the direction of flow of both surface and subsurface waters (including surface water flow generated by hurricane and tropical storm-related activities). This could result in either directing water toward or away from wetland areas, and may be responsible for drying up some of them; however, impacts would not be major if roads are carefully sited and culverted.

Negligible, short-term impacts to surface water quality are expected, resulting from increased total suspended solids during construction activities.

Exploratory Drilling: In addition to construction activities, another primary impact to soils and water resources is the potential for releases of contaminating and hazardous substances used in the drilling process and diesel fuel used to support drilling operations.

The composition of the mud system depends on the types of formations being drilled, economics, water availability, pressure, temperature, and many other factors. Mud can be as simple as freshwater, or a complex emulsion of water, oil, chemicals, clays, and weighting material. Chemical additives such as alkalies, bactericides, soluble chromates, and corrosion inhibitors are often used to adapt mud properties to conditions encountered while drilling. Weighting material is often added to prevent formation fluids from flowing into the well as it is being drilled. Mud systems can be highly toxic or relatively benign.

Drilling muds and diesel fuel could be spilled during drilling operations, contaminating soil and groundwater in the vicinity of the spill. Contamination of groundwater by drilling operations would be localized because the potential sources of pollution are short-lived. Primary and secondary containment systems on a drill pad should avoid the release of drilling muds and other hazardous and contaminating substances into the environment. The drilling mud circulating system would be completely containerized in tanks. A totally containerized system stores the cuttings and waste fluids in tanks. Use of blow-out preventers should prevent blow-outs from occurring.

It is not expected that drilling operations would encounter formations with high pressures and associated strong fluid flows of oil, gas, brine, or fresh water. There is also very little possibility for encountering hydrogen-sulfide-gas-bearing zones during exploratory drilling operations. However, in the event that these zones or high pressures are encountered, the drilling mud system and standard safety procedures are expected to prevent release or blow-outs.

Production Operations: A successful exploratory well would lead to the drilling of additional wells to develop the field. The development of the field may involve building storage tanks, separation and treatment facilities (to separate gas and water from oil), burying pipelines, and drilling injection wells. Directional drilling from existing pads may decrease the necessity of developing a large number of new well sites.

The most serious impact to soil and water resources from production operations would be from leaks and spills of oil and gas, and other hazardous and contaminating substances. Because longevity of production operations could last for 20 years or longer, the potential for leaks and spills from production operations is greater than for any other type of oil and gas operations. Even small leaks and spills, over an extended time, could become a major impact and costly to remediate. Windblown saltwater from the Gulf contributes to a highly corrosive environment that corrodes oil and gas facilities and equipment, which could result in leaks and spills. Routine monitoring by operators and the NPS, to promptly identify and correct potential problems that could lead to leaks and spills, is expected to avoid or minimize such incidents.

Leaks and spills of contaminating substances are the singular most important impact that persists over time and can increase in toxicity or spread over distance through various pathways if left untreated. At three existing or abandoned oil and gas operations sites at Padre Island, contamination by heavy metals, produced water, and/or hydrocarbons has occurred, and persists. Impacts at these sites are to soil, surface waters, and the perched aquifer. In all three cases, the NPS is working with responsible operators who are diligent to characterize and remediate the contaminants, and the operators are committed to remediate the contaminants to meet NPS objectives. The NPS would require prompt and appropriate remediation of all hazardous and contaminating substances that are leaked or spilled as a result of oil and gas operations.

Padre Island has 15 threatened and endangered species, including birds and sea turtles, and has important habitat for many other waterfowl and fishery resources that could be recipients of these contaminants through soil and surface and groundwater pathways.

Casing failure due to faulty installation or corrosion of the casing by strong brine solutions could result in impacts to groundwater as a result of leakage of hydrocarbons and/or brine from one formation into a freshwater aquifer. This could result in the contamination of the aquifer. Threats to groundwater from casing leaks are more likely to occur during the long-term production life of the well. Underground casing leaks may go undetected for years.

Fresh and salt waters are produced during production activities, sometimes in large quantities. They can contain solids and oil particles. Their release through leaks and spills from corroded flowlines and storage tanks, and through transfer to a tank truck could contaminate soils and water resources.

Pipelines from production facilities can rupture due to corrosion of the pipe or failure of a flange, valve, or seal. The escaping fluids could contaminate soils and surface and subsurface waters. Rupturing can be responsible for igniting fires. In addition to oil and gas, other substances like brine, treating chemicals, and acidizing or fracturing fluids could leak from production equipment and flow lines.

An alternative to the pipeline transportation of fluids from well sites to storage tanks or the refinery is to transport them by tanker trucks. This method has a greater potential for leaks and spills during transfer of fluids to the tanker, in addition to the potential for vehicular accidents in which the tank contents could be spilled.

In the event of leaks and spills, primary and secondary containment systems required under the Current Legal and Policy Requirements, in Chapter 2, are expected to prevent oil and gas, and other contaminating and hazardous substances to escape into the environment and contact soil or water. In these events, operators are required to promptly remove and dispose of released oil and gas, and contaminants and hazardous substances at a State-approved facility. Depending on the type of contaminant and size of the spill, the NPS may require the operator to perform site characterization pursuant to NPS Guideline for the Detection and Quantification of Contamination for Oil and Gas Operations (Appendix F). Depending on these results, the NPS may also require the operator to design appropriate remediation techniques. By using mitigation techniques and response actions described in Chapter 2, Part II, Current Legal and Policy Requirements, major impacts to soils and water resources are not expected to occur from future oil and gas operations.

The potential for subsidence as a result of withdrawing large quantities of fluids from the pore spaces of the productive formations was considered; however, the NPS does not anticipate that the potential withdrawal of 80 BCF from an estimated 18 wells over a 30-year period would result in the subsidence of areas of Padre Island.

The potential for encountering hydrogen sulfide during production operations was also considered. As discussed under exploratory drilling, Padre Island is not known as a hydrogen sulfide area.

Flowlines and Pipelines: A primary impact to soils and water resources from flowlines and pipelines is the long-term potential for releases of oil and gas, and other contaminating and hazardous substances transported in flowlines and pipelines. By using mitigation techniques and response actions described in Chapter 2, Part II, Current Legal and Policy Requirements, major impacts to soil and water resources as a result of flowline/pipeline ruptures and spills are not expected to occur from future oil and gas operations.

Plugging/Abandonment/Reclamation: There are various stages involved in the abandonment of a well. They involve plugging the well, removing equipment and supplies, and removing road and pad fill materials. Each of these activities can impact soils and surface and subsurface waters.

The abandonment of a well could result in its being improperly plugged. This could lead to the contamination of the unconfined aquifer. Improper removal of contaminated equipment, toxic supplies, and toxic materials produced during production activities could result in the contamination of soils and subsurface waters. Incorrectly removing road and pad fill could result in the erosion of soils and disruption of surface drainage patterns.

Under the Current Legal and Policy Requirements, in Chapter 2, an operator is required to provide a description, schedule, and estimation of reclamation for the type of operations proposed. NPS review and approval of the plan and subsequent monitoring of plugging/abandonment/reclamation operations is expected to ensure that soils and water resources at the operations site are returned to their pre-impact condition. In the event that an operator does not comply with the conditions of the permit and approved Plan of Operations, the NPS has the option of attaching the operator's performance bond and overseeing plugging/abandonment/reclamation operations under a contract with private contractors. Therefore, future oil and gas operations are not expected to result in major impacts to soils or water resources.

Conclusion

- A parkwide 3-D seismic survey would impact soils on 748 acres. Effects to soils include erosion, compaction, rutting and contamination. Impacts would be short-term and negligible if mitigation techniques under Current Legal and Policy Requirements are used. Primary measures include avoiding vehicle use on saturated soils, or using light weight vehicles to minimize rutting and damage to vegetative cover.

- Water quality could experience short-term impacts from 3-D seismic activities. These effects are expected to be minor with the application of equipment requirements, access restrictions, and monitoring of compliance with the plan of operations, and particularly the standard 500-foot offset from waterways (36 CFR 9.41(a)). If exemptions are given to permit access for seismic activities in waterways, turbidity could increase as a result of foot and/or vehicle/boat traffic, vibrations from detonation of explosives inshotholes, and use of airguns. Seismic activities are expected to have minor effects on groundwater quantity or quality.

- Constructing access roads, pads, flowlines and pipelines for up to 18 wells under the RFD scenario could directly effect soils on 250 acres or 0.2 percent of the National Seashore. These activities would result in clearing of vegetative cover, exposing soils to erosion, and compacting and introducing nonnative fill materials. Increased soil erosion could increase sediment loads in nearby surface waters, and disrupt natural surface flow patterns. Careful siting to locate in the least-damaging area and proper number and placement of culverts would allow natural surface flow patterns to continue with minimal impedance. The standard 500-foot offset from waterways would reduce impacts to water quality. Short-term impacts to soils and water resources could range from moderate to significant depending on the size, location and spacing between drillpads. Production of up to 18 wells would have long-term impacts to soils and adjacent water bodies, lasting 20 years or longer. As some operations are developed, however, others would be reclaimed; therefore, only a portion of the estimated 250 acres is expected to impact soils and water resources over the long-term.

- A primary impact to soils and water resources from drilling and production operations could result from a release of oil and gas, and contaminating or hazardous substances. Current

Legal and Policy Requirements call for stringent operational measures to minimize the potential for any spilled or leaked pollutants to be released into the environment. These include using the least contaminating substances, primary and secondary containment, automatic shut-off valves, and storing sufficient spill response equipment and materials on location to effectively respond in the event of a spill. In the event of a release, prompt response to remove or neutralize contaminants would follow a Spill Notification and Response Plan contained in the operator's plan of operations.

- Within 6 months of of properly plugging the well, the operations area would be reclaimed to natural topographic contours to conform to natural drainage patterns, predisturbance soil chemistry reestablished, and 70% initial native vegetative cover achieved to control soil erosion.

- Contamination of soils at 3 sites from previous oil and gas activity persists. Until cleanup is successfully completed, these impacts would persist.

Impacts to Soils and Water Resources under Alternative A, Proposed Action

The designation of SRAs, and establishment of special restrictions and operating standards prescribed under this Alternative would provide consistent protection of soils and water resources in SRAs from future nonfederal oil and gas operations.

Seismic surveys would be allowed in nearly all areas of Padre Island under Current Legal and Policy Requirements, except that specific restrictions would be prescribed for SRAs; e.g., no surface disturbance would be permitted in foredunes (shotholes would not be permitted in the primary dune line), and no surface disturbance would be permitted within 500 feet of three permanent freshwater ponds or the two relict live oak mottes, or within the Mansfield Cut Archeological District. Impacts from seismic operations on soils and water resources are anticipated to be short-term and negligible due to use of Current Legal and Policy Requirements (Chapter 2) and specific protection provided to SRAs.

SRAs would experience little or no impacts to soils and water resources as a result of drilling, production, or pipeline operations, because specific protection provided by the No Surface Occupancy restriction precludes access roads, on-site drilling, or production, except that some oil and gas activities may be permitted if they meet the least damaging method. Where No-Surface Occupancy is applied to SRAs, targeted drilling sites under SRAs could be reached by directional drilling techniques from outside SRAs, which is expected to have no impact on soils or water resources within the SRAs. Seven existing pipelines cross under three SRAs (Novillo and Black Hill Line Camps, and seagrass beds). The continuing operation of these pipelines is not expected to have impacts to soil or water resources, unless there is a leak or spill. Over the long- term, these pipelines would be purged and filled with nitrogen and left in place; therefore, there should be no, or only negligible, long-term impacts to soils and water resources in these SRAs.

Cumulative Impacts to Soils and Water Resources under Alternative A, Proposed Action

Existing heavy metals and hydrocarbon contamination at several abandoned and existing oil and gas operations have impacted soils and water resources. While contaminated areas are localized in small geographic areas, these contaminants can spread via various pathways, including surface and groundwater, or biologic pathways such as foodchains. Therefore, the cumulative impact to soils and water resources under Alternative A is considered a major impact until the contaminants are removed.

Conclusion

- Formal designation of SRAs, and application of specific protection would provide consistent protection of soils and water resources in Sensitive Resource Areas from future nonfederal oil and gas operations.

- As a result of the specific protection provided to SRAs, direct and indirect impacts to soils and water resources in SRAs are avoided or reduced. As a result, minor to moderate impacts to soils and water resources are expected in SRAs.

Impacts to Soils and Water Resources under Alternative B, No-Action/Current Management

Under Alternative B, basic minimum protection to soils and water resources would be provided by applying Current Legal and Policy Requirements to oil and gas operations proposed in all areas of the park. No special protection would be prescribed for any SRAs in advance. Under this alternative, SRAs could experience impacts to soils and water resources, if appropriate identification of a sensitive resource area and avoidance or mitigation techniques are not applied, possibly resulting in minor to moderate impacts.

More time would be needed for park staff to identify concerns about impacts to soils and water resources, and additional time would be required to review and consult with resource specialists and to develop project-specific mitigation techniques. Additional time and identification of project-specific mitigation measures, particularly related to protecting sensitive resources, would increase the time to process plans and could possibly incur increased costs for operators if modifications to the plan based on redesign of proposed operations are necessary.

Cumulative Impacts to Soils and Water Resources under Alternative B, No-Action/Current Management

Cumulative impacts to soils and water resources would be the same as described for Alternative A.

Conclusion

- SRAs are not formally designated; therefore, all areas of the National Seashore receive standard protection under Current Legal and Policy Requirements. Soils and water resources in localized areas where oil and gas operations are conducted could experience impacts of minor to possibly moderate levels, ranging from short- to long-term.

- Alternative B, No-Action/Current Management, would provide the minimum protection to soils and water resources by applying basic federal laws and regulations and NPS policies on a project-by-project basis, through which project-specific mitigation measures would be applied. This management strategy could be time-consuming. Impacts to soils and water resources could include impacts to soils and water resources in SRAs; however, no major impacts are anticipated.

Impacts to Soils and Water Resources under Alternative C, Maximum Resource Protection in All SRAs

Under Alternative C, no surface access would be permitted in any SRA for oil and gas operations, including the stipulation that no surface access would be permitted for seismic operations in any SRA. In all other areas of the park, oil and gas operations may be permitted under Current Legal and Policy Requirements.

SRAs are afforded maximum resource protection under this alternative. As a result, environmental quality of SRAs would be maintained, and there would be no adverse impacts to soils and water resources in any SRA as a result of permitting future oil and gas operations under the RFD scenario.

Impacts to soils and water resources could affect up to 250 acres or 0.2 percent of the park and an additional 748 acres affected by seismic surveys, but no soils or water resources in SRAs would be affected.

Cumulative Impacts to Soils and Water Resources under Alternative C, Maximum Resource Protection in All SRAs

Cumulative impacts to soils and water resources would be the same as described for Alternative A.

Conclusion

- Under Alternative C, all SRAs receive maximum resource protection by applying a No Surface Access restriction on all oil and gas operations, including seismic. Therefore, under this alternative, impacts to soils and water resources would not occur within SRAs.

IMPACTS TO FLOODPLAINS

Introduction

As described in Chapter 3, most of Padre Island National Seashore lies within the 100-year floodplain, with the exception of the high dune ridges along the Gulf beach. Siting oil and gas operations, including access roads, drill pads, flowlines and pipelines, could be permitted in floodplains, if there are no other practicable alternatives. The foredunes and washover channels, which play important roles in the island's flooding characteristics, are recognized as SRAs. For these reasons, potential adverse effects to floodplains is an important topic for this EIS.

Impact Significance Criteria

Impacts to floodplains would be considered significant or major if:

- Development or activities would require the long-term occupancy and/or modification of regulatory floodplains that result in alterations in floodplain conditions to the degree that they cannot be restored to their natural floodplain values at the completion of operations.

- Locating oil and gas operations and activities in a regulatory floodplain would increase risk to life and property which cannot be adequately mitigated by design or taking appropriate hazard-reduction actions during flooding conditions.

Impacts to Floodplains Common to All Alternatives

Floodplains on Padre Island would experience the same effects described above under the description of Impacts to Soils and Water Resources, including loss of vegetation and habitat acreage from well-pad construction, and ancillary facilities; deterioration in water quality from increased soil erosion and sedimentation; and changes to surface drainage regimes. These impacts may include the disruption of hydrologic functions and impairment of the biological components associated with these areas.

A serious consequence of siting drilling or production operations in floodplains is the potential for releases of oil and gas, and contaminating or hazardous substances that are typically used and stored on drilling and production pads. Such a release during a flood would increase flood hazards. Siting of drilling or production operations in a floodplain could also increase hazards to the oil and gas operator's workers and contractors, park staff, and park visitors in the event of a flood.

The NPS Floodplain Management Guidelines, Special Directive 93-4, would usually avoid or minimize the potential impacts to floodplains. The special directive, described in Chapter 2, Part II, requires NPS and operator compliance with the Special Directive for Floodplain Management. The intent of the directive is to recognize and protect beneficial floodplain values and to avoid long-term surface occupancy in floodplains, and to minimize impacts when there is no practicable alternative to locating developments or activities in a regulatory floodplain. The directive requires operators to avoid or minimize developments and activities, and storage of hazardous or contaminating substances within 100- and 500-year floodplains that could result in increasing flood hazards and reducing the beneficial value of floodplains. However, surface occupancy would be permitted for limited phases of operations in which there is no other practicable alternative, and where floodplain values can be maintained and surface quality is fully reclaimable. Since it is almost impossible to avoid siting facilities in a floodplain on Padre Island, the minimization of impacts required by this directive is very important.

The environmental analysis conducted at the Plan of Operations development stage would identify the least damaging locations for siting roads, flowlines, drill pads, and production operations and would identify the least damaging methods for conducting operations. An example of a least-damaging method for placement of flowlines and drillpads in regulatory floodplains include such precautionary measures as automatic shut-off valves on flowlines that cross wetland sites, berm and liner installation at storage tank locations, and increasing tank battery berm capacity to reduce the risk of breaching berms during high precipitation vents. Please refer to Current Legal and Policy Requirements, Chapter 2, Part II, for further discussion of preventative measures that pertain to protecting floodplain values.

The approach of hurricanes and flooding events provide the park and operators sufficient time to take the reasonable actions at oil and gas facilities necessary to avoid or reduce the potential impacts of flooding or hurricanes, such as securing storage tanks, removing product from tanks and replacing with water, shutting-in wells, and removing excess containers of contaminating and hazardous chemicals. Therefore, no major adverse impact to floodplain values is anticipated from implementing any of the alternatives.

Protection of foredunes as SRAs would help to prevent back-island flooding. Washover channels, which are also SRAs, could be formed or modified by flooding.

Conclusion

- Siting of oil and gas operations or activities would be permitted in regulatory floodplains only when there is no other practicable alternative, under NPS Floodplain Management Guidelines.

- When there is no practicable alternative to siting in a floodplain, selection of the least-damaging floodplain location and utilization of mitigation measures would result in minor to moderate floodplains impacts. Requirements for mitigation would result in no increase in flood hazards and no appreciable loss of beneficial floodplain values.

- Leaks and spills of oil and gas, and contaminating or hazardous substances in floodplains could increase flood hazards. Impacts could range from minor to moderate, depending on the type and amount of substance released, flood conditions, and the methods and speed in accomplishing cleanup. If the requirements of the NPS under Current Legal and Policy Requirements are met, there should be no major adverse impacts.

- At the completion of operations, reclamation of the site would restore floodplain values and functions.

Impacts to Floodplains under Alternative A, Proposed Action

Under the proposed alternative, the foredunes of Padre Island would be afforded additional protection as SRAs, including prohibition of drilling shotholes in the primary dune line and no surface disturbance (except roads of the proposed location is least damaging to park resources). Impacts would be limited and all precautions taken, per the Current Legal and Policy Requirements. No major adverse impacts would be expected.

Cumulative Impacts to Floodplains under Alternative A, Proposed Action

No major adverse cumulative impacts to floodplains are anticipated as a result of future oil and gas operations through application of NPS Floodplain Management Special Directive 93-4 and the SRA designations for foredunes and washover channels.

Conclusion

- Formal designation of foredunes and washover channels as SRAs under this alternative would help to protect floodplain values, because of the specific provisions provided to these areas, such as No Surface Disturbance for drilling and production operations.

Impacts to Floodplains under Alternative B, No-Action/Current Management

Under this alternative, impacts to floodplains would still be limited to minor to moderate impacts, if all Current Legal and Policy Requirements are followed. Without the SRA designation forforedune and washover channels, there is more of a possibility that disruption in these areas could cause more floodplain damage; however, in general, impacts would be as described under Impacts Common to All Alternatives.

Cumulative Impacts to Floodplains under Alternative B, No-Action/Current Management

No major adverse impacts to floodplains are anticipated as a result of future oil and gas operations through application of the NPS Floodplain Management Special Directive 93-4 and environmental oversight of park staff.

Conclusion

- Although there is a greater possibility of disruption to foredunes and/or washover channels under Alternative B, it is still expected that impacts to floodplains would be limited to minor to moderate adverse effects, given adherence to Current Legal and Policy Requirements and NPS Floodplain directives.

Impacts to Floodplains under Alternative C, Maximum Resource Protection in All SRAs

Under this alternative, foredunes and washover channels would be subject to No Surface Access restrictions and floodplains would receive maximum protection by this stipulation. Therefore, there would be no major adverse impacts to floodplain values under Alternative C.

Cumulative Impacts to Floodplains under Alternative C, Maximum Resource Protection in All SRAs

No major adverse impacts to floodplains are anticipated as a result of future oil and gas operations through formal designation of SRAs and associated floodplain protection measures.

Conclusion

- There would be no major adverse impacts to floodplain values under Alternative C as a result of the No Surface Access provision applied to all oil and gas operations and activities in SRAs and the selected floodplain siting and use restrictions under NPS directives and policies.

IMPACTS TO VEGETATION

Introduction

At Padre Island, upland vegetation includes that of dunes, low coastal sands, marsh, salty sands, and shoregrass flats plant communities. No protected plant species have been identified and are not believed to be present at Padre Island National Seashore. Impacts to vegetation from oil and gas exploration and development are important to analyze because of the potential for loss of habitat, erosion control, and visually pleasing cover as a result of clearing and construction of well-pads, roads, pipelines and ancillary facilities.

Impact Significance Criteria

Impacts to vegetation resources associated with implementation of the proposed action or alternatives would be considered significant or major if:

- Reclamation of disturbed areas would not attain an adequate cover of vegetation to stabilize the disturbed site to pre-disturbance conditions; or attain a species composition to support pre-existing land uses including wildlife habitat within 18-36 months afterrevegetation.

- Operations could spread or encourage the growth of exotic species.

- Contamination from blowouts, spills, or other accidents would necessitate long term remedial efforts to achieve revegetation standards.

- Any vegetation designated as an SRA would be adversely affected.

Impacts to Vegetation Common to All Alternatives

Vegetation holds and traps blowing sand which prevents erosion, as well as provides food and habitat for park wildlife. All surface disturbing activities have the potential to have adverse impacts to vegetation resources. Oil and gas exploration usually creates varying amounts of surface disturbance, depending on the size of the project and the length of time involved. Construction of drilling pads and roads would be the leading cause of disturbance to vegetation, followed by seismic activities and pipeline construction.

Geophysical Exploration (3-D Seismic Surveys): Impacts from seismic surveys would depend on the type of survey done, the equipment and vehicles used, and the season of the year. It is expected that all future surveys in Padre Island National Seashore would utilize 3-D seismic technology and follow the current legal and policy requirements in their Plans of Operations.

Impacts to vegetation resulting from a parkwide 3-D seismic survey operation could directly affect up to 748 acres (0.88 percent of the terrestrial parkland). Selecting a time to conduct seismic operations when soils are not saturated, and employing low-impact off-road vehicles and equipment, would minimize the areal extent and degree of surface disturbances. Using a one-way method for vehicles drilling seismic shot holes, and similarly for the transecting line of vehicles laying geophones, would minimize damage to and loss of vegetation. Studies conducted in the park concluded that there was no permanent damage to the vegetation of any plant community impacted by multi-track vehicles used for previous 2-D seismic survey operations using similar mitigation techniques (Drawe 1988, Drawe and Ortega 1996). Any surface disturbance greater than 1 inch resulting from seismic operations would be recontoured and seeded with native plant species to result in short-term return of native vegetative cover.

The amount of time impacts from the seismic survey are visible would be most dependent upon the amount of normal precipitation that occurs. Vegetative recovery is dependent on rainfall frequency and amount. Reclamation activities undertaken during a period of normal precipitation is expected to result in reclamation of disturbed areas to near pre-impact conditions within 1 to 3 years.

Construction Activities: Direct loss of upland vegetation as a result of clearing, contouring, and construction for the 18 RFD wells, with associated roads, flowlines and pipelines, and other ancillary facilities, could effect approximately 250 acres or 0.2 percent of the park. Area of ground disturbance would depend on the well depth and the size of equipment required to drill and the terrain. Other factors that would determine the amount of vegetative clearing would be the distance of access roads needing to be constructed to access the drill pad, whether existing pads or disturbed areas could be utulized, the need to locate production facilities at a separate location from the well, and the need for flowlines and pipelines to transport products. Construction activities and drilling operations would be considered short-term, lasting a few to 6 months. However, if the well is placed in production, pads and roads could create long-term impacts for up to 20-30 years until the site is abandoned and reclaimed.

Exploratory Drilling: Access routes and drill site construction requires approximately 30 days and would depend upon the location of the well. The time needed to drill to total depth, testing, and completion of the well would require approximately 30 to 45 days. If the exploratory well shows signs of being productive, the anticipated longevity of operations would be determined by the economic life of the well. If a dry hole is reached, the operation would be complete within 25-30 days. Successful exploratory wells could result in the reduction in size of the drill pad for the production phase, thereby reclaiming some of the pad to original contours and vegetative cover.

There is a potential for leaks and spills of oil and gas, and other contaminating and hazardous substances to affect site or off-site soil and groundwater and associated vegetation.

Production Operations: If the exploratory well is placed in production, subsequent impacts to vegetation would be contingent on whether production would be integrated on the drill pad or if product would be transported by flowline to a shared or separate production facility. If production facilities are placed at the well location, a portion of the drill pad would be reclaimed; however, if a production facility is shared, a greater area of the drill pad could be reclaimed sooner. This may be offset, however, by clearing of vegetation and trenching for placement of a pipeline to a shared production facility.

Production operations, due to their potential long-term presence, could present a long-term potential for leaks and spills of oil and gas, and other contaminating and hazardous substances to affect site or off-site soil and water/groundwater and associated vegetation. Herbicides used to control site vegetation could drift or migrate off-site, causing damage to nontarget vegetation on adjacent areas.

Although drilling and production operations cannot avoid clearing of vegetation, there are mitigation measures under current legal and policy requirements that could minimize long-term effects. These include using already disturbed areas (including existing pads) for well pad sites, using existing access roads, and using closed loop drilling fluid systems and/or tanks to hold cutting and fluid which are then disposed off site. In addition, indirect impacts from leaks and spills could be limited by using automatic shutdown, blowout preventers, drip pans, berms, liners, clean-up plans and equipment, and regular flowline testing. Vegetation control plans should be part of every Plan of Operations, and use of herbicides to keep vegetation off the site should be limited and/or restricted to those that would not drift or migrate offsite. If these mitigation measures are implemented, and sensitive vegetation communities are avoided, impacts from drilling and production would be reduced to minor or moderate levels at worse.

Flowlines and Pipelines: Product from wells would be transported by flowlines and possibly pipeline. Pipeline construction would require varying amounts of vegetation disturbance depending on the size and length of the pipeline. Reclamation of disturbed areas would minimize impacts from pipeline construction. If disturbed areas are properly prepared and seeded with native vegetation, reclamation would further reduce impacts. Routine maintenance and use of corrosion detection and prevention methods such as cathodic protection would minimize the potential for pipeline leaks or ruptures which could contaminate soils and water, and kill vegetation. On abandonment, pipelines would be flushed of product, filled with nitrogen, sealed, and left in place; therefore, only limited additional surface disturbance and negligible impacts to vegetation would be expected from abandonment of pipelines.

Plugging/Abandonment/Reclamation: Pad and road construction would include the harvesting and stockpiling of vegetation from proposed sites to be used as mulch and seedbank for revegetation. The removal and storage of topsoil is unnecessary because the island consists primarily of sand. Any organic matter that may be contained in the sand would be leached out by rain over a period of time. During plugging/abandonment/reclamation phase of operations, sites are reclaimed by removing any contaminated soil or materials, grading the site to natural contours, adding topsoil, seeding with a selected mix of native vegetation, and possibly planting grasses and shrubs. Reclamation would begin immediately upon finding that an exploratory well is a dry hole. Within 6 months of plugging a producing well, reclamation and revegetation of the operations area would begin. Reclamation activities are expected to be completed within 120 days, weather permitting. The success of vegetative recovery would be measured when 70 percent of cover with pre-impact species and diversity is attained.

Conclusion

- Direct impacts to vegetation from parkwide 3-D seismic surveys would effect up to 748 acres (if only uplands vegetation communities are impacted). These impacts would be short-term and could range from minor to moderate. Surveys performed when soils are not saturated, and employing low-impact off-road vehicles and equipment, and a one-way pass method, would minimize damage to and loss of vegetation. The amount of time impacts from the seismic survey are visible would be most dependent upon rainfall frequency and amount.

Reclamation activities undertaken during a period of normal precipitation is expected to result in reclamation of disturbed areas to near pre-impact conditions within 1 to 3 years.

- Direct impacts to vegetation from oil and gas drilling and production could affect up to 250 acres under the RFD scenario (if only uplands vegetation communities are impacted). Impacts associated with producing wells would be long term, lasting 20-30 years. Indirect impacts could occur to vegetation communities located near well sites; however, with appropriate mitigation under current legal and policy requirements, none of the impacts are expected to be major.

- Impacts to vegetation are anticipated to be corrected through reclamation by recontouring to natural grade and reseeding with native vegetation, using reserved seed source material taken from the site. Attainment of 70 percent native vegetative cover is expected within 1 to 3 years with normal precipitation, and no major adverse impacts are therefore expected.

Impacts to Vegetation under Alternative A, Proposed Action

The clearing of vegetation due to construction of access roads, drill pads, production and associated facilities, and pipelines is anticipated to impact anywhere from an estimated 113 acres, or 0.08 percent of the total area of Padre Island National Seashore, up to 250 acres or 0.2 percent of the park, if only uplands vegetation is developed and not wetlands communities.

Under this alternative, the two relict live oak mottes would be designated as SRAs, and there would be no surface disturbance within 500 feet of the mottes. There would also be no surface disturbance of the foredune community, except roads may be permitted if they meet the least damaging method of access. In this case, a road cut through the foredunes would need to be orientated in such a way that prevailing winds cannot create blowouts.

Cumulative Impacts to Vegetation under Alternative A, Proposed Action

The clearing of vegetation expected is relatively small. Also, reclamation requirements would result in restoration of the affected communities in a relatively short-time period, since the replacement time for most Padre Island vegetation averages 1 to 3 years. Therefore, no adverse cumulative impacts are expected under this alternative.

Conclusion

- The designation of the foredune community and the live oak mottes as SRAs would result in no adverse impacts to these sensitive vegetation types.

Impacts to Vegetation under Alternative B, No-Action/Current Management

The total amount of surface disturbance would be the same as under Alternative A. Under this alternative, protection of the relict live oak mottes and foredunes would not be provided for under the protection of designated SRAs. If these areas were not excluded from disturbance by the Plan of

Operations/EA, there could be major adverse impacts. However, it is expected that these areas could be avoided under most plans of operations.

Cumulative Impacts to Vegetation under Alternative B, No-Action/Current Management

Cumulative impacts would be the same as described under Alternative A.

Conclusion

- With recognition of the live oak mottes and foredunes as areas to be avoided during Plan of Operations development, there should be no major adverse impacts to vegetation under this alternative. If these areas are not given adequate protection, major adverse impacts could result.

Impacts to Vegetation under Alternative C, Maximum Resource Protection in all SRAs

Under this alternative, there would be no new cuts through theforedunes for access roads, and relict oak mottes would be protected by restricting access for all types of nonfederal oil and gas operations. Impacts to other areas of vegetation could actually increase in comparison to Alternatives A and B. Not permitting any new cuts through theforedunes for roads could result in nonfederal oil and gas operations relying on existing cuts and access roads through theforedunes, which would increase traffic through existing cuts and on existing roads. Road extensions would need to be constructed to access remote areas, or new access roads could be developed on the western side of the park. This would result in the development of access road extensions behind the foredunes, thereby shifting vegetation impacts from new cuts through foredune vegetation communities to all other vegetation communities. This could potentially increase vegetation clearing for operators to access currently inaccessible areas of the park. In this situation, pipelines would parallel road corridors, thereby minimizing impacts to vegetation.

Cumulative Impacts to Vegetation under Alternative C, Maximum Resource Protection in All SRAs

Cumulative impacts would be the same as described under Alternative A.

Conclusion

- Impacts would be the same as described in Impacts Common to All Alternatives,with the possibility of an increase in impacts to vegetation in non-SRA vegetative communities.

- The designation of the foredune community and the live oak mottes as SRAs, with a No Surface Access provision, would result in no adverse impacts to these sensitive vegetation types.

IMPACTS TO WETLANDS

Introduction

Wetlands habitats dominate Padre Island National Seashore. Over 60 percent of the park is comprised of wetlands, including marshes, inland waters, wind-tidal flats, and seagrass beds (Laguna Madre). The most abundant wetland types are seagrass beds and wind-tidal flats. These two wetlands cover types comprise over 45 percent of the park. Both the Laguna Madre and the wind-tidal flats have been designated as SRAs because of their ecological values. Given the extensive cover of wetlands in the park, it is inevitable that there would be impacts on wetlands as a result of oil and gas exploration and development.

Impact Significance Criteria

Impacts to wetland resources associated with implementation of the proposed action, or action alternatives, would be considered significant or major if:

- Wetland vegetation, algal mats (wind-tidal flats) or other SRAs (e.g., seagrass beds in Laguna Madre), would be directly or indirectly affected.
- Soils or hydrology are modified such that the potential for restoration of the natural communities present prior to disturbance is prevented or reduced.
- Reclamation of disturbed areas fails to achieve prescribed cover or survival levels within a year after the site reclamation.

Impacts to Wetlands Common to All Alternatives

Under any of the alternatives, there would be impacts to wetlands from oil and gas operations if wetlands cannot be avoided. Since wetlands comprise over 60 percent of the National Seashore, avoidance of wetlands by oil and gas activities may be unavoidable, particularly for large-scale seismic surveys. Even if wetlands are directly avoided, there is still the possibility of indirect impacts from oil and gas activities located on adjacent uplands. Impacts that could be common to all alternatives are described below.

The types of impacts to wetlands associated with oil and gas operations would include not only the visible loss of vegetation and disruption to soils and surface/ground water, but the effects on the functions and values of the community. Typical functions and values of wetlands include high productivity, fish and wildlife support (especially for certain threatened and endangered species), erosion and sedimentation control, dampening storm effects and flood control, water purification, and nutrient cycling. Wetlands also play a major role in the biodiversity of Padre Island National Seashore and add to its cultural and scientific value. Different wetland types have different levels of importance for these various functions, and site-specific functions and values would be assessed and included in the development of mitigation plans for any wetland disturbance that triggers NPS approval and Section 404 permitting. Restoration time is also an issue. Some of the wetlands, such as wind-tidal flats, may be difficult and costly to successfully recreate or restore.

Geophysical Exploration (3-D Seismic Surveys): For seismic surveys, a grid pattern of explosive charge holes and receiver lines is necessary. The extensive wetlands in the park make it impossible to avoid wetlands while conducting 3-D seismic exploration. As described in Chapter 2, a parkwide 3-D seismic survey could directly affect 748 acres. Operating standards (36 CFR 9.41), such as restricting operations within 500 feet of natural impoundments (freshwater ponds) or mean high tide-line (e.g., wind-tidal flats, Gulf shore), could be excepted to permit 3-D seismic surveys in these areas of the park. The NPS could restrict equipment utilized in, and access to, wetlands as conditions of approval of a 3-D seismic survey Plan of Operations.

Because the 3-D seismic survey operations would be subject to equipment requirements, access restrictions, and monitoring of compliance with the Plan of Operations, there would be minor and temporary wetland impacts. Access controls and equipment limitations on 3-D seismic surveys are designed to minimize wetland vegetation disturbance by requiring wide tires on light-weight vehicles (e.g., 4-wheel-drive, off-road vehicles) used in wetland areas. Wide-tired or tracked vehicles would rut wet soils less, minimizing disturbance to the root zone of wetland vegetation. Flotation-type tires (wide) would not compress wetland soils to any great extent, avoiding the creation of depressed linear channels, or ruts, which may alter wetland hydrology. If substantial rutting (over 1 inch) is observed in wetlands, the activity could be halted by park staff until the operator can prepare and demonstrate adequate preventive measures. By applying these operating standards, there would be minor disturbance to wetlands vegetation. There would be no fill placed in wetlands as a result of 3-D seismic surveys.

Construction Activities: Construction of drill pads, production pads, roads, and flowlines and pipelines, utilizing up to 250 acres, or 02 percent of the park, would cause both direct and indirect impacts to wetlands from alteration of wetland hydrology and increased siltation or turbidity.

It was assumed that roughly 50 percent of the total estimated RFD acreage would fall into wetlands. Where the well pad was placed in a wetland, it is assumed that a greater proportion (>50 percent) of roads, pipelines, and production well pads would also be in wetlands. Pipelines, due to their linear nature, would likely impact wetlands in the proportion in which they occur (estimated 50 percent). Where exploration facilities are located on the back-island (e.g., seagrass beds or wind-tidal flats), there are more wetlands to encounter in extending roads and pipelines. A drill pad placed in seagrass beds would have extensive pipelines and roads in wind-tidal flats due to the relationship of tidal flats to seagrass beds (Laguna Madre). At the high side of wind-tidal flats is a fringe of emergent wetlands (e.g., *Salicornia* sp.), which grade into uplands. These acreage estimates do not include indirect effects, which are expected to be much greater in area than direct effects.

The duration of impacts to wetlands would extend through the construction and operation of drilling activities, drill pad removal and site preparation activities, and the time required for wetland vegetation to be restored in disturbed areas. If exploration leads to production, direct and indirect wetland impacts would be long-term and possibly major in severity, if vital wetland functions/values are not restored or replaced.

Exploratory Drilling, Production Operations, Flowlines and Pipelines: Accidental spills from exploratory drilling, production/storage facilities, and flowlines/pipelines that escape primary and secondary containment to be released into the environment would have the potential for adverse impacts to wetlands.

Plugging/Abandonment/Reclamation: As discussed in Chapter 2, Executive Order 11990 (Protection of Wetlands) and Director's Order 77-1 (NPS Guidelines for Protection of Wetlands) require that all wetland impacts be avoided, minimized, and mitigated, and set "no net loss of wetlands" as the goal of the NPS and other federal agencies. Mitigation, the compensation for affected wetlands, often at a greater than 1:1 ratio, is often ineffective in Texas coastal areas (Cobb, 1987). Cobb (1987) found that over 50 percent of wetland mitigation projects fail to achieve their goal. Other studies in Texas coastal ecosystems have shown that poorly executed wetland compensation fails to provide vital wetland functions, such as nursery grounds for fish (Nicolau and Adams, 1993; and Nicolau, 1993). Recently, park staff has had some success in restoring wetland functions to wind-tidal flats, emergent wetlands (D. Echols, pers. comm., 1998), and seagrass beds. Careful attention to restoring pre-disturbance elevation, soils, and hydrology has aided in these successes, but it is still difficult to ensure replacement of wetland functions and values.

Conclusion

- Seismic surveys would have minor and short-term impacts to wetlands, in any wetland community.

- Direct, and potentially long-term, impacts to wetlands from oil and gas drilling and production could involve a portion of the 250 acres under the RFD scenario, if wetlands cannot be avoided, estimated at 142.5 acres. At least an equal acreage of indirect wetlands impacts could occur with successful mitigation. Only a small portion of the estimated 142.5 acres would result in long term impacts, because as some oil and gas operations are being undertaken, others are being reclaimed.

- The NPS no-net loss policy and DO 77-1 require a minimum 1:1 compensation ratio for direct and indirect impacts to wetlands, to be performed prior to or at the time of impacts. In addition, the requirement to reclaim disturbances and restore wetlands communities to their natural condition at the completion of oil and gas operations should result in no major impact to wetlands, if mitigation is successful in replacing or restoring wetlands functions and values.

Impacts to Wetlands under Alternative A, Proposed Action

The direct effect to wetlands of the Proposed Action is estimated to be 142.5 acres. The extent of wetlands in the park and the limits of offset available to exploration wells with existing directional drilling technology suggest that wetlands would be encountered by all exploration activities. The specific protection provided under Alternative A to specific wetlands communities increases awareness about the sensitive nature and high value of these wetlands communities. Under this alternative, the wind-tidal flats would be protected against impacts from fill and rutting, and both the wind-tidal flats and Laguna Madre seagrass beds would be off limits to production facilities, thereby limiting direct impacts to these specific wetlands community types.

Specific control of surface access to the three freshwater ponds would prevent wetland losses at these select ponds; however, it is likely that exploration facilities displaced by these access restrictions would affect wetlands elsewhere in the park. Access restrictions on wind-tidal flats allow use only if it is the least damaging alternative. Restrictions on Laguna Madre seagrass beds prohibit dredging of new channels; however, maintenance dredging of existing channels, and dredging of new channels may be permitted if they meet the least damaging method of access.

Indirect effects on wetlands may be reduced by the SRA restrictions provided by Alternative A, the Proposed Action. For example, careful access through foredunes may prevent a washover during a hurricane. An intact foredune provides protection to wetlands, and other habitats behind the dunes.

Careful conservation of the foredune as an intact hurricane barrier would prevent indirect effects to wetlands, including wind-tidal flats and Laguna Madre seagrasses. As discussed above, sand moved inland by storm surge and hurricane winds could fill emergent wetlands, raise wind-tidal flat elevations, and cover seagrass beds. Though a natural process, creation of hurricane washover channels can be exacerbated by manmade breaches of the foredunes (e.g., access roads) (Scott, et al., 1969).

Another potential effect of access limitations may be to force exploration activities (e.g., roads, well pads) onto habitats adjacent to the access-limited habitats. For example, avoidance of cultural sites on uplands may force access roads or drilling pads onto emergent wetlands. Similarly, access limitations may cause exploration activities or access to be located on adjacent lands under Texas General Land Office (GLO) or other ownership (e.g., Laguna Madre). The potential exists for access limitations to encourage exploration access to bottomhole targets in the park from adjacent lands under GLO ownership. While wetland avoidance, minimization, and mitigation requirements apply to state lands as well, oil and gas exploration activity in the park may affect adjacent lands in this way.

Indirect wetland effects may include siltation of wetlands adjacent to fill or dredge activities or modifications of local wetland hydrology, with consequences for surrounding wetlands. For example, a fill road or channel across a wind-tidal flat may alter tidal flat hydrology, affecting wetland flora and fauna (Elliott and Zonick, 1996). Interception of wind-driven tides by even a low elevation fill barrier (e.g., road fill) can cause the flat to become drier on the downwind side, affecting the algal community and associated invertebrate fauna, reducing these wetlands' productivity. Changes in wind-tidal flooding can affect the algal mat communities that dominate the wind-tidal flats (see Elliott and Zonick, 1996). Examples of extensive wind-tidal flat alteration by fill placement can be found in the Laguna Madre (e.g., Laguna Atascosa National Wildlife Refuge) (Farmer, 1991). Fill placed perpendicular to the prevailing wind direction is especially disruptive to wind tide hydrology (Elliott and Zonick ,1996).

Culverts placed in fill to transmit wind tides are poor substitutes for the sheet-flow typical across undisturbed wind-tidal flats. Culverts increase tidal velocities through the culvert, causing erosion of the wind-tidal flat. Culverts also change the duration and extent of wind-tidal flat inundation through restriction of tidal flow, affecting the nature of tidal flat vegetation communities. Erosion contributes both to loss of wind-tidal flats and to siltation of seagrass beds. As discussed previously, protection of the barrier dune would protect interior wetlands, wind-tidal flats, and seagrasses from filling as a result of hurricane washovers. Thus, this alternative may decrease indirect effects of hurricane washovers, exacerbated by new breaches in the foredunes.

Indirect effects may affect larger areas than direct effects, especially in wetlands with complex hydrology. Alteration of wind-tidal flat sheet flow by even minor elevation changes may change inundation frequency and duration with consequences for wetland plants and animals (Farmer, 1991).

Siltation during dredging operations in the Laguna Madre has been suggested as the cause of seagrass (e.g., *Halodule wrightii*) decline (Onuf, 1994). Erosion of fill structures (e.g., service roads, well pads) may contribute to siltation of adjacent wetlands. Elliott and Zonick (1996) discuss the effects of erosion of old oil and gas exploration channels and spoil on wind-tidal flats in the Laguna Madre. See Weise and White (1980) for a discussion of erosion of spoil areas as it affects nearby seagrass beds.

Cumulative Impacts to Wetlands under Alternative A, Proposed Action

Cumulative effects of the proposed action on wetlands would include unmitigated wetland losses, the result of failed or inadequate mitigation. Where tidal hydrology is altered, there may be long-term effects for the Laguna Madre ecosystem as a result of diminished primary productivity and dominant plant community changes. The process of ecosystem change in the LagunaMadre as a result of the Gulf Intracoastal Waterway (GIWW) and related past dredging and wetland fills would continue. Wetland losses and fragmentation as a result of this action would contribute to that process. Protection of the barrier dune from breaches would have beneficial cumulative effects for all communities behind the dunes, including wetlands, by protecting them from the effects of severe blowouts.

Conclusion

- SRA restrictions applied in Alternative A would result in fewer direct wetland impacts to the seagrass beds in the Laguna Madre SRA, the wind-tidal flats, and emergent wetlands associated with the three freshwater ponds.

- Specific wetlands communities, including the three freshwater ponds, seagrass beds and other wetlands in the Laguna Madre, and wind-tidal flats, receive increased recognition by being identified as SRAs, which heightens awareness that they are sensitive to disturbances and are important for providing habitat for wildlife, particularly for threatened and endangered shorebirds. The SRA restrictions provide for no production activities in the LagunaMadre or wind-tidal flats, thus eliminating potential long-term adverse impacts from production in these areas.

- Spills of oil and gas, and other contaminating and hazardous substances, may be an indirect effect of oil and gas exploration and development that impacts wetlands. These substances could kill wetland plants and benthic fauna. Remediation of spills in coastal wetlands is a difficult task. With restrictions on production operations in wind-tidal flats and the Laguna Madre, the long-term possibility of spills is lessened in these areas.

Impacts to Wetlands under Alternative B, No-Action/Current Management

Under Alternative B, no special protection would be provided for SRAs. Access restrictions, if any, would be negotiated for each well, within the applicable law or regulation. Under this alternative, all federal laws, NPS policy, and park regulations (Current Legal and Policy Requirements) would apply.

Impacts to all types of wetlands communities are likely to be greatest under the No-Action Alternative, because some particularly important and/or sensitive wetlands communities, such as Laguna Madre seagrass beds, wind-tidal flats, and the three permanent freshwater ponds, are not identified in advance as SRAs. Therefore, variation in the application of access restrictions, equipment requirements, and SRA valuation through time is likely to result in impacts to wetlands proportional to their acreages in the park. Variations in identifying some wetlands communities as being more sensitive than others, and development of mitigation measures may occur under different park administrations, resulting in different interpretations and applications of policy. Additionally, as information accumulates on resource values and functions, policies and procedures are modified. New technologies, for example directional drilling, vastly change what were once considered standard practice.

Estimated direct wetland impacts under the RFD scenarios for this alternative total about 142.5, with a proportionate acreage of surface disturbance to wind-tidal flats, Laguna Madre seagrass beds, and the permanent freshwater ponds, to other wetlands communities according to their total acreages in the park. Wetland impacts would be avoided, minimized and mitigated by applying Current Legal and Policy Requirements, through Section 404 permitting with the U.S. Army Corps of Engineers, and NPS wetlands guidelines, DO 77-1.

Under alternative B, indirect effects to wetlands may include the loss of wetlands as a result of hurricane washover, created by a road cut in a foredune. Sand transported from the foredunes may be deposited on wetlands in the island interior, filling them or altering hydrology (Scott, et al., 1969). Washover fans on the Laguna Madre side of the island raise the elevation of wind-tidal flats, altering their hydrology and making them drier (see Figure 62, Weise and White, 1980). While hurricanes are a natural force affecting barrier island geography, the potential exists to exacerbate their effects through alteration of natural island formations (e.g., barrier dunes) during oil and gas exploration.

Oil spills may be an indirect effect of oil and gas exploration that impacts wetlands. Oil could kill wetland plants and benthic fauna. Remediation of oil spills in coastal wetlands is a difficult task.

Cumulative Impacts to Wetlands under Alternative B, No-Action/Current Management

Each incremental loss of wetland productivity (e.g., nutrients supporting biological processes) affects the Laguna Madre ecosystem. Mitigation actions may take years to replace the habitat values lost; and some mitigation may fail. Long-term impacts of this and other wetland loss in the Laguna may eventually begin to affect overall productivity. The Laguna Madre has been substantially altered by the GIWW, and past oil exploration. The combined effects of wetland losses include increased siltation, reduced primary productivity, changes in dominant communities of seagrasses, and ultimately changes in the fauna. Temporal loss of habitat values and functions, incomplete mitigation, fragmentation of habitats, and similar effects are changing the nature of the Laguna Madre, including major components of Padre Island National Seashore. These processes would continue, and would continue to be a focus of management concern for the NPS.

Conclusion

- All types of wetlands communities would be affected, proportionately to the totalacreages in which each is found in the park, and this could include adverse impacts to wetlands that have been designated as SRAs (Laguna Madre wetlands, wind-tidal flats, e.g.).

- No identification of wetlands communities that are known to be highly sensitive to oil and gas activities would be provided to oil and gas operators. Therefore, identification of wetlands communities and Current Legal and Policy Requirements would be applied on a case-by-case basis. This could result in greater variation and the potential for greater impacts to all types of wetlands communities, especially SRAs.

Impacts to Wetlands under Alternative C, Maximum Resource Protection in All SRAs

Under Alternative C, SRAs are subject to a No Surface Access restriction to all types of oil and gas activities. As a result, the park's most extensive and valuable wetland types – Laguna Madre seagrass beds and wind-tidal flats, in addition to three permanent freshwater ponds -- would have no direct impacts from oil and gas activities. The No Surface Access restriction in these wetlands communities, however, would force wetland impacts onto fringe salt marshes adjacent to the wind-tidal flat and on freshwater wetlands on the island interior. Because many of the SRAs are uplands (i.e., cultural sites, foredunes, visitor use areas, live oak mottes, and washover channels), the No Surface Access restriction in these areas would force more impacts onto island interior uplands and wetlands. Under Alternative C, freshwater wetlands and fringe salt marsh wetlands may be disproportionately affected.

The effect of shifting impacts away from certain upland sites, the foredune, seagrass beds, and wind-tidal flat is to focus impacts toward the island interior. Under the RFD scenario assumptions made, wetland types common on the interior are emergent freshwater and fringe salt marsh, which would receive the brunt of the exploration impacts. Operators seeking to locate wells on areas dominated by seagrass beds or wind-tidal flats may move to adjacent fringe salt marsh, uplands, or freshwater wetlands to employ directional drilling, although production sites would be directed to upland areas whenever possible. Under this alternative, potential direct impacts to fringe salt marsh and freshwater wetlands may be greater than 140 acres. Interior island wetlands (freshwater emergent) are relatively small compared to the extensive wind-tidal flats and seagrass beds. Thus, impacts to these wetlands would be more localized.

Indirect effects of Alternative C may include effects on wind-tidal flats or Laguna Madre seagrass beds. For example, fills in fringe salt marsh may cause siltation of adjacent wind-tidal flat. Erosion of fills may also increase siltation of seagrass beds and contribute to turbidity. By avoiding wind-tidal flats, indirect effects such as altered hydrology on tidal flats and siltation of seagrass beds are substantially avoided. Protection of the barrier dune reduces the potential for blowouts, as discussed above, also reducing indirect impacts to wetlands.

Cumulative Impacts to Wetlands under Alternative C, Maximum Resource Protection in All SRAs

The cumulative effect of Alternative C would be relatively small. Mitigation actions and natural recovery processes would restore interior and fringe wetland functions after removal of oil and gas exploration and production equipment. Because this alternative avoids Laguna Madre seagrass beds and wind-tidal flats, the cumulative effects on the Laguna Madre are limited. Temporal losses of interior wetland areas would have some negative effect on waterfowl, migratory birds, and wading birds as a result of lost habitat. Mitigation for wetlands would be at the expense of island upland habitats. Alternative C may reduce the amount of NPS staff time spent in monitoring and enforcement activities, because substantially large areas of wetlands are avoided.

Conclusion

- Specific wetlands communities that are designated as SRAs or that are parts of larger SRAs, including the three freshwater ponds, Laguna Madre seagrass beds, and wind-tidal flats, are protected by the application of a No Surface Access restriction to all oil and gas operations, including seismic. This would result in no direct impacts to these SRA wetlands communities. However, it may also result in other wetlands communities, such as inland freshwater wetlands and salt fringe wetlands, becoming the focus of wetlands impacts.

- Spills of oil and gas, and other contaminating and hazardous substances, may be an indirect effect of oil and gas exploration and development that impacts wetlands. These substances could kill wetland plants and benthic fauna. Remediation of spills in coastal wetlands is a difficult task. With No Surface Access restrictions in wind-tidal flats and the Laguna Madre, there would be little or no possibility of spills in these areas.

IMPACTS TO FISH AND WILDLIFE

Introduction

The native animal population found at Padre Island National Seashore includes an extensive diversity of both marine and terrestrial species. Wildlife known to occur in the National Seashore include: 266 species of neo-tropical migrants, migratory, coastal, and marine birds; 47 species of terrestrial and marine mammals; 100 species of fish; 56 species of reptiles and amphibians; 36 species of marine crabs; and numerous species of plankton, and benthic organisms. The NPS would protect these animals against harvest, removal, destruction, harassment, or harm through habitat degradation through human action. The NPS would also preserve the populations and habitats of native migratory species including: marine turtles, geese, peregrine falcons, piping plover (Management Policies (DOI, NPS 1988, Ch. 4:7). Specific habitat areas of concern to wildlife within Padre Island include the freshwater ponds, Laguna Madre rookery islands, wind tidal flats, seagrass beds, and emergent and relict wooded areas (i.e. oak mottes, willow thickets), most of which have been designated as SRAs for the purposes of this Plan/EIS. The impacts on special status wildlife species (federal, state, and local Threatened and Endangered species) will be covered under the next section.

Impact Significance Criteria

The programmatic nature of this document makes it difficult to quantify specific actions or environmental impacts on wildlife species and habitat. In order to define major adverse impacts to wildlife species, criteria derived from government regulatory standards, existing scientific documentation, previous environmental documents and/or professional judgment of resource specialists has been utilized. The criteria for wildlife and game species in this document are based on basic ecological principles and incorporate regulatory standards.

Regulations in 36 CFR 9.37, state that the conduct of proposed operations **not "significantly injure federally owned or controlled lands or waters"**. An **"injury"** would include an action which subjects a wildlife population to a change in numbers of individuals, age class structure, migration routes, habitat usage, etc., thereby threatening the survivability of the population.

An impact would be considered significant or major if:

- It would disrupt nests or breeding grounds of native wildlife species to the extent that it would have a measurable negative effect to the population of that species.
- It would permanently interfere with the routine movements of wildlife within the park or surrounding areas.
- It would remove a sufficient numbers of individuals to endanger the population.

Impacts to Fish and Wildlife Common to all Alternatives

The predominant impact-producing factors related to the RFD Scenario common to all alternatives that could affect wildlife are:

- The presence of people working in oil and gas fields generally disturb wildlife.
- Drilling, operation of construction, service equipment and well production equipment produce physical and chemical hazards and noise.
- The development of oil and gas facilities and pipelines removes existing habitat.
- Development of well pads and roads removes and fragments habitat.
- Traffic on roads disturbs wildlife and occasionally kills animals. Roads also increase the influence of visitor use and disturbance to wildlife species.
- Lighting from vehicles and oil and gas operations often adversely affect wildlife species through disorientation and/or habitat abandonment.
- Spills from pipeline ruptures or facility failures can directly injure or cause wildlife mortality and have a secondary impact of habitat degradation.
- Geophysical exploration activity disturbs habitat, nesting areas, and can injure or kill wildlife species.

Impacts to fish and wildlife from oil and gas operations would result from construction of access roads, drilling and production pads, flowlines and pipelines, and ancillary facilities; and from drilling, production and flowline/pipeline operations. These activities would cause the direct loss of fish and wildlife habitat, and could contribute to fragmentation of habitat.

Impacts to fish and wildlife from geophysical exploration, drilling or production activities could range from no impacts to significant impacts depending on location, timing, and scope of operations proposed.

Displaced wildlife cannot be expected to find suitable, unoccupied habitat to support them in adjacent areas, but would potentially die of natural causes or displace other wildlife. Undisturbed wildlife normally exhibit patterns of activity and habitat selection that result in the optimization of energy expenditure. Disturbance of normal activity patterns and habitat use though oil and gas operations would have an adverse affect on the amount ofwildlifes' available energy and, therefore, the welfare of an animal and/or a population could suffer. If the animal is unable to compensate for these increases in energy utilization, reproduction, growth, and survival are often greatly reduced.

There is a remote possibility for the incidental take of fish and wildlife during the course of oil and gas operations from vehicle use; construction activities; seismic activities; or from oil and gas, and contaminating or hazardous substances which escape containment systems and is released in sufficient quantities into the environment and come into contact with fish and wildlife.

Fish and wildlife could be affected by noise from construction activities, seismic surveys,drilling and production activities. Impacts are usually temporary, with fish and wildlife avoiding or moving away from the source of noise, but returning after noise is reduced, or even becoming acclimated to some noise disturbance. Drilling operations introduce noise with the highest measurements in the90 dBA range for a period typically ranging from 30 to 90 days, with noise emanating mostly from multiple diesel engines. Noise is persistent during the term of drilling operations, which typically runs constantly until completed. Seismic surveys introduce a different type of noise that is variable, depending on size of explosive and depth of shot hole. Therefore, explosive detonations could be muffled or could be much louder and startling due to the intermittent detonation of explosive charges.

All three alternatives are governed by Current Legal and Policy Requirements that are expected to avoid or mitigate potential impacts to fish and wildlife for the purpose of protecting the biological diversity and integrity of the Preserve. These provisions are discussed in detail in the second part of Chapter 2. Biological surveys are required under the Current Legal and Policy Requirements, and are necessary to collect basic information about the fish and wildlife and environmental factors that define the proposed operations area. The purpose of the biological survey is to document fish and wildlife within and adjacent to the proposed operations area and to identify potential impacts so as to develop appropriate avoidance or mitigation techniques, which could involve relocating the operations or guide project design to minimize impacts. Required mitigation to protect fish and wildlife from oil and as operations and activities includes fencing around facilities, revegetation and reclamation of disturbed areas, netting of stormwater at oil and gas facilities, and requirements to minimize potential for spills and to clean up releases.

Specific impacts are described under the various types or phases of oil and gas operations below:

Geophysical Exploration (3-D Seismic Surveys): Effects to fish and wildlife species could be increased displacement, increased risk of mortality, decreased production, and increase in stress levels. These effects could be caused by seismic crews occupying a large area to clear vegetation along receiver and source lines, drilling shotholes, detonating explosives, and using vehicles and helicopters. Localized effects on burrowing wildlife (primarily reptiles, amphibians and small mammals), including shock or concussion, and possibly mortality, could result from detonation of explosive charges.

Under any alternative, protection of water quality is provided by 36 CFR 9.41(a), which requires operations to maintain a 500-foot offset from bodies of water would minimize sediment loading and other water quality and quantity impacts. The standard 500-foot offset from water bodies would protect fish and wildlife utilizing water and the areas within this protective zone. Additional protection could be provided by the wetlands and floodplains permitting and compliance requirements.

The potential effects of oil and gas exploration and development on fish and wildlife could result from possible disruption or pollution of habitats. For reptiles, amphibians, invertebrates, and birds utilizing wetlands and riparian habitats, substantial protection of these habitats are provided by current wetlands and floodplains Executive Orders and NPS implementing guidelines, the standard 500-foot offset provided under 36 CFR 9B regulations, and water quality laws. In all areas, including floodplains/wetlands areas, the 36 CFR 9B regulations provide stringent requirements to contain any releases to the smallest area practicable through utilization of primary and secondary containment systems; therefore, while leaks and spills at oil and gas operations are inevitable, the possibility of any leaked or spilled pollutants escaping primary and secondary containments and being released into the environment should be a rare occurrence.

Construction Activities: Fish and wildlife, particularly small mammals, invertebrates, and herpetofauna (reptiles and amphibians) that cannot escape the area during construction of roads, well drilling pads, production pads, and flowlines/pipelines could be killed, and increased mortality for these small species is also likely to occur along access roads.

Fish and other water-dependent species could experience habitat degradation from road construction and use, construction of well pads, and pipelines where these activities occur in or adjacent to water bodies. These effects could include decrease in long-term viability of populations as a result of increased sediment loads from these construction activities and long-term uses, if appropriate mitigation measures are not applied. Some risk of direct mortality to fish and other aquatic species could occur if a pipeline ruptures and toxic materials (such as diesel fuel) are spilled into surface waters.

Because bodies of water are protected by a 500 foot offset under the NPS's Nonfederal Oil and Gas Rights Regulations, at 36 CFR 9.41(a), and receive added protection under the Executive Orders and NPS implementing guidelines for protection of wetlands and floodplain management, changes in water temperatures, or water quality and quantity would be protected from disturbance and water levels would be maintained. Careful siting of facilities when there are no practicable alternatives to locating an operation or activity in floodplains and wetlands is expected to result in stringent mitigation measures to minimize potential impacts. Required compensation for direct and indirect impacts to wetlands could be used to restore wetlands habitats and increase fish and wildlife habitat values.

Construction of oil and gas-related roads, pads or flowlines could result in direct loss of habitat; however, identification of fish and wildlife habitat through biological surveys would result in development of mitigation measures intended to avoid or minimize impacts. Where roads, pads, flowlines and pipelines are sited, reclamation of disturbed areas would minimize impacts, particularly in the short-term for drillpads and flowlines; therefore, where disturbed areas are prepared and seeded with native species properly, reclamation would expedite the return of habitat. For production operations, these areas and their associated access roads, would be unavailable as wildlife habitat for the long-term, for 20 years or longer. Use of already-disturbed areas for siting new operations would minimize loss of fish and wildlife habitat.

All construction activities are likely to displace animals along access corridors and near the well pad during construction, and through exploration and development. Displacement is the major effect to most wildlife species. Wildlife are also impacted when access is increased or human access becomes easier, especially in areas previously experiencing little human access increases the risk of mortality, through legal or illegal means.

Exploratory Drilling: Displacement of wildlife would continue from the initial wellpad construction phase into exploratory drilling, and if the well is placed in production, the area of operations would not be useable for wildlife habitat during the potentially long-term life of the producing well. The increase of and ease of access routes for public travel would serve to increase public motorized travel or if the roads are closed to public motorized travel they still serve as an access route by foot. New access roads may even serve as travel corridors for wildlife which may increase their risk of mortality either legal or illegally. Low-speed roads are not expected to appreciably increase mortality from road kill.

In spite of careful best management practices to minimize the release of oil and contaminating and hazardous substances, in the worst case scenario, releases could potentially escape primary and secondary containment systems and species inhabiting the area could be harmed. If releases are transported into waterways, fish and other species occupying the water could be impacted.

Production Operations: Long-term access into previously inaccessible areas provided by new road construction to access well pads would increase human access and potentially increase the risk of mortality to wildlife, through legal or illegal means. The park superintendent can close or restrict motorized public access on roads that are to be used for oil and gas development if necessary. With this authority, the NPS can mitigate the effects of increased public access caused by road construction and long-term operation of production facilities.

Some facilities associated with production operations (i.e. heater-treater units/separator units) could cause the mortality of bats, migratory birds and raptors through asphyxiation or incineration. To mitigate the residual impacts from these facilities, a cone device, placed on top of all vent stacks, would be required under Current Legal and Policy Requirements. The cones would be constructed in a manner that prevents perching on the vent stacks and subsequent asphyxiation, and eliminates all access into the vent stack pipes. Inaccessibility to the vent stacks would curtail any potential mortality to bats and avian species.

Another operating standard requires that all open containers that collect stormwater be netted or covered. This requirement prevents avian and other wildlife species to access stormwater that may have contacted and mixed with oil and gas, and contaminating and hazardous substances.

Selection and use of herbicides and pesticides must be approved by the NPS Integrated Pest Management Coordinator; therefore, effects on native fish and wildlife would be avoided.

In spite of careful best management practices to minimize the release of oil and contaminating and hazardous substances, in the worst case scenario, releases could potentially escape primary and secondary containment systems and species inhabiting the area could be harmed. If releases are transported into waterways, fish and other species occupying the water could be impacted.

Plugging/Abandonment/Reclamation: Plugging and abandonment operations and site preparation during reclamation would introduce heavy equipment and people, along with increased noise levels for a short time; however, the long-term effect of these activities is to return natural conditions to the operations area. Wherever access roads have been developed or allowed to continue for the primary purpose of allowing access for oil and gas operations, access roads would be reclaimed at the completion of operations. This would return the area to its natural conditions, thereby having a beneficial result on the park environment. Wherever possible, habitats would be improved to perpetuate the viability of habitats and increase the survivability of species.

Conclusion

- The standard 500-foot offset from water bodies provided by 36 CFR 9.41(a), would reduce the potential for water quality and quantity impacts and protect fish and wildlife utilizing water and the immediate riparian areas within this protective zone.

- Oil and gas operations would cause the displacement of wildlife, and loss and fragmentation of fish and wildlife habitat. Impacts could range from no impacts to major impacts depending on location, timing, scope and duration of operations proposed.

- Increased mortality to fish and wildlife would result from vehicles; construction activities; seismic activities; or in the event that a spill of oil and gas, and contaminating and hazardous substances escape containment systems and is released into the environment and comes in contact with fish and wildlife.

- Access into previously inaccessible areas provided by new roads would increase human access and potentially increase the risk of mortality to wildlife, through legal or illegal means.

- Upon completion of operations, reclamation would return natural conditions to the operations area. Wherever possible, habitats would be improved to perpetuate the viability of habitats and increase the survivability of native fish and wildlife.

- Over time, standard protection provided to resources in the National Seashore under Current Legal and Policy Requirements would result in maintaining and improving habitat for native fish and wildlife.

Impacts to Fish and Wildlife under Alternative A, Proposed Action

The displacement of wildlife and loss of habitat due to construction of access roads, drill pads, production and associated facilities, flowlines and pipelines is anticipated to impact up to 250 acres, or 0.2 percent of the park. A parkwide seismic survey would directly impact 748 acres of the land base of the National Seashore.

Under this alternative, approximately 50 percent of the National Seashore would be formally designated as Sensitive Resource Areas. These areas include four cultural sites, three freshwater ponds, Laguna Madre, wind-tidal flats, visitor use areas, foredunes, washover channels, rookery islands, and two live oak mottes. Geophysical exploration would be allowed in most SRAs; however, no surface disturbance would be allowed in the Mansfield Archeological District, within 500 feet of the ponds and mottes; no shotholes would be permitted in the foredunes; and a timing restriction would apply within 1,000 feet of the rookery islands.

Drilling and production would not be permitted within most SRAS; except that if it meets the least damaging method, drilling would be permitted in the Laguna Madre and wind-tidal flats.

In addition to Current Legal and Policy Requirements, these specific SRA requirements would limit potential impacts to fish and wildlife and their habitats located within SRAs to minor or moderate levels, at most. Impacts associated with seismic surveys and drilling operations would be short-term.

Cumulative Impacts to Fish and Wildlife under Alternative A, Proposed Action

Cumulative impacts to fish and wildlife as a result of oil and gas operations, plus other human-induced activities and development on Padre Island, as well as natural events such as floods and hurricanes, are not expected to result in actions that threaten the survivability of any fish or wildlife population. Therefore, cumulative impacts are not expected to be major under this alternative.

Conclusion

- Formal designation of Sensitive Resource Areas comprising approximately 50 percent of the National Seashore and application of surface use restrictions for geophysical exploration, drilling and production activities provide consistent protection to fish and wildlife and their habitat in SRAs. Sensitive Resource Areas within Padre Island that provide essential habitat for wildlife include foredunes, freshwater ponds, Laguna Madre rookery islands, washover channels, Laguna Madre seagrass beds, relict live oak mottes, and certain visitor use areas. While drilling could be permitted in the Laguna Madre and wind-tidal flats if it meets the least-damaging method, long-term impacts from production activities would not occur in these SRAs. Seismic activities, roads, and pipeline activity could still occur in some SRAs, but seasonal or surface use restrictions would apply to limit impacts to minor or moderate levels, at most. Impacts associated with seismic surveys and drilling operations, where they would be permitted in SRAs, would be short-term.

Impacts to Fish and Wildlife under Alternative B, No-Action/Current Management

Development of oil and gas under this alternative could result in impacts to wildlife as described under Impacts Common to all Alternatives, above. The scope of the RFD with Current Legal and Policy Requirements provisions applied is not expected to include an action which subjects a fish or wildlife population to a change in numbers of individuals, age class structure, migration routes, habitat usage, etc., thereby threatening the survivability of the population. However, under this alternative, the protection afforded SRAs that support wildlife would not be recognized and would have to be provided on a case-by-case basis in Plans of Operation.

Cumulative Impacts to Fish and Wildlife under Alternative B, No-Action/Current Management

Cumulative impacts to fish and wildlife would be the same as described for Alternative A.

Conclusion

- Operational standards would be applied under Current Legal and Policy Requirements. No major adverse impact on wildlife is anticipated under Alternative B. However, adequate protection for wildlife-rich SRAs would need to be provided on a case-by-case basis, and impacts would vary with the amount of protection provided.

Impacts to Fish and Wildlife under Alternative C, Maximum Resource Protection in all SRAs

Under this alternative, SRAs would be fully protected from disturbance under the RFD scenario because of No Surface Access provisions. Development in all other areas could result in impacts to wildlife as described under Impacts Common to all Alternatives, above.

Cumulative Impacts to Fish and Wildlife under Alternative C, Maximum Resource Protection in all SRAs

Cumulative impacts to fish and wildlife would be the same as described for Alternative A

Conclusion

- There would be no direct impacts from oil and gas operations on fish and wildlife and their habitats within SRAs due to the application of No Surface Access restriction afforded to all SRAs. The known and forecasted effects of Alternative C are not expected to result in actions that threaten the survivability of any wildlife population, and no major adverse impacts would be expected in any area of the park.

IMPACTS TO THREATENED AND ENDANGERED SPECIES AND THEIR HABITATS

Introduction

Threatened and endangered wildlife species known to occur at the park total 15 different species of marine mammals, birds, and reptiles, including several sea turtle species. These species are described in Chapter 3 Affected Environment, under Threatened and Endangered Species and Their Habitat. No threatened or endangered plant species are known to be present on Padre Island National Seashore.

The NPS manages federally-listed threatened and endangered species within the park and their habitats as mandated under the Endangered Species Act of 1973 (ESA). The ESA, as amended, prohibits the NPS and other federal agencies from implementing any action that is likely to jeopardize the continued existence of a federally protected species. Furthermore, the act requires that the NPS consult with the FWS and/or the NMFS on any action it authorizes, funds, or executes that could potentially affect a protected species or its designated critical habitat. Species of special concern not only includes federal threatened and endangered candidate species, but state and locally listed threatened, endangered, rare, declining, sensitive, or candidate species that are native to the park and their critical habitats. These species would be afforded the same status asfederally-listed species (Management Policies, USDI, NPS 1988, 4:11). All marine mammals are protected under the Marine Mammal Protection Act and many are listed as threatened or endangered under the ESA.

Impact Significance Criteria

An action that is likely to jeopardize the continued existence of a federally protected species would include an action which subjects a wildlife population to a change in numbers of individuals, age class structure, migration routes, habitat usage, etc., thereby threatening the survivability of the population.

Therefore, an impact to any threatened and endangered would be considered significant or major if:

- It would disrupt the habitat, nests, or breeding grounds of special status wildlife species.
- It would permanently interfere with the routine movements of special status wildlife within the park or surrounding areas.
- It would remove individuals from the population.

Impacts to Threatened and Endangered Species and Their Habitats Common to all Alternatives

Impacts to threatened and endangered species resulting from the RFD scenario would be the same as those described in the discussion of Impacts Common to All Alternatives presented in the impact analysis for Fish and Wildlife, found earlier in this chapter.

The Endangered Species Act of 1973 requires federal agencies such as the NPS to request an official list of federal threatened and endangered species for evaluating federal actions such as approving a nonfederal oil and gas Plan of Operations. Compliance with the Endangered Species Act requires early consultation with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Texas Parks and Wildlife Department by the NPS and nonfederal oil and gas operators, for the purpose of identifying any special status species and mitigation measures for proposed nonfederal oil and gas operations.

Through the consultation mechanism required under the ESA, when the NPS identifies that a proposed nonfederal oil and gas operation is in or near an area where listed species are known to occur, and the proposed oil and gas operation may have an affect or adverse affect on a listed species, Current Legal and Policy Requirements including operating standards, seasonal/time limitations, or no surface occupancy restrictions could be applied, which would result in avoiding potential impacts to the listed species. For example, specific operating standards for protection of threatened and endangered sea turtle species are included in the Current Legal and Policy Requirements outlined in Chapter 2, Part 2, under the heading "Protection of Threatened and Endangered Wildlife." By applying these requirements, no adverse impacts to listed species or their habitat is expected under any alternative.

Conclusion

- Oil and gas operations would not be allowed to occur in areas or during specified times if there is a potential to adversely affect threatened or endangered species. The development, if it were allowed, would only occur after consultation under the ESA was completed. When listed species and their habitat are identified to be within the project area, sufficient distance offsets and/or seasonal/timing restrictions to nesting and other sensitive periods in a given species' life cycle would result in avoiding impacts.

- Over time, standard protection provided to resources in the National Seashore under Current Legal and Policy Requirements would result in maintaining and improving habitat for listed species.

Impacts to Threatened and Endangered Species and Their Habitats under Alternative A, Proposed Action

Under this alternative, increased protection from habitat modification and/or loss of special status species would be achieved by restricting surface occupancy for drilling and production activities in most SRAs and by applying operating standards under Current Legal and Policy Requirements. Many SRAs within the park provide habitat for threatened and endangered species. Protection under SRA limitations for rookery islands, the freshwater ponds, wind-tidal flats and the Laguna Madre would protect habitat for many endangered or threatened wildlife species, especially the listed egrets, ibis, and plovers. Specific timing and locational restrictions that would be included in operating standards for activities in or near sea turtle habitat or egg incubation facilities (described under Protection of Threatened and Endangered Wildlife in Chapter 2, Part II) would help to avoid impacts to sea turtle species.

Seismic activities and pipeline activity could still occur in SRAs, but site-specific access restrictions, seasonal restrictions and operating standards could be applied on a project-by-project basis, which would result in avoiding adverse impacts to listed species.

Cumulative Impacts to Threatened and Endangered Species and Their Habitats under Alternative A, Proposed Action

No cumulative impacts to threatened and endangered species and their habitats as a result of oil and gas operations, plus other human-induced activities and development on Padre Island, as well as natural events such as floods and hurricanes, are expected. Applying the Current Legal and Policy Requirements which include consultation under the ESA, affords the required protective mechanism to identify and avoid impacts to listed species.

Conclusion

- Formal designation of SRAs and specific protection provided by the restrictions in the SRAs (especially those that serve as support/habitat for threatened and endangered species), along with the case-by-case consultation would result in no adverse impacts to any special status species.

Impacts to Threatened and Endangered Species and Their Habitats under Alternative B, No-Action/Current Management

Nonfederal oil and gas operations could be developed under Current Legal and Policy Requirements which includes consultation under the ESA if operations are in an area where threatened and endangered species are known to occur or could impact listed species. By applying these requirements, no adverse impact to listed species or their habitat is expected.

Cumulative Impacts to Threatened and Endangered Species and Their Habitats under Alternative B, No-Action/Current Management

Cumulative impacts on threatened and endangered species and their habitats would be the same as described for Alternative A.

Conclusion

- Specific protection measures for threatened and endangered species, even in sensitive areas, would be determined through application of Current Legal and Policy Requirements and a case-by-case evaluation under consultation provisions. With adequate input, review, and data, it is expected that there would be no adverse impacts to any special status species.

Impacts to Threatened and Endangered Wildlife Species and Their Habitats under Alternative C, Maximum Resource Protection in All SRAs

Under this alternative, no access in SRAs would provide the highest level of protection to listed species using those habitats from nonfederal oil and gas operations, since the No Surface Access restriction would help to ensure that there would be no habitat disturbance, and no chance of disrupting any endangered species present in these areas. Development in all other areas would be permitted by applying Current Legal and Policy Requirements, which includes consultation under the ESA and operating standards, if operations are in or near an area where threatened and endangered species are known to occur. No adverse impact to listed species or their habitat is expected under this alternative.

Cumulative Impacts to Threatened and Endangered Wildlife Species and Their Habitats under Alternative C, Maximum Resource Protection in All SRAs

Cumulative impacts to threatened and endangered species and their habitats would be the same as described for Alternative A.

Conclusion

- Formal designation of SRAs and specific protection provided by the restrictions in the SRAs (especially those that serve as support/habitat for threatened and endangered species), along with the case-by-case consultation, would result in no adverse impacts to any special status species. No Surface Access restrictions in SRAs would help to ensure no habitat disturbance or disturbance of individual threatened and endangered species present in these areas.

IMPACTS TO CULTURAL RESOURCES

Introduction

Cultural resources was selected as a topic for this chapter because hydrocarbon contamination from an abandoned natural gas processing facility has spread via surface water into Novillo Line Camp, a historic site listed on the National Register of Historic Places. The contamination is resulting in a visible hydrocarbon sheening on surface water and strong hydrocarbon odor, which are substantially degrading the character and setting of the historic property.

Except for the persisting contaminants issue at Novillo Line Camp, the NPS anticipates that federal laws and regulations and NPS policies provide management tools for protection and management of cultural resources. These are described in Chapter 2, Part II, under Current Legal and Policy Requirements. Nonfederal oil and gas Plans of Operations would continue to be evaluated on a project-by-project basis, and the integrity of physical remains and the context therein of listed or potentially eligible historic properties would be protected under federal laws and regulations and NPS policies as described in Chapter 2, Part II. National Seashore staff would coordinate with cultural resource specialists in the Intermountain Support Office-Santa Fe, and with the Texas Historic Preservation Office, to identify potential impacts and develop mitigation techniques. Through this process, project-specific mitigation techniques would be applied, and cultural resources would be avoided.

Only about 0.5 percent of the park has been surveyed for archeological resources; therefore, it is likely that the majority of below-surface resources on Padre Island National Seashore have not been discovered. Visible, aboveground cultural resources have been identified: Novillo Line Camp, Green Hill Line Camp, and Black Hill Line Camp. The Mansfield Cut Archeological District and Novillo Line Camp are listed on the National Register of Historic Places. The Black Hill Line Camp and the Green Hill Line Camp (including their cultural landscapes) are recommended as eligible for the National Register. All four of these cultural sites were identified as Sensitive Resource Areas (SRAs) for the purposes of this Plan/EIS.

Actions on or near historic properties are assessed for their potential to adversely affect the qualities that make the property eligible for the National Register of Historic Places. To be eligible for the National Register, a property must be not only historically significant but it must also have integrity. The National Register defines "integrity" as the property's ability to convey its historic significance. Further, the National Register identifies seven qualities that comprise integrity: location, design, setting, materials, workmanship, feeling, and association. A property does not have to retain all seven aspects to retain its integrity. The reason for the property being historically significant determines which integrity qualities are most important for that particular property.

Impact Significance Criteria

The following would be considered significant or major impacts to cultural resources:

- Destruction or alteration of part or all of a prehistoric or historic property.
- Isolation from or alteration to its surrounding environment.
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.

Impacts to Cultural Resources Common to All Alternatives

Because only a very small percentage of the park has been surveyed for archeological resources, it is possible that cultural resource surveys to be performed in and adjacent to the proposed operations area could lead to the discovery of previously unknown archeological sites and other cultural resources. The discovery of previously unknown archeological sites increases the NPS's knowledge of the National Seashore. When the park was established, access and surface uses were permitted under Special Use Permits. Then in 1979, permits were authorized under the NPS's Nonfederal Oil and Gas Rights Regulations, 36 CFR 9B. Since that time, all new surface uses permitted under Plans of Operations, pursuant to the 36 CFR 9B regulations, have required cultural resource surveys. See the Nonfederal Oil and Gas Exploration and Development section in the Affected Environment Chapter for a description of existing and abandoned nonfederal oil and gas operations. To date, archeological surveys related to nonfederal oil and gas operations have resulted in several new archeological discoveries.

Known archeological sites are relatively small, so avoidance of sites by road construction, seismic operations, and well drilling and production could be easily achieved. Under all alternatives, when significant sites cannot be avoided, cultural resources would be protected from potential impacts of oil and gas operations by excavating the site, using methodologies defined in a reviewed and approved research design (described under Current Legal and Policy Requirements in Chapter 2, Part II). In these rare instances, while information is retrieved from the site, the impacts to the site would be irreversible. Certain sites are considered significant for reasons other than their scientific value. Sites associated with significant events (criterion “a”) or persons (criterion “b”) or which embody distinctive characteristics (criterion “c”) cannot have direct impacts mitigated merely through data collection, and often memoranda of agreement stipulating other types of mitigation measures must be developed and signed before a proposed action can proceed. Indirect impacts must also be considered at these sites and some standing structures may require that a sensory buffer be defined in which visual, audible or atmospheric elements do not alter the setting.

Geophysical Exploration (3-D Seismic Surveys): Three-Dimensional (3-D) seismic operations could have both beneficial and adverse impacts concerning unknown archeological sites. Because the seismic lines would run in a dense grid pattern over the entire park, with a minimum of 12,800 shot holes drilled along lines in one direction while geophone lines are placed perpendicular to the shot lines, there is potential for discovering previously unknown archeological sites, thereby increasing the NPS's knowledge of the park. However, there is also the possibility that archeological evidence could be destroyed in the process of conducting seismic operations. However, each shot hole would be approximately 3 to 4 inches in diameter, which is smaller than the area typically disrupted by a professional archeologist performing a shovel test. Also, seismic surveys could be performed with specially designed lightweight vehicles and hand drills to minimize surface disturbance. In addition, surface cratering and erosion resulting from dynamite detonation is not expected at Padre Island, since operators generally drill relatively deep shotholes (25 to 50 feet). Following placement of the charge at the bottom of the hole, the sandy soil rapidly collapses the hole above the charge. Also, multiple shotholes at one location are usually not required.

Construction Activities: Any ground-disturbing activity, such as those associated with construction of drilling and production pads, access roads, flowlines and pipelines, geophysical exploration, and field development, have the potential to affect prehistoric, historic, and traditional cultural resources. Specific actions could include: limited clearing of vegetation along source and receiving lines, dredging, survey marking, foot and vehicle traffic, construction and maintenance of roads, drill and production pad construction, disposal of dredge material, drilling, spill response, reclamation, fire management, flowline and pipeline construction, construction of fencing, and directional drilling. Prior to any ground-disturbing activity, an archeological survey would be required. It is expected that such surveys would identify buried cultural resources and damage to them would be avoided by project design.

Exploratory Drilling, Production Operations, and Flowlines and Pipelines: Sights, sounds, and odors from wellsites and production sites could have an effect on cultural sites. Strong hydrocarbon odor was documented at Novillo Line Camp during a period of high water (March and May 1998) and is thought to have been carried by the prevailing wind from the nearby Chevron abandoned shorebase production facility. Refer to the section titled "Contamination" under the heading "Nonfederal Oil and Gas Exploration and Development" in Chapter 3, Affected Environment, for a description of the abandoned oil and gas site, and the section "Historic Structures" in the Cultural Resources section of Chapter 3 for a description of significance ofNovillo Line Camp. Hydrocarbon odor introduces an atmospheric element that is out of character with the historic property and alter its setting.

Chevron has committed to remediate the hydrocarbon contamination at the abandoned shorebase production facility to meet NPS objectives. The NPS anticipates that when Chevron has completed cleanup at the abandoned shorebase production facility, the hydrocarbon odor at Novillo Line Camp would be removed.

To protect significant cultural sites from sights, sounds and odors of oil and gas operations, mitigation measures would include locating oil and gas operations away from cultural sites, and utilizing screening, noise abatement, and other methods to minimize anticipated effects.

Conclusion

- Cultural resource surveys required prior to ground disturbance could lead to the discovery of previously unknown archeological sites and other cultural resources, and add to the information about the cultural resources of the park.

- Ground-disturbing activities associated with construction of well pads, roads, placement of flowlines, or geophysical exploration has the potential to affect prehistoric, historic, and traditional cultural resources. Sites that cannot be avoided would be excavated so that information is retrieved; however, impacts to the site would be irreversible.

- Three-dimensional seismic survey shot holes, 3 to 4 inches in diameter, are smaller than the area typically disrupted by a professional archeologist performing a shovel test; therefore digging of shot holes would not be considered an adverse effect. Detonation of explosive charges may have an effect on the distribution and condition of artifacts in a surface artifact scatter or the condition of surface features. Each shot hole location would be surveyed by a qualified archeologist, and avoidance would result in repositioning the shot hole location.

- A qualified archeologist would monitor ground-disturbing activities so that cultural sites not be visible from the surface are not damaged by construction activities or seismic operations. Operations shall be halted in the area where archeological resources are uncovered and the operations re-evaluated with an NPS archeologist to evaluate the significance of the discovery and to determine how the project in the area of discovery shall be conducted to avoid impacting the site.

- Sights, sounds, and odors from wellsites, developed fields, or geophysical exploration activities could have an effect on cultural sites. Mitigation measures including setbacks for siting oil and gas operations, screening, and noise abatement may be employed to mitigate anticipated effects. Some standing structures may require that a sensory buffer is defined in which visual, audible or atmospheric elements do not alter the setting.

- Indirect impacts to cultural resources would occur by increased public access into areas that could increase the visibility of cultural resources and result in vandalism, illegal artifact collecting, or illegal excavation. While such activities could be minor and occur sporadically, over a period of time the impacts could be considered cumulatively significant. Conversely, increased access can often increase the recreational or educational value of such sites.

- Contamination at a nearby abandoned oil and gas production facility may be adversely affecting the Novillo Line Camp, listed on the National Register, by introducing an atmospheric element, hydrocarbon odor, which is out of character with the historic setting. Until such time as the operator successfully completes cleanup, which is ongoing, this resource may be adversely affected.

Impacts to Cultural Resources under Alternative A, Proposed Action

Under this alternative, four listed or potentially eligible historic properties would be identified as Sensitive Resource Areas, and protective zones would be established in which a No-Surface Occupancy stipulation would be applied to drilling and production operations. The No-Surface

Occupancy stipulation would result in avoidance of surface disturbances, and would also minimize visual, audible, and atmospheric elements from nonfederal oil and gas operations that could be permitted adjacent to the cultural sites but outside the protective buffer, which would be out of character with the cultural properties or alter their settings.

Seismic operations may be permitted within four significant cultural zones under Current Legal and Policy Requirements requiring no surface disturbance, except that 3- to 4-inch diameter shot holes may be drilled but shall be reclaimed to grade after seismic operations are completed. With the application of avoidance and mitigation measures described in Chapter 2, under Current Legal and Policy Requirements, impacts from seismic operations on significant cultural sites are expected to be negligible.

This alternative provides for consistent application of mitigation techniques to protect the four sites, and would allow for more efficient processing of Plans of Operations, saving time and costs for the operator, NPS, and Texas State Historic Preservation Office staff.

The four listed or potentially eligible historic properties and their protective buffers comprise 3,703 acres, or 2.8 percent of the park.

Cumulative Impacts to Cultural Resources under Alternative A, Proposed Action

Under Alternative A, negligible cumulative impacts to cultural resources could occur in the event that cultural sites cannot be avoided and excavation/data recovery is required.

Conclusion

- The designation of four historic properties as Sensitive Resource Areas and establishment of protective zones and operating stipulations would provide consistent protection of the integrity of physical remains and the context of these sites from future nonfederal oil and gas operations. Restrictions on drilling and production in and near SRA cultural sites would limit potential direct and indirect adverse impacts in these areas.

- The prescribed buffers and operating restrictions would also provide for more efficient processing of Plans of Operations, reducing time and costs for the operator, NPS, and State Historic Preservation Office staff.

Impacts to Cultural Resources under Alternative B, No-Action/Current Management

Under Alternative B, No-Action/Current Management, SRAs are not recognized, nonfederal oil and gas Plans of Operations would continue to be evaluated on a project-by-project basis, and the integrity of physical remains and the context therein of four listed or potentially eligible historic properties would be protected under federal laws and regulations and NPS policies as described in the Current Legal and Policy Requirements - Protection of Cultural Resources, contained in Chapter 2. Park staffs would coordinate with cultural resource specialists in the Intermountain Support Office-Santa Fe, and with the Texas State Historic Preservation Office, to identify potential impacts and develop mitigation techniques. Through this process, project-specific mitigation techniques would be identified and applied. Additional time would be required to review and process Plans of Operations for approval in order to incorporate consultation and coordinate between the park, support office, cultural resource specialists, and SHPO staff. This would incur additional time and possibly increase costs for operators in cases where operators would need to modify or redesign operations. The potential could exist for the loss of integrity or context of these sites as a result of applying inadequate mitigation measures and/or inconsistently applying mitigation techniques due to changes in administration in the park and the Texas State Historic Preservation Office.

Cumulative Impacts to Cultural Resources under Alternative B, No-Action/Current Management

Cumulative impacts to cultural resources would be the same as described for Alternative A.

Conclusion

- Alternative B, No-Action/Current Management, would provide protection to significant cultural resources by applying basic federal laws and regulations and NPS policies on a project-by-project basis, through which project-specific mitigation measures could be applied. This management strategy would be the most time-consuming of the three alternatives. Negligible impacts to cultural resources are anticipated from the RFD scenario under this alternative.

Impacts to Cultural Resources under Alternative C, Maximum Resource Protection in all SRAs

Under this alternative, the four listed or potentially eligible historic properties would be identified as SRAs, and establishment of protective zones, within which No Surface Access for any type of nonfederal oil and gas operation would be permitted. This alternative would consistently provide maximum protection for the integrity of physical remains and the context therein of these sites as nonfederal oil and gas Plans of Operations are evaluated on a project-by-project basis by not allowing any access and therefore no potential for impacts.

Similar to Alternative A, the prescribed buffers and operating restrictions would provide for more efficient processing of Plans of Operations, reducing time and costs for the operator, NPS, and State Historic Preservation Office staff. Negligible impacts to cultural resources are anticipated under Alternative C.

The four listed or potentially eligible historic properties and their protective buffers, within which no access for any type of nonfederal oil and gas operation would be permitted, comprise 3,703acres or 2.8 percent of the park.

Cumulative Impacts to Cultural Resources under Alternative C, Maximum Resource Protection in All SRAs

Cumulative impacts to cultural resources would be the same as described for Alternative A.

Conclusion

- Under Alternative C, four historic properties would be identified as SRAs, and protective zones are established in which a No Surface Access stipulation would apply to all nonfederal oil and gas operations. This alternative provides maximum protection to the significant cultural sites by precluding surface access to nonfederal oil and gas operations and therefore avoiding major adverse impacts. A No Surface Access restriction on geophysical exploration, drilling and production in and near SRA cultural sites would avoid direct and indirect adverse impacts in these areas. Therefore, only negligible impacts to cultural resources are anticipated from the RFD scenario under Alternative C.

- Similar to Alternative A, more efficient processing of Plans of Operations and consultation with the State Historic Preservation Office are anticipated with the development of protective buffers and operating restrictions.

IMPACTS TO VISITOR EXPERIENCE

Introduction

Visitor experience was selected as a topic for this chapter because oil and gas operations introduce an industrial element into a natural environment, with potential conflicts with visitor uses, enjoyment, and safety.

An estimated 800,000 people visit Padre Island National Seashore every year to fish, swim, hike, wind surf, beachcomb, camp, view wildlife, and observe a relatively undeveloped barrier island environment. Oil and gas operations could cause direct and indirect impacts to the visitor experience. Access restrictions, surface disturbances, noise, odors, noxious fumes, and release of oil or hazardous chemicals all would affect recreation activities, because the opportunities for certain types of recreation would be lost or the quality of the recreation experience would be lowered.

As described in Chapter 3, Padre Island National Seashore offers the visitor many different options, from developed visitor use areas, trails, and campgrounds to beaches and water-related recreational experiences. Of particular interest are those visitor areas designated as SRAs, such as Malaquite Visitor Center and Bird Island Basin. To date, visitor use surveys have concentrated on Bird Island Basin and the down-island beaches, and the visitor comments concerning impacts of oil and gas operations were limited to oil and debris on beaches. In general, existing oil and gas operations have been sited and operated with a minimal number of visitor complaints. There are few other direct reports of visitors' negative perceptions of oil and gas operations, although a few noise-related complaints have been received by the park staff, especially during seismic operations (Echols, pers. comm., 1998).

The following discussion includes an analysis of potential impacts to visitor experience from direct and indirect impacts, especially visual intrusion and noise.

Impact Significance Criteria

Impacts to visitor experience could be considered significant or major if:

- The release of a contaminating or hazardous substance would endanger visitor health and safety.
- Oil and gas operations would interfere with traditional visitor uses at established visitor use areas during peak times (holidays, weekends). This includes any closure to visitor access for more than 4 hours.
- Oil and gas development would alter the physical setting by introducing unwanted visual contrast to the landscape, intrusive noise, smells, or lighting that would be noticeable to the casual viewer and would interfere with the visitor experience.
- Oil and gas operations would not be operated in a clean and workmanlike manner, resulting in leaks and spills of oil and gas products, and/or litter.

Impacts to Visitor Experience Common to All Alternatives

Recreation Experience: Direct impacts would occur in areas where oil and gas activities would temporarily displace a recreation activity, create the loss of land available for recreation, or cause the loss of recreational settings. The land use for oil and gas development sites and access roads would be closed to visitor access. This could restrict recreation use on up to 250 acres or 0.2 percent of the National Seashore. Another 748 acres (0.88 percent of the terrestrial lands of the park) could experience direct impacts from seismic survey activity. Direct impacts to developed visitor use areas from disturbance caused by oil and gas activity should be negligible with the application of the 1,500-foot offsets requiring "no-surface occupancy" for drilling, producing, and pipeline activities. Indirect impacts would result if disturbance is visible or audible from recreation areas. Indirect impacts such as noise, dust, odors, night lighting, and increased human activity would not necessarily preclude recreational use, but would decrease the quality of the recreation experience.

Past oil and gas activities have resulted in the transport of hydrocarbon contamination from an abandoned production facility into the nearby Novillo Line Camp. The line camp is probably the most significant of the line camps, because it is already listed in the National Register of Historic Places and is very accessible from a primary road. Although this condition can be corrected, the visible sheening on the surface of the water and strong hydrocarbon odor degrades the visitor experience. Therefore, because of this, the cumulative impact to visitor experience under any alternative is a major adverse impact, and would persist until the contamination is corrected.

Visual Impacts: Park visitors could have a high sensitivity to any changes (modifications in form, line, color, and texture) to the visual environment. Oil and gas activity visible from adjacent roads in the foreground (0 to 1/2 miles), would result in high impacts to recreation resources in the form of strong visual contrasts visible from sensitive viewpoints. Moderate impacts would result from strong contrasts visible in the middleground view (1/2 to 3 miles) and moderate contrasts in the foreground view. In primitive areas of the park requiring four-wheel-drive access, such as along the Gulf beach south of the four-wheel-drive sign, an indirect impact would be expected due to the reduction or loss of the recreation experience where users anticipating a nature experience would pass a developed field or view a related disturbance. The visual or audible presence of oil and gas activities could impact these primitive areas of the National Seashore by potentially lessening the experience for those resource users of primitive areas, and possibly displace these users to other more remote areas of the National Seashore where the potential for this experience exists, if the users are adversely affected by the presence of the oil and gas operations. Based on the minimum 3-mile distance from roads with motorized use, the potential affected acreage from one exploratory well and associated road development would potentially change 1,200 acres. If field development were to occur in primitive areas, 7,500 acres per field would potentially be affected. However, the actual impact would depend greatly on visitors' perceptions of the oil and gas presence, and few complaints have been registered to date regarding this.

Exploration and most development activities would have relatively minor and short-term impacts on recreationists. The exception would be in fields where more intensive oil and gas development occurs. Field development is anticipated to occupy a small percentage of the land within the National Seashore. In developed oil and gas fields, permanent support facilities such as roads, powerlines, compressors, and storage facilities would cause alteration of the landscape.

When facilities and activities cause extensive alteration of the landscape, the recreation setting shifts from undeveloped to developed. Recreation settings would shift from primitive, semiprimitive non-motorized, or semiprimitive motorized to modern urban or rural settings. Activities would change from resource-dependent (primitive) to facility-dependent (modern urban). Once these changes occurred, the areas would probably never be returned to their original class, even with rehabilitation. The effect would be a decline in the area available to users who prefer undeveloped settings and an increase in the area available to users who prefer more developed settings. However, once exploration and development have ceased, rehabilitation would resolve many of the adverse impacts to recreation. The remaining production facilities could have a long-term moderate to major adverse impact on outdoor recreation.

Recreational settings, opportunities, and recreational developments would be maintained through the application of Current Legal and Policy Requirements. These would prevent desired recreational settings and opportunities from being impaired or destroyed. Under Current Legal and Policy Requirements, production facilities are to be located where they would not be seen by the visiting public using the Gulf beach or campground areas, including Bird Island Basin, Malaquite Visitor Center, Malaquite campground, and significant cultural sites, or else technically feasible methods to minimize the visual impact are to be used. Exploratory wells and production operations in the Gulf are to be offset 2 miles offshore from the 2-fathom line (from September 15 to March 15), and 3 miles from March 15 to September 15, or directionally drilled from behind the high dune line, to minimize visual impacts to Gulf beach visitors. Production equipment is to be designed to minimize visual intrusion and painted to blend with the surrounding environment. In addition, the provisions state that surface operations shall not be conducted within 500 feet of any structure or facility (excluding roads) used for unit interpretation, public recreation, or administration, unless specifically authorized. All of these provisions, applied under any of the alternatives, serve to reduce indirect visual (and other) impacts from oil and gas operations.

Other Indirect Impacts, Including Noise: Oil and gas development would increase the number of vehicles in the park, and introduce large-scale drilling equipment on park roads and the Gulf beach. Increased traffic and operational activity could lower the quality of the recreational experience due to the increased noise associated with vehicles and operations. The noise could especially affect opportunities for users to enjoy semiprimitive, nonmotorized, and semiprimitive motorized recreation experiences.

Major adverse noise impacts would occur if the oil and gas activity occurs close enough to a visitor use area to cause interference with the enjoyment of the park. Drilling and production operations would increase noise levels where ambient noise levels are substantially lower. Drilling and production operations would also introduce light into areas of natural darkness, which could reduce the recreation experience for some visitors. Drilling and production activities would intrude on the natural setting for potentially 30 years or more.

Creating the buffers for the SRAs was done partly in response to concern about noise impacts, because these can carry farther from the source than visual, odor, or some lighting impacts. Also, noise can drive wildlife away from visitor use areas, thus diminishing the visitor experience related to wildlife viewing in these areas. The 1,500-foot buffer provided for the Malaquite Visitor Center and campground, Grasslands Nature Trail, and Bird Island Basin would help to reduce many indirect impacts from oil and gas operations, including visual, odor, lighting, and especially noise impacts. This size of buffer is needed so that noise levels remain at or near the background levels inthese visitor use areas (see Figure 3.10). With the buffers included under Alternatives A and C, the oil and gas operations would be sited farther away from popular visitor use areas, so that effects on visitors using these areas would be minimized.

Geophysical exploration could alter recreation experiences and fishing success within a few miles of the exploration activity with the unanticipated noise from seismic blasting. This might result in temporary displacement of recreation activities. Geophysical activities generally last only a short time in a given area, and timing of operations could reduce the potential impact on visitor use and enjoyment to minor levels.

Health and Safety: All oil and gas development activities could increase the potential for hydrocarbon and hazardous substances to be released into the environment, jeopardizing park visitors' health, safety, and recreation experiences. Geophysical exploration could subject park visitors to hazards associated with coming into contact with explosives. The possibility of a hurricane damaging drilling and production sites and pipelines and spreading materials and substances could cause environmental contamination. Also, increased traffic associated with all oil and gas development could increase the potential for conflicts and motor vehicle accidents involving recreationists, particularly visitors on the Gulf beach to minor levels.

Several of the Current Legal and Policy Requirements address protection of human health or safety and, if applied, would serve to minimize impacts to visitors. These include requirements to site and operate production facilities so as to minimize conflicts with visitor use; clean up contamination; hire security; provide fencing around facilities and hazardous equipment; clearly mark hazardous areas; and not conduct surface operations within 500 feet of any structure or facility used for interpretation, public recreation, or administration, unless specifically authorized. There may also be restrictions to minimize visitor conflicts during certain holidays or other days and times where additional visitors are expected.

Although geologic conditions make it unlikely, a remote possibility exists of an accidental release of hydrogen sulfide during drilling operations due to equipment failure or accident.

A well blowout could cause unpredictable, and possibly major, damage near the proposed well sites. The extent of damage could depend on the volume and characteristics of the materials released; environmental conditions at the time of the blowout; and the length of time required to bring the well back under control. A blowout could release liquid materials (drilling fluids, formation waters, oil, or natural gas condensate) under pressure. These liquids could be spread some distance from the well site. A well blowout could also release methane, carbon dioxide, H_2S, and other gases into the atmosphere. If fires accidentally occurred, or if the well was intentionally set on fire for safety reasons, sulfur dioxide could be produced.

Preventing well blowouts is an important concern during drilling, and is accomplished by use of experienced drilling personnel and measures required by Current Legal and Policy Requirements that address High Pressure Precautions. These include proper casing and cementing; proper design and use of drilling muds, and constant monitoring of the characteristics and volume of drilling mud to determine conditions in the wellbore; and equipping the well with blowout preventers, which can be used to shut in the well if needed. Proposed Plans of Operations for drilling would be required to prepare and submit an H_2S Contingency Plan in the event that H_2S is encountered.

Conclusion

- Although there has been little indication to date that oil and gas operations are causing major disruption to the Padre Island National Seashore visitor, there is the possibility that major impacts to visitor experience could occur near certain visitor use areas and other remote locations used by visitors to experience the natural and cultural environments, and view wildlife. Noise, in particular, may affect the visitor, if buffer distances are not sufficient and background levels are exceeded, causing disruption to wildlife use and/or visitor enjoyment, especially to visitors seeking solitude.

- Hydrocarbon contamination at several oil and gas production facilities may be degrading visitor experience to Padre Island National Seashore visitors due to the introduction of industrial uses and hydrocarbon odors that is out of character with the natural and cultural surroundings. Until such time as the operators successfully complete clean up and restoration, adverse impacts to visitor experience may continue.

Impacts to Visitor Experience under Alternative A, Proposed Action

Under this alternative, specific protection measures would be applied to protect visitor use areas, including those identified as SRAs (Malaquite Visitor Center and Campground, Bird Island Basin, and Grasslands Nature Trail). These would have a 1,500-foot buffer in which no surface occupancy for road construction, well drilling, production, or pipelines would be permitted. Short-term seismic operations may be permitted under Current Legal and Policy Requirements.

The effects of oil and gas development on visitor use areas and the general visitor experience at Padre Island National Seashore are not expected to result in major adverse impacts under Alternative A, because of the buffers established for the sensitive visitor use areas and other operating stipulations regarding lighting, location, health and safety precautions, security, and spill prevention and cleanup. Also, there is little evidence to indicate that the visitor experience has been substantially affected by existing operations. Therefore, with the additional protective measure built into the SRA buffers, impacts to visitor experience would be minor to moderate at most under Alternative A.

Cumulative Impacts to Visitor Experience under Alternative A, Proposed Action

Hydrocarbon contamination at an abandoned production facility near the Novillo Line Camp is resulting in hydrocarbon odors which may be degrading visitor experience. Until corrected, this represents a major adverse cumulative effect on the visitor experience.

Conclusion

- There are no major impacts expected from the RFD scenario to Visitor Experience under Alternative A due to the specific distance restrictions provided with the SRA buffers; the Current Legal and Policy Requirements, which provide avoidance, mitigation and health and safety measures; and the indications that visitors do not have major issues with oil and gas operations in the park, as evidenced by surveys and the complaint record at the park.

- With the application of the SRA buffers, plus the avoidance, mitigation, and health and safety measures provided in the Current Legal and Policy Requirements, there should be no major impacts to visitor experience under Alternative A.

Impacts to Visitor Experience under Alternative B, No-Action/Current Management

Under this alternative, continued implementation of current management policy and objectives would result in protecting visitor use developments and visitor enjoyment on a case-by-case basis. No specific protection would exist to ensure that visitor uses or developments would be protected from oil and gas development in the form of designated SRAs and buffers.

Developed recreation sites may not receive adequate protection if an oil and gas activity is proposed immediately adjacent to or on these sites. Noise, dust, odors, increased traffic, and visual impact from well sites could reduce the quality of the visitor experience when well sites are very close to sensitive visitor use areas and result in major adverse impacts. It is expected that the measures provided for in the Current Legal and Policy Requirements would lessen impacts considerably; however, there is the potential for major impacts, especially from noise, since the buffers needed to substantially reduce this impact (1,500-foot) would not apply in SRAs. Only a 500-foot buffer is required under Current Legal and Policy Requirements.

Cumulative Impacts to Visitor Experience under Alternative B, No-Action/Current Management

Cumulative impacts to visitor experience would be the same as described for Alternative A.

Conclusion

- Current Legal and Policy Requirements, especially the lesser locational restriction provided for near SRA Visitor Use Areas (500-foot), may not provide enough mitigation, so that there is the possibility that major impacts to visitor experience could occur near the SRA Visitor Use Areas and other remote locations used by visitors to experience the natural environment and view wildlife. Noise, in particular, may affect the visitor, if buffer distances are not sufficient and background levels are exceeded, causing disruption to wildlife use and/or visitor enjoyment in these areas. Although there has been little indication to date that noise is causing major disruption to the Padre Island National Seashore visitor, the possibility exists, if oil and gas facilities are sited too close to sensitive use areas.

- If the buffers and other provisions provided for by the Current Legal and Policy Requirements are not sufficient to mitigate impacts that can affect the visitor experience, then there could be major adverse impacts (e.g., from noise).

Impacts to Visitor Experience under Alternative C, Maximum Resource Protection in All SRAs

Under this alternative, the same protective measures applied under Alternative B would be used to protect visitor uses and developments from oil and gas operations; however, under this scenario, all visitor use areas (including the Malaquite Visitor Center and Campground, in addition to the segment of Gulf beach along these areas, Bird Island Basin, and the Grasslands Nature Trail) would have a 1,500-foot buffer in which no oil and gas activities would be permitted.

Under this alternative, there would be no major adverse impacts expected to visitor experience, either direct or indirect, from visual, noise, or other intrusions, because of the limited access in SRAs and associated larger buffer areas, and the limitation on exploratory (seismic) activities in all SRAs.

Cumulative Impacts to Visitor Experience under Alternative C, Maximum Resource Protection in All SRAs

Cumulative impacts to cultural resources are the same as described for Alternative A.

Conclusion

- There are no expected major adverse impacts in any SRA under Alternative C, given the level of specific protection provided by the "No Surface Access" restriction to all types of oil and gas activity in any SRA.

- If the buffers and other provisions provided for by the Current Legal and Policy Requirements are not sufficient to mitigate impacts that can affect the visitor experience, then there could be major adverse impacts (e.g., from noise).

COMPARATIVE ANALYSIS OF THE PROPOSED ACTION AND ALTERNATIVES

Summary of Impacts

Table 2.4 provides a summary of the impacts associated with each alternative for each issue addressed in this chapter. The reader is referred to this table for an abbreviated comparative analysis of the differences among the alternatives.

Enhancement of Long-term Relationship between Local Short-term Uses of the Environment and Maintenance and Productivity

For all alternatives, most impacts would be relatively short-term and would be mitigated so that they do not persist beyond the life of the well fields. Land disturbed would be reclaimed, all equipment and contamination or wastes removed, and the ground restored to its natural contours. However, some soil and land surface disturbances for well field development may cause long-term effects, if disturbed land is not totally restored or restored only after a very long period of time. For example, access roads may be used for more then one well pad or for other multiple uses. In such cases, long-term productivity would likely decrease and possibly be lost in the areas used for access roads. Also, for wetlands, if the mitigation required is not successful in recreating the original productivity of areas lost, there could be a loss in long-term productivity in certain areas. This would be the case if certain out-of-kind wetland mitigation would be approved for replacement of productive wetland acreage.

Irreversible or Irretrievable Commitments of Resources

The term “irreversible commitment of resources” refers to the loss of production or use of a resource that cannot be changed. Nonrenewable minerals are an irreversible commitment, if used. An “irretrievable commitment of resources” refers to losses of production, harvest, or use of renewable natural resources.

For all the alternatives, there would be an irreversible commitment of oil and gas resources of up to 80 BCF. Any cultural resources destroyed due to surface exploration would be irreversible; however, given the size of the seismic shotholes, this would be relatively minor. For all alternatives, there would be an irretrievable loss of production and a loss of undeveloped areas for visitor experience where the ground is cleared and disturbed for oil and gas exploration, including roads, well pads, and nearby areas. This involves approximately 250 acres or 0.2 percent of the park. The potential for these lands to produce vegetation or be viewed in an undisturbed state would be irretrievably committed for the duration of the oil and gas development activities.

Unavoidable Adverse Impacts that Cannot be Avoided Should the Action be Implemented

Unavoidable adverse impacts are major impacts that cannot be avoided and cannot be mitigated, and, therefore, would remain throughout the duration of the project to some point beyond. For Alternatives A or B, there may be unavoidable adverse impacts if roads are constructed through foredunes. This impact is difficult to mitigate, because it is very difficult to rebuild and reclaim foredune areas affected by road-building.

For all alternatives, there may be unavoidable adverse impacts if the mitigation proposed for affected wetlands is not successful and/or does not replace the original wetland functions and values. It is difficult to ensure that mitigation of wetlands would have the necessary water regime and other environmental conditions to succeed. Although Alternative C avoids impacts to sensitive seagrass beds in the Laguna Madre, it is likely that other wetlands could be impacted.

Finally, under Alternative B, there may be unavoidable adverse impacts to visitor experience and some SRAs (visitor use areas) if the buffer (500-foot) and other measures under Current Legal and Policy Requirements do not provide enough of a restricted area between oil and gas operations and sensitive visitor use areas, such as Malaquite Visitor Center, Bird Island Basin, Grasslands Nature Trail, and other more primitive areas. If only a 500-foot buffer is used, there is a distinct possibility that noise from drilling rigs could affect the visitor experience at these areas. This would depend on the specific location, intervening topography and vegetation, and the existing background noise levels.

CHAPTER 5

CONSULTATION AND COORDINATION

CHAPTER 5
CONSULTATION AND COORDINATION

INTRODUCTION

During consultation and coordination for this Final Oil and Gas Management Plan/Environmental Impact Statement, formal and informal efforts have both been made to involve the public and local, state, and federal agencies. This involvement occurred through an open house, telephone calls, and letters. All applicable public participation has been documented and analyzed and is on file.

The planning process for this document was officially initiated through a public notice in the *Federal Register* on June 10, 1997. This notice invited the general public, as well as federal, state, and local government agencies, to identify issues and submit comments regarding the proposed planning effort to the NPS. In June 1997, the NPS mailed a public scoping newsletter to over 300 individuals, organizations, and government agencies. The newsletter announced the beginning of the EIS scoping process and the location, date, and time of the scoping open house. The NPS also published the notice of intent and announced the scoping open house by placing newspaper advertisements in the Austin *American-Statesmen*, Houston *Chronicle*, and the Corpus Christi *Caller Times*. The notices requested public participation, and provided the public with opportunities to schedule additional scoping open houses; however, the NPS received no requests for additional scoping meetings. The scoping open house was held in Corpus Christi, Texas, on July 9, 1997. At this meeting, the NPS received comments directly pertaining to the issues identified with oil and gas development. A second newsletter was sent to the public on March 6, 1998, to over 280 individuals, summarizing the results of the scoping open house and the written comments received by the NPS. This newsletter is on file at the NPS Intermountain Support Office-Santa Fe, and Padre Island National Seashore.

The U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Texas Parks and Wildlife Department have been consulted concerning listed threatened or endangered wildlife and plant species. Also, the Texas State Historic Preservation Officer and the Tonkawa Tribe have been consulted concerning cultural resource and ethnographic concerns. Documentation of these consultations is on file at the NPS Intermountain Support Office-Santa Fe, and Padre Island National Seashore. In response to receiving the Draft Oil and Gas Management Plan/EIS, the State of Texas' General Land Office commented on May 20, 1999, that the National Park Service needed to submit the document for a consistency determination to the Coastal Coordination Council, prior to finalizing the EIS. The National Park Service did so, and on September 17, 1999, the Coastal Coordination Council determined that there are no significant unresolved consistency issues with respect to the project, and concluded that this project is consistent with the Coastal Zone Program goals and policies. Coordination and consultation with these federal and state agencies and the Tonkawa Tribe will be continued during the life of the plan.

The Draft Oil and Gas Management Plan/EIS was available for public review from February 26 through May 12, 1999. The National Park Service published a Notice of Availability in the Federal Register on February 24, 1999; and, upon filing of the Draft Oil and Gas Management Plan/EIS with the U.S. Environmental Protection Agency, the EPA published a Notice of Availability in the Federal Register on February 26, 1999. The National Park Service mailed the Draft Oil and Gas Management Plan/EIS to state and federal agencies, organizations and individuals on February 26, 1999. Fifteen (15) comment letters were received. They are reprinted in full at the end of this chapter. The National Park Service's responses to substantive comments are also provided.

LISTING OF DOCUMENT RECIPIENTS

The following provides a listing of recipients of the Oil and Gas Management Plan/EIS for Padre Island National Seashore.

Federal Government

Congressional Delegation

Senator Kay Bailey Hutchison
Senator Phil Gramm
Honorable Solomon P. Ortiz

Agencies

Federal Emergency Management Agency
Department of Energy
U.S. Environmental Protection Agency
Department of Agriculture
    Natural Resources Conservation Service
Department of the Army
    U.S. Army Corps of Engineers
Department of Commerce
    National Oceanic and Atmospheric Administration
Department of Interior
    Bureau of Land Management, Santa Fe, New Mexico
    Bureau of Reclamation, Billings, Montana
    U.S. Fish & Wildlife Service, Albuquerque
        Corpus Christi Field Office
        Aransas National Refuge, Austwell, Texas
        Laguna Atascosa Wildlife Refuge, Rio Hondo, Texas
        National Wildlife Refuge Complex, Alamo, Texas
    U.S. Geological Survey, Denver, Colorado
    National Park Service
        Superintendent, Aztec Ruins National Monument
        Superintendent, Big Cypress National Preserve
        Superintendent, Big South Fork National River and Recreation Area
        Superintendent, Big Thicket National Preserve
        Superintendent, Buffalo National River
        Superintendent, Cuyahoga Valley National Recreation Area
        Superintendent, El Morro National Monument
        Superintendent, Jean Lafitte National Historical Park and Preserve
        Superintendent, Lake Meredith National Recreation Area
        Superintendent, Lyndon B. Johnson National Historical Park
        Superintendent, New River Gorge National River
        Superintendent, Obed Wild & Scenic River
        Superintendent, San Antonio Missions National Historical Park
Department of Transportation
    Federal Aviation Administration
    Federal Highway Administration
    U.S. Coast Guard

Tribal Government

Tonkawa Tribe

State Government

Senator Carlos Truan, Corpus Christi
Congressman Gene Seaman, Texas
Texas State Department of Highways and Public Transportation, Austin, Texas
Texas State Highway Department, Corpus Christi, Texas
Texas General Land Office, Corpus Christi
Texas General Land Office, Austin, Texas
Texas Historical Commission, Austin, Texas
Texas Natural Resources Conservation Commission, Austin Texas
Texas Parks and Wildlife Department, Austin, Texas
Texas Parks and Wildlife Department, Edinburg, Texas
Texas Parks and Wildlife Department, Corpus Christi
Texas Railroad Commission, Austin, Texas
Texas Railroad Commission, Corpus Christi, Texas
Texas State Aquarium, Corpus Christi
Director, Corpus Christi Museum
Director of Parks, South Padre Island, Texas
Mustang Island State Park, Port Aransas, Texas

City and County Commissions/Planning Commissions

Honorable Lloyd Neal, Mayor, Corpus Christi, Texas
Alice Chamber of Commerce
Aransas Pass Chamber of Commerce
Assistant City Manager, Corpus Christi, Texas
Bee County Chamber of Commerce
Brownsville Convention & Visitor Bureau
City Council, Corpus Christi, Texas
City Council, District 1, Corpus Christi, Texas
City Council, District 2, Corpus Christi, Texas
City Council, District 3, Corpus Christi, Texas
City Council, District 4, Corpus Christi, Texas
City Council, District 5, Corpus Christi, Texas
City of Corpus Christi
County Commissioner, Precinct 1, Corpus Christi, Texas
County Commissioner, Precinct 2, Corpus Christi, Texas
County Commissioner, Precinct 3, Corpus Christi, Texas
County Commissioner, Precinct 4, Corpus Christi, Texas
Corpus Christi City Manager, Corpus Christi, Texas
Corpus Christi Hispanic Chamber of Commerce
County Judge, Corpus Christi, Texas
Corpus Christi Parks and Recreation
Ships of Discovery, Corpus Christi
Visitor Information Centers, Corpus Christi, Texas

City Manager, South Padre Island
Director of Parks, Nueces, Texas
Falfurrias Chamber of Commerce
Gregory Chamber of Commerce
Greater Corpus Christi Business Alliance
George West Chamber of Commerce
Ingleside Chamber of Commerce
Kenedy County Courthouse
Kingsville Chamber of Commerce
Kingsville Visitor Center
Parks and Recreation, Kingsville, Texas
Kleberg County Courthouse
Lake Mathis Chamber of Commerce, Mathis, Texas
Mayor of Refugio
Port Aransas Chamber of Commerce
Refugio County Chamber of Commerce
Rockport/Fulton Chamber of Commerce
Sinton Chamber of Commerce
Taft Chamber of Commerce
Texas Center for Policy Studies, Austin, Texas
Victoria Convention/Visitor
Willacy County Courthouse
Woodsboro Chamber of Commerce

Oil and Gas Industry

American Association of Geophysical Contractor
American Association of Professional Landmen
Amoco Production Company
American Petroleum Institute
Carrizo Oil & Gas
Corpus Christi Geological Society
Duke Energy
Dunn-McCampbell Royalty Interest Group, Inc.
ENRON Oil & Gas Co.
ENRON Pipeline Group
ENSERCH Exploration
ENTRIX, Inc.
Exxon Company, USA
Fina Oil and Chemical Company
Forcenergy, Inc.
Houston Geological Society
Louis Dreyfus Natural Gas Corporation
Marconi Exploration, Inc.
Petrotex Engineering Company
Polaris Exploration Corporation
Royal Production Company, Inc.
Samedan Oil Corporation
Texas Energy & Environmental, Inc., Houston, Texas
Texas Independent Producers & Royalty Owners Association
Valero Energy Corporation

Organizations and Businesses

Adopt-a-Beach Program
Applied Earth Sciences
Aransas Pass Progress
Audubon Outdoor Club
Austin ISD
Belaire Consulting, Inc.
Bob Conwell & Associates
Carter - Burgess
Coastal Bend Audubon Society
Coastal Bend Sierra Club
Corpus Christi Sailboard Association
CCISD
Ecoservices
Elich & Associates
Endangered Species & Wetlands Rpt.
Fishermans Wharf
First State Bank
George Wright Society, Hancock, Michigan
Garth Henro Realty
Goldston Engineering
Gulf Coast Conservation Association
HEART - Help Endangered Animals - Ridley Turtles
Institute for Policy Research Sierra Club
King Ranch
Lower Laguna Madre Foundation
M.D. Surf and Skate
National Parks and Conservation Association
Olivarri & Associates
OPUS
Padre Island Park Company
Padre Isles Property Owners
Padre Island Realtors
Pelican Cove
Peterson Maritime Services, Inc.
Resort Marina
Robstown Economic Development Council
Sabal Palm Grove Sanctuary
Shiner, Moseley and Associates
South Texas Water Authority
Texas Audubon
Texas Excursions
Texas Organization of Endangered Species Trust for Public Lands, Austin, Texas
Texas Shrimp Association
The Gulfstream
Turner Collie & Braden Inc.
Welder Wildlife Foundation
Wetland Habitat Alliance of Texas, Nacogdoches, Texas
Wind and Wave Watersports

Universities

Del Mar College, Corpus Christi, Texas
Southwest Texas State University, Department of Geography and Planning, San Marcos, Texas
Texas A&M University, Corpus Christi Texas
Texas A&M University, C CBN E Program, Corpus Christi, Texas
Texas A&M University, Department of Biology, Kingsville, Texas
Texas A&M University, Sea Grant College Program, Galveston, Texas
Texas A&M University, Sea Grant College Program, College Station, Texas
Texas A&M University, College Services & Technology, Corpus Christi, Texas
University of Texas, Marine Science Institute, Port Aransas, Texas

Newspapers and Magazines

Corpus Christi Caller Times
Flour Bluff Sun
Navy Flightline
Sun Publishing
University News

Radio and Television

KBSO/KCCT
KCTA
KDF-TV
KEDT-TV
KEYS/KZFM
KFGG
KILL-TV
KLUX
K-LITE/KDAE/KLTG
KLTG
KOUL/KCTA
KNCN
KRIS-TV
KRYS
KZTV/K-SIX
WFAA-TV

COMMENT LETTERS ON DRAFT OIL AND GAS MANAGEMENT PLAN/EIS AND NPS RESPONSES TO SUBSTANTIVE COMMENTS

The following pages provide a reproduction of the 15 comment letters received on the Draft Plan/EIS, with NPS responses to substantive comments provided in the right column.

Federal Emergency Management Agency

Region VI
Federal Regional Center
800 North Loop 288
Denton, TX 76201-3698

TX

See below

Kent Baxter 5/25/99

The local flood plain administrator for Kleberg County must be contacted to determine whether a flood plain development permit is required. Please contact Mr. Tomas Sanchez at 512-592-9652 for this information.

1 The local flood plain administrator for Kenedy County must be contacted to determine whether a flood plain development permit is required. Please contact Mr. Don Freeman at 210-583-2551 for this information.

The local flood plain administrator for Willacy County must be contacted to determine whether a flood plain development permit is required. Please contact Mr. M.W. Gould at 956-689-3621 for this information.

1. As requested, on April 1, 1999, the NPS mailed copies of the Draft Oil and Gas Management Plan/Environmental Impact Statement to the three local floodplain administrators. The Protection of Floodplain Values/Hurricane Preparedness section in Chapter 2, Part II, under Current Legal and Policy Requirements, has been revised to include the following requirement: "Nonfederal oil and gas operators shall include in their proposed plans of operations copies of all pertinent county floodplain development permits. All pertinent floodplain development permits would be required by the NPS prior to approving a Plan of Operations."

United States Department of the Interior

U. S. GEOLOGICAL SURVEY
Padre Island National Seashore
P.O. Box 181300
Corpus Christi, Texas 78480-1300

IN RELPY REFER TO:

March 29, 1999

Superintendent
Padre Island National Seashore
Attention: Linda Dansby, EIS Team Leader
Intermountain Support Office - Santa Fe
P.O. Box 728
Santa Fe, New Mexico 87504-0728

Dear Ms Dansby:

I am hereby providing written comments on the Draft Oil and Gas Management Plan Environmental Impact Statement for Padre Island National Seashore.

These comments pertain to concerns regarding sea turtles at Padre Island National Seashore. Padre Island National Seashore (PAIS) provides important habitat for all five sea turtle species that occur in the northwestern Gulf of Mexico. All five species have been documented nesting at PAIS and all five species have been found stranded (washed ashore) at the park

Although pelagic leatherback turtles normally do not inhabit park waters, park waters provide important habitat for foraging and migrating individuals of the other four sea turtle species. Visitors frequently report observations of sea turtles in nearshore Gulf waters and, of course, these waters must be traversed by sea turtles that come ashore to lay their eggs at the park. A large number of green turtles use the Mansfield Channel jetty area for foraging and resting habitat and this area likely serves as one of the most important developmental habitats for green turtles in the northwestern Gulf of Mexico. Green turtles use Laguna Madre waters within park boundaries for foraging and resting; loggerhead, Kemp's ridley, and hawksbill turtles occasionally enter the Laguna Madre, but apparently they are not very abundant there.

Padre Island National Seashore is the most important area in the United States for Kemp's ridley sea turtle nesting. Kemp's ridley is the most critically endangered sea turtle species in the world. During the last 50 years, more Kemp's ridley nests have been documented at Padre Island National Seashore than at any other location in the U S. The mating areas for Kemp's ridleys that nest at PAIS and elsewhere are unknown. The only documented observation of Kemp's ridleys mating in the wild was a pair found in the Mansfield Channel in June, 1991 For over 20 years, a bi-national, multi-agency project has been underway to increase Kemp's ridley nesting at Padre Island National Seashore. This project has been showing promising signs of success during the last few years. It is likely Kemp's ridley nesting will continue to increase at Padre Island National Seashore in future years, if adequate protection is afforded to adult Kemp's ridley turtles in

COMMENTS	RESPONSES
nearshore Gulf waters and on park beaches and to Kemp's ridley eggs and hatchlings on park beaches. As you are aware, Padre Island National Seashore conducts an extensive patrol program to detect and protect nesting sea turtles and their eggs. Although the primary focus of this program is to detect and protect Kemp's ridleys, nests from other sea turtle species are also detected and protected. Virtually all confirmed loggerhead, green, and hawksbill nests found on the Texas coast during the last decade have been located at Padre Island National Seashore. Currently, sea turtle eggs that are located on North Padre Island are transported to the PAIS incubation facility for protected care. Eggs laid in other areas of Texas are also often transported to PAIS for care. Thus, during many years, all confirmed Kemp's ridley eggs laid in the U.S. and all loggerhead, green, and hawksbill eggs laid in Texas, are incubated at PAIS. However, if numbers of sea turtle nests found at PAIS continue to increase, eggs may someday have to be incubated on the beach, due to a lack of space in the PAIS incubation facility and an insufficient number of employees to care for the incubating eggs.	
2 On page 1-18 of the draft plan, Table 1.1 lacks a federal status for green sea turtles. The federal status for green turtles in the state of Texas is threatened. This same table also lacks the state status of hawksbill sea turtles. The state status for hawksbill turtles is endangered.	2. The description of Threatened and Endangered Species and Their Habitat has been moved from Ch 1, Introduction, to Ch 3, Affected Environment, and the description of impact analyses has been relocated and evaluated in further detail in Ch 4, Environmental Consequences. The table of "Listed Species Known to Occur within the Park" has been corrected to show the federal status for green sea turtles as threatened, and the state status of hawksbill sea turtles as endangered.
3 On page 1-19 of the draft plan, it is stated that "The Texas coast averages one sea turtle nest per year, with the majority documented on Padre Island." Through 1994 only about one nest was documented each year. However, it is likely that sea turtle nesting went undetected before and after that time. From 1995-1998, 50 sea turtle nests were documented on the Texas coast, an average of 12.5 nests/year. It was stated that "Twenty-one nests were documented during the nesting season of 1998." It should be noted after that sentence that 17 of those 21 (including four species) were found at PAIS. I think that the importance of PAIS to Kemp's ridley nesting should be emphasized more in the plan. During the last 50 years, more Kemp's ridley nests have been found at PAIS than at any other location in the U.S. An increased number of Kemp's ridley nests have been found in the U.S. each year since 1995 and it is likely that Kemp's ridley nesting will increase in the future. It is likely that PAIS will continue to be of utmost importance to Kemp's ridleys nesting in the U.S., as nesting increases and other south Texas beaches north and south of PAIS become more heavily developed.	3. The description of Threatened and Endangered Species and Their Habitat (moved to Ch 3, Affected Environment) has been revised. Under the section "Sea Turtles," a statement to describe the importance of Padre Island National Seashore to Kemp's ridley turtle nesting has been inserted.
4 On page 1-19 of the draft plan, it is stated that the "park staff locates and cares for an average of 10 stranded hatchlings washed in on the tide yearly." Although the park locates these turtles, we do not care for them - they are sent to the University of Texas Marine Sciences Institute for rehabilitation.	4. The "Sea Turtles" section under the description of Threatened and Endangered Species and Their Habitat (moved to Ch 3, Affected Environment) has been revised to note that "Seashore staff routinely transport stranded sea turtle hatchlings to the University of Texas Marine Science Institute, Port Aransas, for extended rehabilitation as authorized by the U.S. Fish and Wildlife Service."
5 On page 1-19 the draft plan, more emphasis should be placed on the importance of the Mansfield Channel jetties to green turtles. This area supports a large population of green turtles (particularly during the warmer months) and is likely one of the most important developmental habitats for green turtles in the northwestern Gulf of Mexico.	5. The "Sea Turtles" section under the description of Threatened and Endangered Species and Their Habitat (moved to Ch 3, Affected Environment) has been revised to emphasize the importance of the Mansfield Channel jetties to the development of juvenile green sea turtles in the Seashore. Also, specific operating standards have been included under Current Legal and Policy Requirements in Chapter 2, Part II, under the heading "Protection of Threatened and Endangered Wildlife." These include prohibitions on the use of explosive charges, air guns, or drilling, production, and pipelines within 500 feet of the jetties.

COMMENTS	RESPONSES

6 On page 1-19 of the draft plan, Table 1.2 lists outdated information. I suggest that the table be replaced with the table listed below. This table should highlight the nesting seasons for the four sea turtle species that have been documented nesting at PAIS during recent years A statement in the text that hatchlings of various species strand at PAIS from June through September should suffice for the topic of hatchling strandings. I also suggest elimination of the location column since the plan focuses on PAIS and most nesting for the Texas coast has been documented at PAIS. Please note that nest detection dates have probably been influenced by PAIS patrol dates and Gulf shrimping seasons. During the last few years, PAIS patrols have begun in April and tapered off/terminated during August; eggs laid outside the patrol season (particularly by night nesting species) probably would not have been found. Nestings during dates outside of the Texas Closure (which typically extends from mid-May through mid-July) may have been reduced due to mortality of adult turtles during times when shrimp trawling occurred off park beaches. Also, the precise nesting seasons for these species vary from year to year, perhaps due to climatic variations. Below I have included a column listing the probable nesting season for these species, based on the nesting seasons that have been recorded at the closest monitored nesting beaches for these species.

Events	Dates	Probable Nesting Season
Kemp's ridley nesting/tracks	April - mid-July	late-March - August
Loggerhead nesting/tracks	May - August	late-April - early-September
Green turtle nesting/tracks	June - July	May - September
Hawksbill nesting/tracks	June	April - August

Table 1.2. General Dates and Locations of Sea Turtle Nesting and Tracks at Padre Island National Seashore and Probable Nesting Seasons for these Species.

6. The Table entitled "General Dates and Locations of Turtle Nesting, Tracks, and Hatchling Strandings" has been revised to include all recommended changes.

Oil and gas activities will be conducted at PAIS in the future. Among these activities are seismic surveys, construction activities, exploratory drilling, production, and abandonment. These activities must be managed in such a way that environmental impacts to park resources are minimized. I recommend that the following actions be taken to protect sea turtles at PAIS from oil and gas activities that will be conducted here in the future:

7 1. To avoid disturbance of mating and nesting Kemp's ridley turtles, certain oil and gas activities should not be conducted in nearshore Gulf waters within park boundaries or on park beaches during the Kemp's ridley mating and nesting seasons (March through August) Among the activities that should be prohibited during this time are: seismic surveys, exploratory drilling, and dredging to construct/maintain pipelines. In-water activities conducted from March through August could be lethal to adult Kemp's ridleys, could scare them away from the area, and could harm eggs within gravid turtles. Activities on the beach could deter nesting and could harm eggs while they are in the sand. These same restrictions would apply to other sea turtle species if their nesting also increases at PAIS in the future, but the precise season of concern would be dependent on their particular nesting mating and seasons.

7. To recognize the importance of the nearshore Gulf of Mexico beach area (tide line to the foredunes) and nearshore waters within the Seashore boundary (tide line out to a depth of 2 fathoms) to mating and nesting sea turtles, specific operating standards have been added to the Current Legal and Policy Requirements listed for Threatened and Endangered Wildlife in Chapter 2, Part II, under "Protection of Threatened and Endangered Wildlife." These standards include seasonal restrictions on certain seismic survey activities, and no surface occupancy for drilling, production, or pipeline operations.

COMMENTS

8 — 2. Sea turtle eggs are vulnerable to movement induced mortality and the vibrations of nearby seismic blasts or exploration activities could be lethal to developing embryos. Seismic detonations and exploration activities should be prohibited near the PAIS incubation facility while eggs are being incubated within that facility. Neither seismic blasts nor exploration activities should be allowed within a given distance of this facility. This given distance should be determined based on how far the vibrations and loud sounds travel. Vibrations and loud sounds resulting from these activities must not be detectable within the incubation facility. If eggs are incubated on the beach in the future, such distance prohibitions should also apply to the egg locations on the beach.

9 — 3. During the Kemp's ridley nesting season (March through August) and the nesting seasons for other sea turtle species that lay eggs at PAIS (generally April through September), vehicles traversing the beach to conduct various oil and gas activities, must be observant for nesting turtles. These vehicles could crush nesting turtles or emerging hatchlings (from undetected nests) if they are traveling at high rates of speed and/or if they are failing to watch for these turtles Only a limited number of heavy equipment vehicles should be permitted on the beach during this time period. These large vehicles could cause so much noise and visual intrusion that they frighten nesting turtles back into the water prior to nesting, could cause deep ruts that might be impossible for nesting turtles to cross over to nest on the beach or that could trap turtles on the beach, could compact the sand making it difficult for nesting turtles to excavate a nest cavity, and could be lethal to undetected eggs through vibrations, crushing, sand compaction, or unearthing. If heavy equipment vehicles must traverse the beach during the nesting and hatchling emergence seasons, it would be most desirable to have these large trucks escorted by people on ATVs that would be dedicated to watching for nesting turtles and hatchlings. Also, if these vehicles are found to create large ruts or compaction, their operations should be altered to reduce this problem. The construction of wooden roads on the beach to allow heavy equipment access should be prohibited during the nesting and egg incubation seasons.

10 — 4. Hatchlings move towards the brightest area and can be disoriented by artificial lighting. If the brightest area visible to hatchlings is an artificial light source, hatchlings will move towards the artificial light source rather than towards the water. This movement in the incorrect direction usually results in increased mortality. So, if hatchlings are released on the beach at PAIS during nighttime hours, measures must be taken to eliminate visible lighting from oil and gas activities conducted in the vicinity of hatchling release sites, during times when hatchlings are released.

11 — 5. Green turtles use the Mansfield Channel jetty area nearly year-round and show some degree of site fidelity to the area. However, green turtle abundance is greatest at the Mansfield Channel jetties during the warmer months. From March through October, oil and gas activities that could impact resting and foraging green turtles, should be restricted within the immediate area surrounding the Mansfield Channel jetties. Among the activities of concern are seismic surveys, construction activities (particularly involving dredging), and exploratory drilling.

12 — 6. Green turtles are apparently dispersed in Laguna Madre waters within park jurisdiction. Boat and other activity associated with the oil and gas industry may cause turtles to leave or avoid the area, thereby reducing direct harm to them from these activities. However, project workers should be observant for sea turtles in the area and avoid conducting harmful activities where and when sea turtles are located.

RESPONSES

8. Based on the threat of vibration-induced mortality to developing sea turtle embryos, operating standards under Current Legal and Policy Requirements (Chapter 2, Part II, under "Protection of Threatened and Endangered Wildlife") have been modified to add restrictions on blasting and surface occupancy near the Sea Turtle Incubation Laboratory located at Park Headquarters or any sea turtle egg incubation facility constructed on the beach area, if such a facility is required in the future based on the number of retrieved nests.

9. See Responses #7 and #8 (and operating restrictions for Protection of Threatened and Endangered Wildlife in Chapter 2, Part II, under "Protection of Threatened and Endangered Wildlife") for descriptions of operating restrictions that would be applied to the Gulf beach and nearshore waters and any sea turtle egg incubation facility. Also, Chapter 2, Part II, Current Legal and Policy Requirements, the section "Protection of Threatened and Endangered Wildlife" has been amended to describe the park's existing standard operating practice of providing a park orientation to nonfederal oil and gas operators and their subcontractors prior to beginning operations in the National Seashore. The park will continue to provide pre-operations training to operators and their subcontractors on species identification, particularly how to identify sea turtles, crawls and potential nests on the Gulf beach, and explain safe vehicle use and speed limits on the Gulf Beach." Similarly, park staff will continue to provide this information as a standard component of its interpretive program for park visitors.

   Heavy equipment associated with oil and gas operations, such as drilling rigs, that may have reduced maneuverability or have low visibility to monitor the beach driving area may be required to use appropriate mitigation techniques to avoid or minimize adverse impacts to sea turtles, nests and hatchlings. Mitigation techniques could include timing limitations, reduced speed limits, or the requirement for a monitor on an all-terrain vehicle in advance of heavy equipment to monitor the beach for sea turtles and nesting sites. The need for mitigation measures will be identified and developed on a project-specific basis by the NPS in consultation with the USF&WS.

10. The NPS recognizes that sea turtle hatchlings released on the beach during darkness can become disoriented if exposed to an on-shore artificial light source. The NPS also recognizes that artificial lighting on oil and gas drilling rigs is necessary for worker

COMMENTS	RESPONSES
13 7. If sea turtles succumb as a result of any oil and gas activities, operations should be ceased so that procedural improvements can be made to avoid additional mortality. I would greatly appreciate your consideration of these recommendations regarding the Draft Oil and Gas Management Plan Environmental Impact Statement. Thank you very much for your attention to this matter. Sincerely, Donna J. Shaver Donna J Shaver Station Leader cc: Mr. Jock Whitworth Mr. Paul Eubank	safety. If a drilling operation is ongoing near the beach area behind the foredunes when a hatchling release is scheduled during darkness, the NPS believes there is flexibility in selecting an appropriate release location within the National Seashore to prevent hatchling exposure to the artificial light source. Other resource protection measures in the FEIS will also mitigate potential disorientation of adult sea turtles and hatchlings caused by exposure to artificial light sources near the beach during nesting activity and emergence from unrecovered natural nests, respectively. For example, operating standards (Chapter 2, Part II) require that "In natural areas, artificial outdoor lighting will be limited to basic safety requirements and will be shielded when possible." (Protection of Night Sky). In addition, the following operating standard is being added under Protection of Threatened and Endangered Wildlife: "Artificial outdoor lighting on operations conducted near the Gulf beach area will meet human safety requirements and will be designed and shielded to minimize adverse impacts to adult and hatchling sea turtles." 11. Please refer to Response #5. 12. We agree with your comment. Please refer to Response #7. 13. Notification procedures and the requirement to cease work in the event of an incidental take or deliberate mortality of an individual of a threatened or endangered species has been added to the text in Chapter 2, Part II, Current Legal and Policy Requirements, under "Protection of Threatened and Endangered Wildlife."

COMMENTS	RESPONSES

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1229
GALVESTON, TEXAS 77553-1229

REPLY TO ATTENTION OF

April 13, 1999

Environmental Branch

Mr. John Gibson
Acting Superintendent
National Park Service
Padre Island National Seashore
P.O. Box 181300
Corpus Christi, Texas 78480-1300

Dear Mr. Gibson:

This is in response to your letter with accompanying Draft Environmental Impact Statement concerning an Oil and Gas Management Plan, as submitted to us for review and comment. After consideration by elements of the Planning, Environmental and Regulatory Division and the Engineering and Construction Division, our only comment is that a Department of the Army permit may be necessary. Mr. Jim Gilmore of our Corpus Christi Field Office should be contacted at 512/884-2166 to determine if Department of the Army permits will be necessary.

We appreciate the opportunity to review and comment upon the proposed management plan and trust that this response facilitates your planning and implementation process.

Sincerely,

Carolyn Murphy

Carolyn Murphy
Acting Chief, Environmental Branch

COMMENTS	RESPONSES
United States Department of the Interior FISH AND WILDLIFE SERVICE Ecological Services c/o TAMU-CC, Campus Box 338 6300 Ocean Drive Corpus Christi, Texas 78412 May 6, 1999 PADRE ISLAND MAY - 7 1999 NATIONAL SEASHORE Superintendent Padre Island National Seashore P.O. Box 181300 Corpus Christi, TX 78480-1300 Consultation No. 2-11-99-I-117 Dear Sir: The Fish and Wildlife Service has reviewed the February 1999 Draft Oil and Gas Management Plan/Environmental Impact Statement for Padre Island National Seashore (DEIS), and provides the following general and specific comments on that document. GENERAL COMMENTS The DEIS is well organized and written, and reflects a commendable attention to many sensitive and important natural and cultural resources. The Service sees room for significant improvement only in the DEIS's handling of the National Park Service's duties under section 7(a)(1) of the Endangered Species Act. Referring specifically to these duties, the DEIS should discuss how the NPS has used and would use its authority to administer oil and gas development at the National Seashore to create programs for the recovery of federally-listed threatened and endangered species. For example, the NPS might enlist the work crews, who travel up and down the beach daily when exploring for or producing minerals at the National Seashore, in reporting turtle nestings/strandings and wildfires, and might direct restoration efforts at benefitting the habitat of the piping plover. As with the more well-known section 7 (a)(2) of the ESA, the NPS must consult with the Service in carrying out section 7(a)(1). To reflect this, an informal consultation number has been assigned to these comments. SPECIFIC COMMENTS 14 General Management Plan Direction, Bullet Item 2, Second para., p. 1 - 2 - The item reads: "Natural resource manipulation will be limited to localized efforts to correct man-caused impacts." While limited and localized efforts to correct such impacts may aid in the recovery of listed species, it should be stated that section 7(a)(1) of the ESA requires the full use of all of NPS's authorities to carry out programs for the conservation of listed species. To the extent that limited and localized efforts are intended to be parts of a larger program, the quoted language may be appropriate. However, if the passage reflects NPS's intent to limit recovery efforts to correcting localized man-caused impacts, the DEIS should be revised consistent with section 7(a)(1).	14. The FEIS has been revised to better describe the NPS's conservation efforts and recovery program functions. The following text has been added under "Protection of Threatened and Endangered Wildlife," in Chapter 2, Part II, to better clarify nonfederal oil and gas operator responsibilities under Sections 7(A)(1) and 7(A)(2) of the Endangered Species Act. **Performance Standard:** To ensure the continued existence of Federal- and state-listed threatened and endangered species, and to ensure actions permitted aid in the recovery and continuing existence of Federal and state-listed threatened and endangered species by conserving and avoiding threats to threatened and endangered species and their habitat. The following operating standards have also been added: -Operators shall include in proposed Plans of Operations a biological survey of the proposed project area, performed by a qualified biologist. A "qualified biologist" is one with local experience in species and habitat identification." Surveys conducted of operations areas shall be performed at the times when the species of concern are present and identifiable by an experienced surveyor. -Prior to initiating approved operations, operators and their subcontractors shall participate in an orientation training provided by the National Seashore on endangered and threatened species identification, based on habitat type in the area of operations. If approved operations involve beach access during the sea turtle nesting season, operators and subcontractors will receive information pertaining to safe vehicle access and speed limits on the beach, sea turtle protection issues, species identification, adult crawl recognition, adult and hatchling protection measures, and observation reporting protocols. -When proposed operations, utilizing least damaging methods, may adversely affect threatened and endangered species and their habitat, appropriate mitigation measures would be required to avoid impacts. Mitigation measures would include actions specified in species recovery plans developed by the USF&WS and NMFS in coordination with the NPS, including prompt reclamation of disturbed habitat for threatened and endangered species within 6 months following completion of an approved operation. The identification of least damaging methods would be determined through an evaluation of the proposed Plan of Operations by the NPS through consultation with the USF&WS and NMFS. -Heavy equipment associated with oil and gas operations, such as

COMMENTS

2

15 Establishing a Planning Team - U.S. Fish and Wildlife Service, p. 1 - 4 - This section reads: "Pursuant to section 7 of the Endangered Species Act, the NPS consults with the F&WS on a project-by-project basis to evaluate the adequacy of resource survey information and associated mitigation measures being employed to avoid or mitigate potential impacts to threatened/endangered species or their habitat." As commented earlier, this language, with its references to avoidance and mitigation of impacts, responds to the mandates of only part of section 7. The DEIS should be expanded to include references to carrying out recovery programs.

16 Tablel. 1. Listed Species Known to Occur within the Park, p. 1 - 18 - Based on the latest information, the Service recommends the following changes to the table and the introductory paragraph that precedes it:

1. Add a fourth category to the "Federally Protected" column for "Threatened by Similarity of Appearance ("TSA").
2. Add "American" to the common name of *Falco peregrinus anatum.*
3. Add "Arctic" to the common name of *F. p. tundrius,* and change its listing status from "T" to "TSA".
4. Delete the interior least tern from the table.
5. Delete the snowy plover from the table, and replace it with the mountain plover, *Chardius montanus,* a candidate species.
6. Delete the cerulean warbler from the table.
7. Change the American alligator's status from "T" to "TSA."

17 Sea Turtles, p. 1 - 19, and Marine Mammals, p. 1 - 20 - The section on sea turtles only briefly mentions the NPS's efforts to conserve these listed species. In the Service's opinion, the DEIS understates the importance and intensity of these internationally-recognized recovery efforts, and also misses an opportunity to document compliance with section 7(a)(1) of the ESA. On the other hand, even though it repeatedly refers to "section 7 of the ESA," the DEIS section on Marine Mammals does not discuss any other NPS programs for the recovery of listed species. See General Comments and other previous specific comments regarding section 7(a)(1).

18 3 - D Seismic, p. 2 - 4 - This section of the DEIS provides a discussion of the kinds of activities that would take place during a 3-D seismic survey, but, unlike the case in subsequent discussions of impacts from dredging, production facilities, pipelines and access roads, does not give the dimensions of areas of seismic exploration impacts (e.g., the width of paths taken by equipment to access shot holes and receivers), nor does it give an estimate of the acreage of total surface disturbance. The DEIS should add a tabular display similar to that on p. 2 - 4 and elsewhere to provide this seismic survey-specific information. Also, because the scope of impact from 3-D seismic surveys is so vast,

RESPONSES

drilling rigs, that may have reduced maneuverability or have low visibility to monitor the beach driving area would be required to use appropriate mitigation techniques to avoid or minimize adverse impacts to sea turtles, nests and hatchlings. Mitigation techniques could include timing limitations, reduced speed limits, or the requirement for a monitor on an all-terrain vehicle in advance of heavy equipment to monitor the beach for sea turtles and nesting sites. The need for mitigation measures will be identified and developed on a project-specific basis by the NPS in consultation with the USF&WS.

-Artificial outdoor lighting on operations conducted near the Gulf beach area will meet human safety requirements and will be designed and shielded to minimize adverse impacts to adult and hatchling sea turtles.

-Mitigation necessary to avoid or minimize impacts to marine mammals would involve a variety of techniques including timing/seasonal restrictions to avoid marine mammals during key times, employing scare tactics, and using least-damaging methods during the conduct of geophysical exploration, and for construction of pipelines from proposed exploratory wells located outside the National Seashore to production sites behind the foredunes.

- In the event of an incidental take or deliberate mortality of an individual of a threatened or endangered species, nonfederal oil and gas operators shall immediately notify the Superintendent of Padre Island National Seashore, or his designated represented, and will cease work until permission to proceed with activities, as described in an approved Plan of Operations, has been granted by the Superintendent.

15. See Response #14. Also, refer to Chapter 3, in which the NPS has clarified its specific recovery actions under the description of threatened and endangered species.

16. All recommended changes have been made in the FEIS.

17. See Responses #14 and #15.

18. The Reasonably Foreseeable Development Scenario in Chapter 2, Plan Alternatives, has been revised to describe anticipated surface impacts from parkwide 3-D seismic exploration. Actual surface disturbance associated with the conduct of 3-D seismic exploration operations will likely vary depending upon the type of equipment

COMMENTS	RESPONSES

COMMENTS

its total acreage of impact likely would exceed that of all the other oil and gas activities put together, thus enhancing the likelihood of a significant impact on the human environment. Consequently, the DEIS should give particular attention to this potential.

19 Protection of Night Sky, p. 2 - 61 - This section of the DEIS gives performance and operations standards regarding artificial lighting, but these appear to be tailored towards mitigating impacts of the lighting on the overall human visitor experience. While this section may not be the most appropriate place for it, the DEIS should also acknowledge the need to control artificial lighting near the beach, so as to avoid interfering with the nesting of sea turtles.

Protection of Threatened and Endangered Wildlife, p. 2 - 65 - While this section of the DEIS begins encouragingly with this statement,

> Consistent with the purposes of the Endangered Species Act (16 U.S.C. 1531 et seq.), the National Park Service will identify and promote the conservation of all federally listed threatened, endangered, or candidate species within park boundaries and their critical habitats...,

the section appears to limit the NPS's efforts to maintaining the status quo in its next sentence:

> Active management programs will be conducted as necessary to perpetuate the natural distribution and abundance of threatened or endangered species and the ecosystems on which they depend. [Emphasis added.]

This appearance of limitation to carrying out just section 7(a)(2) is reinforced in the DEIS section's Performance Standard: "Ensure the continued existence of federal- and state-listed threatened and endangered species." [Emphasis added.] Fortunately, the DEIS section eventually paraphrases the mandates of both sections 7(a)(1) and 7(a)(2) with this statement:

> Section 7 of the ESA and regulations at 50 CFR Parts 17 and 402 specifically require all federal agencies to use their authorities in furtherance of ESA to carry out programs for the conservation of listed species, and to ensure that any agency action will not jeopardize the continued existence of a listed species or adversely modify critical habitat. [Emphasis added.]

At section 3(3), the ESA defines conservation as meaning more than just ensuring a species' continued existence:

> The terms "conserve," "conserving," and "conservation" mean to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research,

RESPONSES

used and application of applicable SRA stipulations and performance standards. It should be noted that expected surface impacts are largely limited to terrestrial areas, including wind-tidal flats. Marine seismic operations conducted in the Laguna Madre and Gulf of Mexico waters of the National Seashore are expected to result in very minimal impacts to submerged lands. Recently approved 3-D seismic operations in the upper 10 miles of the National Seashore provide a basis for calculating the estimated area of surface impact resulting from such operations. Used of low-impact, tracked aluminum buggies for drilling shot holes along source lines and the placement/retrieval of geophones and cable along receiver lines results in a direct surface impact width of approximately 7.5 feet. This impact width equates to about one (1) acres of direct impact per mile of buggy use. The NPS estimates that the conduct of 3-D seismic operations on terrestrial lands within the National Seashore will likely require a total of 748 miles of buggy use (408 miles of source lines and 340 miles of geophone receiver lines). The anticipated area of direct impact to the surface is approximately 748 acres, or 0.88 percent of the terrestrial land base. This estimate does not take into account multiple trips for trouble-shooting receiver lines or re-drilling source lines.

19. See Response #10.

COMMENTS

census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

20 The Service's comments on all this is not that the NPS does not carry out listed species conservation programs, but that it does not document them well in the DEIS. The Service recommends that the NPS rewrite this section's Performance Standard to ensure the recovery as well as the continued existence of listed species.

21 Operating Standards, p.2 - 66 - The first of these standards reads "Operators shall include in proposed Plans of Operations a biological survey of the proposed project area, performed by a qualified biologist." Because the Service has seen unsatisfactory survey results for projects in South Texas unrelated to the National Seashore, it recommends that the definition of a "qualified biologist" include one with local experience in species and habitat identification, and that the surveys conducted take place at the times when the species of concern are present and identifiable by an experienced surveyor.

22 Protection of Wildlife Biodiversity, p. 2 - 72 - This section cites two Performance Standards to "perpetuate"animal populations and ensure the "preservation" of migratory animals, including listed species. These standards should be expanded to include enhancement and recovery among their goals. See comments above on the section on Protection of Threatened and Endangered Wildlife.

23 Seismic, p. 4 - 9 - See comments above regarding the section on 3-D Seismic.

CONCLUSIONS

This concludes the Service's comments on the DEIS. Despite their length, the Service's comments should not be taken as overwhelmingly critical of the document, much less of the NPS's programs. In reality, the Service frequently found that the DEIS had not given the NPS sufficient credit for its own conservation programs, which carried out NPS's section 7(a)(1) ESA responsibilities.

The Service appreciates the opportunity to review and comment on this DEIS. If you have any questions, please contact Johnny French at (361)994-9005.

Sincerely,

THOMAS D. SEROTA
Field Supervisor

cc: David Dall, U.S. Fish & Wildlife Service, Region 2, Albuquerque, NM
Steve Chambers, U.S. Fish & Wildlife Service, Region 2, Albuquerque, NM
Joe Burns, U.S. Fish & Wildlife Service, Region 2, Albuquerque, NM

RESPONSES

20. See Response #14.

21. The NPS certainly shares the concerns of the U.S. F&WS relating to a complete and accurate survey of the project area by a qualified biologist. The NPS has inserted your recommendation as an operating standard in the FEIS under Current Legal and Policy Requirements, Chapter 2, Part II, under Protection of Threatened and Endangered Species.

22. The Performance Standard for Protection of Wildlife Diversity, Chapter 2, Part II, derives from the National Park Service's Management Policies.

23. Impact Analyses in Chapter 4, Environmental Consequences, have been revised to reflect the estimated surface disturbance of 748 acres, or 0.88 percent of the total land portion of the park.

COMMENTS	RESPONSES

COMMENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

May 7, 1999

Jock F. Whitworth
Superintendent
Padre Island National Seashore
Intermountain Support Office-Santa Fe
P O Box 728
Santa Fe, NM 87504-0728

Dear Mr. Whitworth:

In accordance with our responsibilities under Section 309 of the Clean Air Act, the National Environmental Policy Act (NEPA), and the Council on Environmental Quality Regulations (CEQ) for Implementing NEPA, the U.S. Environmental Protection Agency (EPA) Region 6 office in Dallas, Texas, has completed its review of the Draft Environmental Impact Statement (DEIS) for oil and gas management for Padre Island National Seashore.

Three alternative are considered in the DEIS. The Proposed Action, Alternative A, includes no surface occupancy in some sensitive resource areas, restricted access in other sensitive resource areas, seismic operations permitted only under managed access, and managed access in all other areas of the Park. The proposed action would provide specific protection for 49 percent of the surface acreage, approximately 65,183 acres. Alternative B, No Action, which continues current Management, and Alternative C, Maximum Resource Protection, were also considered.

The DEIS fully describes the proposed action, explores and objectively evaluates reasonable alternatives, provides evidence and analyses of impacts on the affected environment, demonstrates coordination with other agencies with special expertise or jurisdiction by law with respect to environmental impacts, provides for mitigation and monitoring, and documents efforts to involve the public.

24 EPA classifies your DEIS and proposed action as "EC-2," i.e., EPA has "Environmental Concerns" and ask that the Final EIS consider including maximum resource protection for seagrass beds to the preferred management plan, Alternative A, in lieu of managed access. These are critically important fishery habitat areas and deserve the highest level of protection. Our classification will be published in the Federal Register according to our responsibility under Section 309 of the Clean Air Act, to inform the public of our views on proposed Federal actions.

Recycled/Recyclable • Printed with Vegetable Oil Based Inks on 100% Recycled Paper (40% Postconsumer)

RESPONSES

24. We agree that seagrass beds provide critically important fishery habitat and warrant specific protection. The NPS has reassessed the SRA designation for seagrass beds and the applicable operating restrictions as presented in the DEIS. The NPS has removed seagrass beds as a SRA and replaced it with the Laguna Madre SRA, to emphasize the importance of affording a high degree of protection to the entire submerged land ecosystem. Seagrass beds do not occur in all submerged lands within the National Seashore. Shallow water areas along the eastern Laguna Madre shoreline and deeper waters in the vicinity of Yarborough Pass do not typically provide suitable habitat for seagrass establishment and growth. The NPS strongly believes that future oil and gas exploration and development activities may be performed in the Laguna Madre SRA in a manner that avoids or minimizes adverse impacts by use of least-damaging methods. Under standard Section 404 permitting and NPS requirements under the 36 CFR 9B regulations, operators would be required to perform a delineation of seagrass beds to either avoid such areas or to select an operation location in an area with low seagrass concentration. Indirect and direct impacts to seagrass beds require a minimum 3:1 compensation ratio through the U.S. Army Corps of Engineers Section 404 permitting process. These requirements provide a strong incentive to operators to carefully site proposed operations in an area devoid of seagrasses or an area with low seagrass concentration. NPS regulatory approval standards also afford protection to park resources by requiring operators to employ least-damaging methods of operation. The NPS does not believe it is necessary to apply the most stringent operating restriction, No Surface Access, to the Laguna Madre SRA, under the Proposed Action (Alternative A). However, we agree that more stringent restrictions could be applied to specific types of oil and gas operations to increase protection of the Laguna Madre marine environment. The FEIS has been revised to reflect the Laguna

COMMENTS	RESPONSES
2 We appreciate the opportunity to review the DEIS We request that you send our office one (1) copy of the Final EIS at the same time that it is sent to the Office of Federal Activities (2251A), EPA, 1200 Pennsylvania Avenue, N.W., Washington, D.C. 20044 Sincerely yours, for Robert D. Lawrence Chief Office of Planning and Coordination	Madre SRA, with the following specific operating restrictions: **Laguna Madre SRA:** To preserve essential habitat for all sensitive marine biota in the Laguna Madre, including, but not limited to submerged vegetation, invertebrates, fin-fish, colonial waterbirds, migratory bird species, marine turtles and dolphins. Alternative A, Proposed Action: Geophysical exploration may be permitted under Current Legal and Policy Requirements. Dredging of new channels required for drilling operations may be permitted if constructed using the least damaging methods; but production operations must be located on Padre Island, preferably on uplands locations, or outside the National Seashore. Alternative B, No-Action/Current Management: Geophysical exploration, drilling, production, and pipeline operations may be permitted under Current Legal and Policy Requirements. Alternative C, Maximum Resource Protection in All SRAs: No Surface Access would be permitted for geophysical exploration, drilling, production, or pipeline operations.

COMMENTS	RESPONSES

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive N.
St. Petersburg, Florida 33702

May 11, 1999

Superintendent
Padre Island National Seashore
P.O. Box 181300
Corpus Christi, Texas 78480-1300

Dear Sir:

As requested by your office February 20, 1999, the National Marine Fisheries Service (NMFS) has reviewed the Draft Oil and Gas Management Plan, Environmental Impact Statement, February 1999, Padre Island National Seashore, Texas. NMFS finds that Essential Fish Habitat will not be significantly impacted by oil and gas development at Padre Island National Seashore due to the National Park Service implementation of Managed Access Provisions as described in the DEIS.

We appreciate this opportunity to offer our comments and if there are any questions, please have your staff contact Mr. William Jackson at our Galveston Facility at (409) 766-3699.

Sincerely,

for: William [signature]

Andreas Mager, Jr.
Assistant Regional Administrator
Habitat Conservation Division

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

March 11, 1999

Mr. John Gibson
Acting Superintendent
U.S. Department of the Interior
National Park Service
Padre Island National Seashore
P. O. Box 181300
Corpus Christi, Texas 78480-1300

Re: Oil and Gas Management Plan

Dear Mr. Gibson:

The following staff of the Texas Natural Resource Conservation Commission (TNRCC) have reviewed the above-referenced project and offer the following comments:

The Office of Air Quality has reviewed the above-referenced project for General Conformity impacts in accordance with 40 CFR Part 93 and Chapter 101.30 of the TNRCC General Rules. The proposed action is located in Kleberg, Kenedy, and Willacy Counties, which are unclassified or in attainment of the National Ambient Air Quality Standard for all six criteria air pollutants. Therefore, general conformity does not apply.

Although any demolition, construction, rehabilitation or repair project will produce dust and particulate emissions, these actions pose no significant impact upon air quality standards. The minimal dust and particulate emissions can easily be controlled with standard dust mitigation techniques by the construction contractors.

If you have any questions regarding air quality, please feel free to contact Mr. Wayne Young, Air Quality Planning and Assessment Division, at (512) 239-0774.

It has been determined from a review of the information provided that an Application for TNRCC Approval of Floodplain Development Project need not be filed with TNRCC. Our records show that the community is a participant in the National Flood Insurance Program and as such has a Flood Hazard Prevention Ordinance/Court Order. Accordingly, care should be taken to ensure that the proposed construction takes into account the possible Flood Hazard Areas within the community's floodplains. Please notify the community floodplain administrator to ensure that all construction is in compliance with the community's Flood Hazard Prevention Ordinance/Court Order.

P.O. Box 13087 • Austin, Texas 78711-3087 • 512/239-1000 • Internet address: www.tnrcc.state.tx.us

COMMENTS	RESPONSES
Mr. John Gibson Page 2 March 11, 1999 If you have any questions regarding water quantity, please feel free to contact Mr. Mike Howard, Water Quantity Division, at (512) 239-6155. The Policy & Regulations Division has reviewed the environmental impact statement prepared by the National Park Service for the Oil and Gas Management Plan for the Padre Island National Seashore. We have no comments to offer on this document. If you have any questions, please feel free to contact Mr. Clyde Bohmfalk, Policy & Regulations Division, at (512) 239-1315. Thank you for the opportunity to review this project. If I may be of further service, please call me at (512) 239-3906. Sincerely, Cathy Mayes Cathy Mayes Office of Environmental Policy, Analysis & Assessment Texas Natural Resource Conservation Commission	

TEXAS HISTORICAL COMMISSION
The State Agency for Historic Preservation

GEORGE W. BUSH, GOVERNOR
JOHN L. NAU, III, CHAIRMAN
F. LAWERENCE OAKS, EXECUTIVE DIRECTOR

30 March 1999

Mr. John Gibson
Acting Superintendent
Padre Island National Seashore
P.O. Box 181300
Corpus Christi, Texas 78480-1300

Re: Project review under Section 106 of the National Historic Preservation Act of 1966. Draft, *Oil and Gas Management Plan/ Environmental Impact Statement*, Kenedy and Kleberg Counties, Texas (NPS)

Dear Mr. Gibson:

Thank you for your correspondence describing the above referenced project. This letter serves as comment on the proposed undertaking from the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission.

The review staff, led by Debra L. Beene, has completed its review. We favor Alternative C which provides the maximum protection by applying "No Surface Access" to all types of oil and gas activity within the maximum buffer areas of all Sensitive Resource Areas (SRAs). The known archeological sites are relatively small; so complete avoidance of sites could be easily achieved. However, under all alternatives, cultural resources would be protected under the National Historic Preservation Act of 1966, the Antiquities Code of 1906, and the Archaeological Resources Protection Act. Please refer to the following attachment for specific comments on the draft EIS.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your assistance in this federal review process, and for your efforts to preserve the irreplaceable heritage of Texas. **If you have any questions concerning our review or if we can be of further assistance, please contact Debra L. Beene at 512/463-5865.**

Sincerely,

for
F. Lawerence Oaks, State Historic Preservation Officer

FLO/dlb

P O BOX 12276 · AUSTIN, TX 78711-2276 · 512/463-6100 · FAX 512/475-4872 · TDD 1-800/735-2989
www.thc.state.tx.us

COMMENTS	RESPONSES
Attachment: Draft Review Comments COMMENTS: Draft, *Oil and Gas Management Plan/ Environmental Impact Statement*	
25 1. Page 1-11, **Alternative A**, second paragraph: the discussion of directional drilling does not address avoidance of subsurface impacts to buried cultural resources; directional drilling may pose a significant threat of damage to cultural resources under certain conditions.	25. Directional drilling could be permitted to reach target formations 10,000 to 12,000 feet or more underlying Sensitive Resource Areas; or to place pipelines under Sensitive Resource Areas. For drilling a directional well, vertical drilling is performed initially until drinking water zones are passed and a surface casing is set. From this point, the borehole is then drilled directionally to a bottomhole target location. The archeological survey that would be required prior to the ground-disturbing activities associated with constructing the drillpad (typically measuring a surface area of 300 feet by 300 feet, or 2.07 acres) is expected to identify buried cultural resources. Therefore, no damage to cultural resources is anticipated from directionally drilling of wells. For directionally drilling a pipeline under a Sensitive Resource Area, average depth ranges from 50 to 150 feet depending on the size of the Sensitive Resource Area under which the pipeline is being installed. Similar to drilling a well, the archeological survey that would be required prior to the ground-disturbing activities associated with constructing the drillpad and the exit hole location would identify buried cultural resources. Therefore, potential damage to buried cultural resources from directionally drilling of pipelines is a remote possibility at best. In addition, operators must comply with NPS regulations at 36 CFR §9.47 if a cultural resource is inadvertently encountered during the conduct of an approved operation.
26 2. Page 2-55, **Archeological Surveys for 3-D Seismic Operations**, first paragraph: the author has not considered unexpected impacts such as cratering and erosion; these have been reported in the Big Thicket National Preserve. Please explain how this will be avoided at Padre Island National Seashore or require an archeological survey prior to ground disturbance for 3-D Seismic operations.	26. Surface cratering and erosion resulting from geophysical operation dynamite detonation is not expected at the National Seashore. The NPS recognizes this issue has occurred at Big Thicket National Preserve in southeast Texas. However, compared to Big Thicket, significant differences in surface and subsurface geology exist at the National Seashore, and shothole drilling methods at the two park units differ considerably based on the geology. Geophysical operators in the Big Thicket area often use a "shallow mini-hole" drilling technique where charges are set at very shallow depths (5-20 feet). Multiple shallow holes at a shotpoint are often required to generate the required energy to penetrate subsurface target formations. If such mini-holes are drilled in loamy-clay soil types, the hole may not collapse above the charge and "blow-outs" can occur upon detonation, resulting in surface cratering. At Padre Island, geophysical operators drill deeper shotholes (25-50 feet),
27 3. Page 2-55, **Archeological Surveys for 3-D Seismic Operations**, third paragraph: ground disturbance which requires survey is identified as earth-moving below 2 inches: please explain why this is sufficient to protect all cultural resources (ranching remains, prehistoric sites, etc.) at Padre Island National Seashore. We understand that less than 0.5 percent of the park has been surveyed for cultural resources. The author states that all of the visible, aboveground cultural resources have been identified; however, at what depth are below-surface resources expected? We believe that any surface-disturbing activity could potentially damage site integrity, i.e.: vegetative clearing, survey marking, foot traffic, maintenance of roads, etc.	

COMMENTS

Texas General Land Office

David Dewhurst
Commissioner

May 20, 1999

Mr. John Gibson
Acting Superintendent
Padre Island National Seashore
P.O. Box 181300
Corpus Christi, Texas 78480-1300

Dear Mr. Gibson:

Thank you for allowing the Texas General Land Office (GLO) to comment on the Draft Oil and Gas Management Plan/Environmental Impact Statement (EIS) for the Padre Island National Seashore (PINS). We offer the following comments:

1. The GLO prefers Alternative B. Alternatives A and C would overly restrict surface uses because the EIS is too general and broad in designating Sensitive Resource Areas (SRAs) in which surface uses will be either limited or not allowed. For example, Figures 3.8, 3.9, and 3.10 designate all Laguna Madre bay bottoms within the PINS as "seagrass bed." However, on page 3-26, the EIS acknowledges that "seagrass beds do not currently occupy the entire submerged bay bottoms of the Laguna Madre ."

28 2. It is incorrect to characterize Alternative B as leaving all 133,918 acres or 100% of the park, including SRAs, as open for use under Managed Access Provisions. (See pages 1-12, 2-11, and 4-5.) "Managed access" means application of all pertinent federal and state laws, regulations, and policies governing oil and gas operations. It might be theoretically accurate to say that the entire park, including SRAs, is open for use under Managed Access Provisions. As a practical matter, however, existing state and federal regulations put many SRAs "off limits" for any activities that would significantly disturb them. For example, the §404(b)(1) Guidelines, under which the U.S. Army Corps of Engineers would evaluate any proposal to fill wetlands or tidal flats in the park, contain provisions requiring avoidance of impacts and prohibiting significant degradation. Functionally, these and other existing regulatory restrictions will preclude activities in large portions of the SRAs.

Stephen F Austin Building
1700 North
Congress Avenue
Austin, Texas
78701-1495
512-463-5001

RESPONSES

and following placement of the charge at the bottom of the hole, the sandy soil rapidly collapses the hole above the charge. In addition, multiple shotholes at a shotpoint location are not required as frequently at Padre Island. These basic differences minimize the risk of surface cratering at Padre Island.

27. Archeological resources could be located just below the surface of the sand anywhere in Padre Island. Any ground-disturbing activity associated with constructing access roads, drillpads, production pads, or for placement of pipelines would require substantially more earth-moving than 2 inches; and archeological surveys would be required for these activities. Seismic surveys can be performed with specially designed lightweight vehicles so that surface disturbance is minimized. Drilling shotholes are not considered an impact because shotholes are smaller than a typical shovel test performed as a part of archeological surveys, and because drilling of shotholes can be done with hand-held drills which allows for protecting surface features. Ground-disturbance is considered to be 2 or more inches and would require archeological surveys prior to work proceeding so that archeological sites are either avoided or impacts are mitigated.

28. We agree that Managed Access Provisions, retitled in the FEIS as Current Legal and Policy Requirements, provide an existing framework to identify sensitive resources through which a variety of permitting mechanisms are utilized to result in avoidance or mitigation techniques to prevent significant degradation. However, one of the goals of the Plan/EIS is to provide up-front information to the public, federal and state permitting agencies, and nonfederal oil and gas operators, to identify sensitive resource areas and present a range of alternative management strategies. The key difference between the No-Action Alternative and Proposed Action is that Sensitive Resource Areas are formally designated under the Proposed Action and specific operating restrictions are applied to ensure their protection. Under all alternatives, in all areas of the National Seashore, application of Current Legal and Policy Requirements in the future could result in the identification of additional important cultural sites, threatened and endangered species habitat, and other sensitive resource areas in which operating restrictions could be applied. Therefore, while we agree that Current Legal and Policy Requirements provide standard mechanisms to identify and protect park resources, the Proposed Action provides an increased level of certainty to protect SRAs.

COMMENTS	RESPONSES

COMMENTS

Mr. John Gibson
May 20, 1999
Page two

3. The EIS finds that, under both Alternative A and Alternative B, all oil and gas reserves within the park would be accessible, but that costs to explore and develop these reserves would be higher than for reserves outside the park. The GLO agrees. However, the

29 EIS fails to acknowledge that the increased costs will result in decreased revenues to the state's Permanent School Fund, which owns the reserves underlying the Laguna Madre in the PINS.

4. The GLO takes issue with the EIS's comparison of Alternatives A and B. The EIS finds that Alternative A provides clear direction and regulatory standards, and therefore creates certainty and predictability that results in efficiency in planning and operations. In contrast, the EIS finds that Alternative B lacks both a clear regulatory framework and any ability to identify SRAs in advance, and therefore would result in unnecessary expenditures of time and money due to inconsistent interpretations and unanticipated denials.

Alternative B subjects all areas in the park to "managed access," which means application of the normal state and federal regulatory scheme. As pointed out above, this already puts many SRAs "off limits." While one might not be able to predict the outcome of the normal regulatory scheme with mathematical certainty, it is nevertheless fairly well known and understood by operators and state and federal resource agencies alike. By creating blanket prohibitions in certain areas, Alternative A simply adds a marginal degree of additional certainty, predictability, and protection over and above that already provided by the existing regulatory scheme.

Consequently, the basic issue is whether the extra costs and reduced revenues from Alternative A's blanket prohibitions are justified by the marginal degree of certainty, predictability, and protection they add. The GLO believes they are not because there are alternatives that would provide more certainty, predictability, and protection for SRAs without overly restricting access and unnecessarily increasing costs as Alternative A does.

30 The key to avoiding uncertainty and unpredictability is coordination. One alternative would be to closely coordinate the operators' development of, and the NPS' approval of, the Plan of Operations (PO) with the preparation, review, and approval of applications for other regulatory approvals that will be required. Rather than relying on blanket prohibitions to avoid unnecessary planning costs and achieve certainty and predictability, this alternative achieves the same goals by integrating the PO into the existing regulatory scheme for wetlands, endangered species, coastal zone management, water quality, waste disposal, etc.

31 Another alternative to consider would be to develop performance standards for activities using an existing process that takes advantage of the resources of many other agencies, such as the GLO's Resource Management Code (RMC) system. In conjunction

RESPONSES

29. The NPS agrees that nonfederal oil and gas operations in Padre Island National Seashore, or in any unit of the National Park System, may require more stringent environmental safeguards compared to areas outside such sensitive areas, and therefore, could result in increased operating costs. An operator's interest in bidding for State-owned mineral leases would likely be contingent upon two primary factors: 1) environmental considerations of operating in a unit of the National Park System; and 2) availability of information on remaining reserves that make bidding for and developing a lease economically prospective to pursue. These factors will be better described in the impact analysis in Chapter 4, Environmental Consequences, under the section "Impacts to Oil and Gas Exploration and Development." In relation to these two factors, we agree that prospective bids for State-owned leases in the Laguna Madre and Gulf of Mexico may not meet optimum leasing levels; and therefore, if leases are not issued and oil and gas reserves are not developed, then potential revenues may not be derived for the State's Permanent School Fund.

30. We agree, and intend to continue close working relationships and to coordinate and consult with state and federal regulatory and permitting entities during the development of a Plan of Operations and evaluation process. The operating restrictions identified for SRAs under the Proposed Action are in most instances the historical operating restrictions that have been applied as mitigation measures through past application of Current Legal and Policy Requirements. The NPS believes that providing operating restrictions/mitigation techniques up-front in the EIS will facilitate operator preparation of plans of operations, other-agency reviews, and NPS evaluation and approval.

31. The NPS is very much aware of and admires the GLO's Resource Management Code (RMC) system. We encourage the GLO to revise its RMC system; and the NPS offers the participation of National Seashore and NPS technical specialists to assist the GLO in developing Resource Management Codes that would be assigned to state oil and gas leases within the National Seashore. It should be noted, however, that the GLO's RMC system developed in the future would apply to leases of state-owned minerals, whereas the SRAs and SRA-specific operating restrictions presented in the Oil and Gas Management Plan/EIS

COMMENTS

Mr. John Gibson
May 20, 1999
Page three

with these agencies, the GLO inventories the SRAs on each tract of state submerged lands. Codes are assigned that specify which resources are present on a tract (e.g., seagrass, oyster reef, etc.). Additional codes can be assigned that establish a performance standard or other requirement (e.g., no dredging, buffer zones, etc.). The codes inform those exploring for or developing oil and gas on a tract of the regulatory requirements that the agencies intend to impose. To date, the RMC system has never been applied within the PINs. Doing so now would achieve what the NPS seeks through Alternative A. However, it is a more precise way to identify SRAs and would be preferable to the broad SRA designations in the EIS.

The NPS should pursue Alternative B, supplemented by these or other alternatives that provide certainty, predictability, and protection for SRAs without overly restricting access.

32 5. As indicated on page 2-52 of the EIS, §307 of the Coastal Zone Management Act requires an activity on federal lands that has "spillover" effects on coastal resources outside those federal lands to comply with the Texas Coastal Management Program (CMP). During the scoping the EIS, it could not be determined whether the Oil and Gas Management Plan for the PINS would have spillover effects. Based on a review of the three alternatives developed since then, it now appears that the NPS's selection of either Alternative A or C would result in spillover effects. Implementation of Alternative A or C would restrict activities within the PINS to the degree that operators are very likely to use sites outside of the PINS for exploration or production activities, thus affecting coastal resources outside of federal lands. If the NPS intends to choose Alternative A or C in the final EIS, the NPS will need to submit a consistency determination to the Coastal Coordination Council at least 90 days before the EIS becomes final.

Thank you again for the opportunity to comment. Please contact Tom Nuckols, Director of the Coastal Division, at 512/463-5054 if you have any questions or would like to discuss the GLO's comments.

Sincerely,

David Dewhurst

David Dewhurst
Texas Land Commissioner

DHD:tn

RESPONSES

would apply to all activities related to rights associated with nonfederal oil and gas interests, whether private or state-owned, throughout the national Seashore.

32. The NPS does not believe that spillover effects would be appreciably different under the three alternatives, but could be slightly higher under Alternative C, if the number of directionally-drilled wells from locations outside the National Seashore increased due to all SRAs being closed to all types of oil and gas activities under a No Surface Access operating restriction. As described in Chapter 2, Part II, under "Consistency with the Coastal Zone Management Program," while federal lands such as Padre Island National Seashore are excluded from the coastal zone, whenever the NPS is considering approving oil and gas plans of operations, and in the event that proposed nonfederal oil and gas operations may have a spillover effect on Coastal Natural Resource Areas, the NPS will consult with the Texas General Land Office and Coastal Coordination Council for a consistency determination under the Texas Coastal Zone Management Plan. Further, according to the philosophical direction of the NPS, as stated in the agency's Management Policies, "The NPS will comply with provisions of state coastal zone management plans prepared under the Coastal Zone Management Act when such provisions are more environmentally restrictive than NPS management zoning (Management Policies, Chapter 4:20).

Pursuant to this comment, on July 29, 1999, the NPS submitted the Draft Oil and Gas Management Plan/EIS to the Coastal Coordination Council to request a consistency determination with the Texas Coastal Zone Management Program. The Coastal Coordination Council responded to the NPS's request on September 17, 1999. The Council determined that there are no significant consistency issues with respect to the project and concluded that this project is consistent with the Coastal Zone Program goals and policies.

COMMENTS

Geography and Planning

Superintendent
Padre Island National Seashore
PO Box 181300
Corpus Christi, TX 78480-1300

2 March 1999

Dear Superintendent Gibson,

Thank you for the opportunity to review and comment on the Draft Oil and Gas Management Plan Environmental Impact Statement for Padre Island National Seashore. The preferred alternative provides the best mix of access to the area for nonfederal oil and gas exploration and development and stringent protection of the area's unique natural and cultural resources. Some specific comments follow. Feel free to contact me if additional information or assistance is required.

1. Managed Access Provisions/ Emergency Preparedness Plan for Hurricanes (p. 2-58).

Typographical errors in listing of alert levels renders this section indecipherable. Alert levels Yellow and Red have same listed criteria.

33 Is 24 hours sufficient time to shut down and secure a rig then safely evacuate its personnel? An additional confounding factor is the restricted egress via the Kennedy Causeway. How does this plan mesh with those of surrounding counties/communities.

Primary concern seems to be high winds, not rain. However, even systems of tropical storm force can bring significant rain and localized flooding. Given the critical nature of freshwater habitat and shallow aquifer recharge, tropical storm preparedness should also be addressed.

2. Sensitive Resource Areas/Foredunes (p. 3-47).

34 Given the primary role of the foredune in flood prevention, authorized breaches for road access should be minimized and the resulting sides of the cuts should be immediately stabilized. Implied but not explicitly stated, shot-holes for seismic surveys should never be located on the foredunes.

Southwest Texas State University
601 University Drive San Marcos, Texas 78666-4616
Telephone: 512•245•2170 Fax: 512•245•8353
E-mail: GEOGRAPHY@SWT.EDU Home Page: HTTP://WWW.GEO.SWT.EDU
SWT is a member of the Texas State University System.

RESPONSES

33. We have corrected this error in the FEIS, in Chapter 2, Part II, under Protection of Floodplain Values/Hurricane Preparedness:
Green Alert will be issued when a tropical storm develops a circular pattern with winds above 39 miles per hour within 700 miles or 48 hours of Padre Island National Seashore and the storm appears to be moving toward the South Texas coast.
Yellow Alert will be issued when the National Weather Service issues a "Hurricane Watch" for the Padre Island area.
Red Alert will be issued when the National Weather Service issues a "Hurricane Warning" for the Padre Island area.

We appreciate your bringing this issue to our attention. Padre Island National Seashore staff institutes emergency procedures upon the issuance of a "red alert," at which time the National Seashore is evacuated and the park is closed to entry. Abnormally high tide and surf conditions generally occur under a red alert, and will preclude safe vehicular access on the Gulf beach. As a result of further evaluation, the park's emergency preparedness plan for hurricanes and operating standards for nonfederal oil and gas operators require operators to initiate shut-down activities of operations on the island upon the issuance of a Yellow Alert, and evacuate the area during a red alert.

34. The operating restriction for the Foredunes SRA, under the Proposed Action (Alternative A) as shown on Tables S.1 or 2.3, specifies "No surface disturbance, except roads may be permitted if they meet the least damaging method of access." To better clarify how foredunes would be protected under the Proposed Action, we have revised the tables to include: "Drilling of shot holes are not permitted in the primary dune line, but placement of receiver lines, on foot, may be permitted." We have also changed the term "No ground disturbance" to "No surface disturbance" in the Glossary.

COMMENTS	RESPONSES

COMMENTS

Geography and Planning

35 3. Listing of Document Recipients (Table 5.1).

Please move Southwest Texas State University, Department of Geography & Planning (page 5-4, line 17B) from Oil and Gas Industry list to Universities list (page 5-6).

Sincerely,

Richard W. Dixon, Ph.D.
Assistant Professor
James and Marilyn Lovell Center for Environmental Geography and Hazards Research

RD11@swt.edu
512.245.7436

Southwest Texas State University
601 University Drive San Marcos, Texas 78666-4616
Telephone: 512•245•2170 Fax: 512•245•8353
E-mail: GEOGRAPHY@SWT.EDU Home Page: HTTP://WWW.GEO.SWT.EDU
SWT is a member of the Texas State University System.

RESPONSES

35. This has been corrected in the FEIS.

36. In its May 11, 1999, comment letter on the Draft Oil and Gas Management Plan/EIS, BNP Petroleum Corporation ("BNP"), a lessee planning to conduct three-dimensional seismic at Padre Island, dedicates a substantial portion of its letter disputing NPS's authority to regulate nonfederal oil and gas activities at Padre Island National Seashore ("Padre Island"). To avoid possible confusion that BNP's comments may generate among the public, below is a discussion of the arguments raised by BNP and an explanation of why they are without merit. The NPS, as a federal governmental entity, has unambiguous authority to regulate nonfederal oil and gas development in units of the National Park System, including Padre Island.

BNP asserts that federal government's "jurisdictional authority" is tenuous at best because 1) the United States does not own the mineral interest; 2) that the "Texas Consent Statute," a law passed by the State of Texas Legislature, prohibits the application of federal law; and 3) that the State of Texas Legislature has not authorized application of federal law at Padre Island. These arguments are similar to those that the Dunn McCampbell Royalty Interest Group, Inc., mineral owner at Padre Island, unsuccessfully asserted in prior litigation.

In March of 1994, Dunn McCampbell Royalty Interest brought suit in Federal District Court against the National Park Service, <u>Dunn</u>

COMMENTS	RESPONSES

COMMENTS

BNP Petroleum Corporation

May 11, 1999

VIA AIRBORNE EXPRESS
(AIRBILL NUMBER 2402840565)

Superintendent
Padre Island National Seashore
Attention: Linda Dansby, EIS Team Leader
Intermountain Support Office - Santa Fe
1100 Old Santa Fe Trail
Santa Fe, NM 87501

RE: Comments on Draft Oil and Gas Management Plan
Environmental Impact Statement ("Plan")
February 1999
Padre Island National Seashore, Texas

Dear Ms. Dansby:

BNP Petroleum Corporation is the current holder of Seismic Permit and Oil and Gas Lease Option Contracts executed by private mineral owners owning rights in and to oil, gas and other minerals underlying approximately 90,000 gross acres on Padre Island, a substantial portion of which are located within the boundaries of the Padre Island National Seashore. The comments which follow are written on behalf of BNP Petroleum Corporation, as both a representative of the oil and gas industry in general, and as a party with a vested economic interest in the minerals underlying Padre Island National Seashore. BNP is also authorized to make these comments on behalf of the following owners of the mineral estate underlying the affected area: Dunn McCampbell Royalty Interest, Inc.; Dunn Padre Corporation; and McCampbell Minerals, Inc.

36

Prior to commenting on the Draft Oil and Gas Management Plan, it is first necessary to address the question of whether or not the National Park Service, or any other Federal agency is authorized to regulate oil, gas and mineral development under the language contained in current State and Federal legislation. It is clear that despite continuous regulation by the Federal Government, the jurisdictional authority of said entity with respect to mineral development at Padre Island National Seashore is tenuous at best.

The current mineral owners' predecessor in title, P. F. Dunn conveyed the surface estate only in and to Padre Island to third parties in 1926, reserving all of the oil, gas and other minerals, together with the rights of ingress and egress to develop such minerals. The Federal Government ultimately acquired the lands now included within the National Seashore in 1962 through the Federal Enabling Act ("FEA"), Public Law 87-712, 16 U.S.C. §459d (1-7) (1991). At the time the Federal Government acquired the surface estate which now forms Padre Island National Seashore, it intentionally refrained from seeking to acquire the underlying mineral estate due to the prohibitive cost of such acquisition.

The FEA was specifically conditioned on and subject to the consent of the State of Texas. The State of Texas granted its consent in 1963 in the form of Article 6077 (t) V.A.T.S., hereinafter referred to as the

500 N. WATER STREET, SUITE 1000 • CORPUS CHRISTI, TEXAS 78471 • OFFICE: (512) 882-3153 • FAX: (512) 882-2662

RESPONSES

McCampbell v. National Park Service, 964 F. Supp. 1125 (S. Dist. Texas 1995), seeking a declaratory judgment that the NPS had no right to regulate its use of Padre Island. District Court Judge, Janis Jack, dismissed Dunn McCampbell's claims, ruling that it failed to bring its challenge within the six-year statute of limitations period. Dunn McCampbell appealed the District Court ruling to the Fifth Circuit Court of Appeals, Dunn McCampbell v. National Park Service, 112 F.3d 1283 (5^{th} Cir. 1998). The Fifth Circuit affirmed.

Although at the District Court Judge Jack dismissed Dunn McCampbell's claims on procedural grounds, she nevertheless took the opportunity to discuss Dunn McCampbell's substantive claims disputing NPS's regulatory authority. Judge Jack found that the NPS has clear authority to regulate nonfederal oil and gas activities at Padre Island, and found no merit to any of Dunn McCampbell's claims disputing such authority. Her opinion, which draws on extensive case law, is briefly summarized below.

The authority to manage and protect federal property arises from the Property Clause of the United States Constitution. The Property Clause provides that "Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other P5operty belonging to the United States…" U.S. Const. Art. IV, ¶ 3, cl. 2. Congress' power over the public lands is without limitations, and extends to conduct that occurs on or off federal land which affects federal lands. Courts have consistently upheld Congress' broad delegation of authority to federal land managing agencies under the Property Clause in a variety of contexts. See Kleppe v. New Mexico, 426 U.S. 526 (1976); Stupak-Thrall v. United States, 70 F.3d 881 (6^{th} Cir. 1995) (upholding Forest Service's authority to regulate privately-held surface rights to a lake within a wilderness area); Duncan Energy Co. v. Forest Service, 50 F.3d 584 (8^{th} Cir. 1995) (upholding Forest Service's authority to regulate activities on federally owned surface from activities related to private mineral rights underlying National Forest); United States v. Vogler, 859 F.2d 638 (9^{th} Cir. 1988) (upholding NPS regulation of access to a private mining claim in a park); Free Enterprise Canoe Renter's Assoc. v. Watt, 711 F.2d 852 (8^{th} Cir. 1983) (upholding NPS regulations requiring permit for canoe rental businesses located outside park); Minnesota v. Block, 660 F.2d 1240 (8^{th} Cir. 1981) (upholding Forest Service regulation of snowmobile activities on state land).

COMMENTS

Texas Consent Statute. Said statute specifically reserved to the State of Texas, acting through its Railroad Commission, the right to regulate oil, gas and mineral development under the lands which now form the National Seashore. Furthermore, the statute expressly prohibited interference with the rights of ingress and egress inuring to the benefit of mineral owners under Texas law. The Texas Consent Statute referred to both public and private lands, and the terms of the Texas Consent Statute were agreed to by the Federal Government by virtue of their acceptance of the deed from the State of Texas covering state lands, which deed reiterated the provisions to the Texas Consent Statute. The Federal Government's acceptance of the terms of the Texas Consent Statute is tantamount to the passage of a law by Congress preserving the exclusive regulatory authority of the State of Texas with respect to minerals underlying the National Seashore.

Despite its lack of mineral ownership, and despite the clear language of the Texas Consent Statute, the National Park Service has asserted the right to regulate the minerals underneath Padre Island National Seashore pursuant to the National Park Act of August 25, 1916, (16 U.S.C. §1 et seq.). The current nationwide Non-Federal Oil and Gas Rights Regulations are codified at Title 36 of the Code of Federal Regulations, Part 9, Sub-part B. We have assumed for purposes of these comments, that the Draft Oil and Gas Management Plan Environmental Impact Statement for Padre Island National Seashore has been promulgated under the auspices of these regulations.

The private mineral owners filed suit on March 8, 1994 seeking a declaratory judgment that the National Park Service did not have the right to regulate their mineral interests underlying the Padre Island National Seashore. The suit ultimately came before the United States Court of Appeals, Fifth Circuit which issued its opinion on May 23, 1997. *Dunn McCampbell Royalty Interest, Inc. v. National Park Service*, 112 F. 3d 1283 (5th Circuit 1997). The Fifth Circuit ultimately ruled against the private mineral owners, holding that the applicable Statute of Limitations prohibited said owners from asserting a challenge to the then existing Federal Regulations pertaining to mineral development at Padre Island National Seashore on their face, and holding that the claims of the private mineral owners were not yet ripe for adjudication based upon an "as applied" challenge to the Federal Regulations due to the fact that the mineral owners asserted no claims based upon the actual imposition of the regulations against either the mineral owners themselves, or oil or gas operators. The majority opinion, and the dissenting opinion in particular, clearly left open the door for future litigation by the private mineral owners either based on a change in the regulations themselves, or based upon a specific application of the regulations against an oil and gas company operator.

With the above historical and legal framework in mind, BNP Petroleum Corporation objects to the Draft Oil and Gas Management Plan Environmental Impact Statement as a whole due to the fact that the regulations proposed under such plan have not been authorized by a valid governmental authority having jurisdiction, namely the State of Texas. More specifically, the implementation of either Alternatives A or C, as set out in the Oil and Gas Management Plan may very well give rise to a new cause of action under the holding of the Fifth Circuit. Alternatives A and C both clearly impose further undue restriction on the mineral owners' rights of ingress and egress by virtue of designating almost half the acreage within the Park boundaries as no surface access and/or no surface occupancy areas. Indeed, the
37 imposition of either Alternative A or C would likely give rise to additional Constitutional claims based upon the taking of private property without just compensation due to the fact that such alternatives will essentially result in a partial condemnation of the mineral estate.

J:\WPFILES\PRSPECT\PADREISL\3D\NPS\COMMENTS.WPD

RESPONSES

In 1916, Congress exercised its power under the Property Clause and passed the NPS Organic Act, 16 U.S.C. §1 et seq. Congress directed the NPS to "promote and regulate" the National Parks "to conserve the scenery and the natural and historic objects and the wild life therein to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." 16 U.S.C. §1. Congress also mandated that the protection, management, and administration of the National Parks "shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established…" 16 U.S.C. §1a-1. Congress further authorized the Secretary of the Interior to "make and publish such rules and regulations as he may deem necessary or proper for the use of the parks…" 16 U.S.C. § 3.

In 1962, Congress established Padre Island National Seashore and, among other things, authorized the Secretary of the Interior to administer the federal surface interest under rules and regulations, as he may deem necessary or proper for the use of the parks. 16 U.S.C. § 459d-4.

Pursuant to its authority at 16 U.S.C. § 3, the NPS promulgated regulations at 36 C.F.R. Part 9, Subpart B ("9B Regulations") to provide a systemwide regulatory scheme governing the exercise of rights associated with nonfederal oil and gas interests. The purposes of the 9B regulations are to "insure that activities undertaken pursuant to [nonfederal oil and gas rights] are conducted in a manner consistent with the purposes for which the National Park System and each unit thereof were created, to prevent or minimize damage to the environment and other resource values, and to insure to the extent feasible that all units of the National Park System are left unimpaired for the enjoyment of future generations." 36 C.F.R. § 9.30(a). Section 459d-4 of the Padre Island enabling statute authorizes the NPS to protect the federal surface interest at Padre Island from potentially harmful activities associated with the exercise of rights associated with nonfederal oil and gas interests under the 9B regulatory scheme.

The 9B regulations fall within the broad scope of authority granted to the NPS from Congress under the NPS Organic Act – authority that includes the power to regulate conduct that occurs on or off federal land, which may affect federal lands. The 9B regulations are

COMMENTS	RESPONSES
Padre Island National Seashore Page 3 May 11, 1999	designed to control conduct associated with private mineral rights on federal land to avoid or minimize harm to park resources. Thus, in response to GNP's first assertion, the United States need not own the mineral interest beneath Padre Island to regulate rights associated with that interest that may affect the federally owned surface.
38 Beyond the objections noted above which pertain to regulation of mineral development within the Park boundaries, both the existing and proposed regulations and Management Plan attempt to regulate oil and gas development activity which occurs outside of the Park boundaries. This is a clear case of overreaching. Both the current and proposed regulations require operators to obtain an approved Plan of Operations even when a proposed surface location occurs outside of the Park boundaries in the event such operation involves directional drilling in order to access minerals underneath the Park boundaries. Directional drilling from outside the Park boundaries in order to access minerals underneath the Park boundaries in no way involves access through or interference with the surface estate owned by the Federal Government. Therefore, the National Park Service has no right to regulate in any manner the conduct of directional drilling activities from surface locations outside the Park boundaries. To the extent the existing or proposed regulations continue to assert the authority to regulate such operations, BNP Petroleum Corporation specifically objects to this unauthorized exercise of Federal power.	BNP's second argument that "[t]he Federal Government's acceptance of the terms of the Texas Consent Statute is tantamount to the passage of a law by Congress preserving the exclusive regulatory authority of the State of Texas with respect to minerals underlying the National Seashore" is equally without merit. The Texas Consent Statute has two primary effects: 1) it codifies Texas' grant of state owned land to the United States, and 2) it establishes a concurrent jurisdiction scheme (state and federal law apply) at Padre Island. BNP's misguided interpretation of the Texas Consent Statute is not found in any provision of either the Texas Consent Statute or in the Padre Island enabling legislation. The Texas Consent Statute specifically acknowledges that Texas clearly envisioned concurrent regulation of the National Seashore with the NPS via the following:
39 Subject to our objections noted above, and assuming arguendo that the existing Federal Regulations, along with the proposed Oil and Gas Management Plan are in fact authorized by law, Alternative B is clearly preferred to the remaining alternatives. Alternatives A and C identify "Sensitive Resource Areas", build unnecessary buffer zones around such areas, and then seek to eliminate or greatly diminish access to such areas which comprise almost half of the acreage within the Park boundaries. This is proposed despite the fact that the Draft Plan and Environmental Impact Statement acknowledges throughout that access can be had to Such Sensitive Resource Areas with minimal short or long term environmental or other impacts through the use of careful planning, monitoring and mitigation techniques. The condemnation of almost half of the Park acreage does not strike an effective balance between the needs and objectives of the Park and the private property rights and economic benefits associated with efficient domestic oil and gas production activities.	"It is the intention of the Legislature of the State of Texas that the use of said land for [mineral development and exploration] be carried out in such manner as to not unreasonably interfere with the use of said lands for park purposes ...", and "[The Texas Railroad Commission is required] to submit a copy of any proposed rules and regulations affecting the National Seashore...to the United States Department of the Interior, Washington, D.C. ..."
40 With respect to specific economic projections surrounding future oil and gas development, the Plan, and specifically Appendix G, grossly underestimate the future oil and gas reserve potential. The estimates of 80 BCF of gas and 1.7 MMB of condensate are based upon historical production data from known plays and do not account for the potential for discovery of new ideas or plays. Furthermore, the estimates do not take into account an extension of the Lower Frio play which has yielded particularly prolific production at Sarita East Field just west of the Laguna Madre on the S. K. East Ranch. Additionally, BNP is in the process of acquiring 3-D seismic data covering the Park acreage. 3-D seismic has never been acquired within the Park, and historically the acquisition of first time 3-D data has resulted in greatly enhanced reserve estimates. In summary, BNP believes the remaining discoverable reserves potentially greatly exceed the estimates set out in the Plan.	Tex.Civ.Stat.Ann. § 6077t, sec. 3.
41 Of the Sensitive Resources Areas identified in the Plan, wetlands areas comprised of sea grass regions and wind tidal flats make up approximately forty percent (40%) of the Park acreage. The entirety of the Laguna Madre within the Park boundaries is designated as a Sensitive Resource Area based upon the presence of sea grass, although the Plan acknowledges that sea grass is not present in the entire Laguna Madre. It is clearly unreasonable to restrict access to an area which might be in the future, but is not at present, subject to a specific environmental concern. This is especially the case when there are private property rights and significant economic benefits at stake as a result of any such designation. Likewise, the wind tidal flats, making up approximately twenty-two percent (22%) of the Park acreage, are designated as Sensitive Resources Area, and proposed Alternatives A and C both seek to prohibit or F:\WPFILES\SPRSPECT\PADREISL\3D\NPS\COMMENTS.WPD	No "exclusive state jurisdiction" scheme exists at Padre Island, and the State of Texas has no authority to determine when or whether federal law will or will not apply. Both state and federal law govern the conduct of oil and gas operations at Padre Island. To the extent, however, that state laws conflict with the federal statutory and regulatory requirements government the exercise of nonfederal oil and gas rights at Padre Island, the state law must recede. It is important for clarity to note that federal agencies do not "promulgate" management plans, as BNP incorrectly assumes in its comment letter. Regulations are promulgated; management plans are developed. This planning effort is designed to provide Padre

Padre Island National Seashore
Page 4
May 11, 1999

greatly restrict surface access to this acreage. Again, such restriction would be totally unreasonable, especially in light of the fact that based upon the Reasonably Foreseeable Development Scenario set out in the Plan, estimated future oil and gas exploration activities will only impact 0.2% of the Park acreage.

According to the Plan, the future operations conducted under either Alternatives A or B will result in very similar minimal future environmental impacts. The primary benefit attributed to proposed Alternative A is the reduced time period involved in approving future Plans of Operations. This would be due to the certainty provided to industry, namely that industry could not operate on acreage comprising fifty percent (50%) of the Park. Clearly, restricting access to half the Park in exchange for a shorter permitting process is unacceptable. While Alternative B is clearly the best alternative of the three available, we believe a fourth alternative would be preferable. The designation of specific "Sensitive Resource Areas" is a good idea, provided that only those areas that are truly "sensitive" and not those areas that may become sensitive or other buffer areas are included. Industry would propose

42 that the Sensitive Resource Areas be identified and that specific planning and communication requirements with the agency or agencies responsible for protecting such areas be included in the permitting process. Thus, the Sensitive Resource Areas would still be accessible to industry, but such areas would be subject to closer scrutiny in order to minimize impact to natural and other resources. All other acreage within the Park that is not designated a "Sensitive Resource Area" should be subject to a greatly streamlined version of the existing permitting process without the need for six (6) months or more of review. Clearly those areas of the Park that are not designated sensitive resource areas should not be subject to the same overly burdensome permitting and planning requirements as those areas that are sensitive. This alternative, if implemented, would provide true certainty and efficiency for industry, and would protect the rights of private mineral owners while implementing a coordinated plan for protecting the sensitive resources of the Park.

Sincerely,

BNP PETROLEUM CORPORATION

H. Scott Taylor
Legal Counsel

HST:dlc
cc: Mr. Dick Watt
Ms. Caroline Altheide
Mr. Paul Eubank
Mr. Robert Hatter, GLO

J:\WPFILES\SPRSPECT\PADREISL\3D\NPS\COMMENTS.WPD

Island with a comprehensive framework for the NPS to manage access and surface uses for the exploration, development, and transportation of nonfederal oil and gas. The plan itself does not have the force and effect of law. Further, the planning process will not (indeed it cannot) effect a substantive change to the laws and regulations governing the management of park system resources. Changes to the NPS's governing laws and regulations are made either by Congress or by the NPS rulemaking procedures, respectively. It is, therefore, inaccurate and misleading to say that the NPS is "promulgating" a plan, and that regulations are either being modified or proposed under this plan.

37. BNP inaccurately states that implementation of one alternative or another will "condemn" portions of the park. The NPS has no plans to condemn or acquire through other means nonfederal oil and gas rights at the park. The 9B regulations specifically acknowledge that they are "not intended to result in the taking of a property interest, but rather to impose reasonable regulations on activities which involve and affect federally-owned lands." 36 C.F.R. § 9.30(a). Condemnation is the process of taking private property for public use through the power of eminent domain. No such process has been initiated or planned as a result of this planning effort. Further, it is strictly a judicial determination whether or not the NPS's implementation of a particular plan alternative and application of the 9B regulatory provisions to a specific plan of operation would effect a taking of rights associated with a mineral interest. If a holder of a nonfederal mineral interest believes that its rights have been taken, it has redress through the agency's regulatory appeal process and in court. While the NPS is mindful that some of the alternatives proposed will limit access to portions of Padre Island to protect sensitive resources, it remains to be determined, what, if any, legal effect any one of those alternatives will have on the private mineral rights.

38. See Response #36.

39. The total acreage provided in Tables S.1 and 2.3 for Sensitive Resource Areas and their maximum buffers under the Proposed Action, Alternative A, should not be misconstrued to imply that the entire SRA acreage is off-limits to all types of oil and gas activities. Rather, in each SRA, specific operating restrictions are applied to specific types of oil and gas activities. In comparison, under

COMMENTS	RESPONSES

COMMENTS

February 28. 1999

Superintendent
Padre Island National Seashore
Attention: Linda Dansby. EIS Team Leader
Intermountain Support Office Santa Fe
P.O. Box 728
Santa Fe, New Mexico 87504-0728

Gentlemen:

I'am responding to the Draft Oil and Gas Management Plan/Environmental Impact Statement for Padre Island National Seashore. This was quite an impressive document, one that I found most extensive, covering various areas and subjects that I have not seen before in plans. It is certainly basically a fine document. I also am a previous National Park Service Employee, having retired from the above mentioned Park. At the time - I was the Chief Naturalist and then the Chief of Interpretation. I have carried out quite a good deal of field work myself, and made contacts with many professional individuals in many fields during my NPS career here. This will then set the stage for further comments that I would like to make.

I will discuss both details and broad areas that have come to my attention as I read through this document. First on page 1-7 - the second and third lines describe a vegetation classification map. I would like to mention here that there are vegetation types that are very segmented and isolated on the island. They appear in small pockets sometimes. Thus a vegetation map does not do justice or cover these particular cases at hand. This will be dealt with further below.

On page 1-19, Sea Turtles: Second Paragraph. There are 2 notreworthy comments to be made here. First, any operation on the beach during nesting time of Kemps Ridley Sea turtles would basically obliterate tracks leading to a nest, and also impact the nest itself. (I have seen oil and gas operations the beaches here.) The tracks are not easily descernible due to the smaller size of the turtle.

Secondly- stranding documentations of Sea Turtles were first started by myself on the National Seashore some years ago. I started the Texas Marine Turtle Stranding Network. I wrote all my volunteers along the coast and asked them to document any stranding reports that they made with observations of shrimping activities off shore. (I was deeply concerned with the number of dead Kemps washing in and found stranding on the beaches-particulary up north.) These were then sent to me and copied.

43 I wrote a sceintific paper that I presented at a conference in Galveston. It was later printed in the proceedings and sent out to all concerned. Why was this not indicated instead of Ms. Donna Shaver's as indicated?

RESPONSES

Alternative C, Maximum Resource Protection in all SRAs, no surface access would be allowed for any type of oil and gas activity; while under Alternative B, No-Action/Current Management, all types of oil and gas activities could be permitted parkwide under specific mitigation techniques derived by applying Current Legal and Policy Requirements.

40. The NPS recognizes that the U.S. Geological Survey Assessment of Remaining Oil and Gas Resources Beneath Padre Island National Seashore does not take into account specific prospects that may be generated based on local data such as that developed by 3-D seismic. The assessment is a reasonable estimate for purposes of assessing different alternatives to managing oil and gas development in the National Seashore. The volume of gas that is ultimately produced from below Padre Island may be more or less than 80 billion cubic feet.

41. See Response #39. The Seagrass Bed SRA has been deleted and replaced with a Laguna Madre SRA (see Response #24). The Wind-Tidal Flat SRA has been modified so that the operating restrictions under the Proposed Action include: No placement of fill, or compaction and rutting more than 1 inch deep; except geophysical exploration, and construction of roads, drilling pads, and pipelines may be permitted if they meet the least damaging method. Production operations must be located outside wind-tidal flats on uplands locations."

42. A table listing "Legal and Policy Mandates Governing Nonfederal Oil and Gas Operations" has been added in Chapter 1, Introduction, and a new appendix has been provided which summarizes many, but not all, of the legal and policy mandates that currently govern the exercise of nonfederal oil and gas rights in units of the National Park System. During early planning and development of plans of operations, the NPS encourages meetings involving all affected state and federal regulatory and permitting agencies. It is quite conceivable that exemptions to plan requirements, as described in the introductory pages of Chapter 2, Plan Alternatives, could be granted where an operator can demonstrate that least damaging methods would avoid or minimize impacts to a sufficient level that SRA operating restrictions would not be required. In regards to the 6-month review period mentioned, please refer to Table 2.5, NPS Processing Time for a Plan of Operations. Upon receipt of a

COMMENTS	RESPONSES
	substantially complete Plan of Operations from an operator, the NPS routinely performs an internal completeness and technical review which takes 30 days. If substantive information is missing, the operator is encouraged to revise the plan prior to the Superintendent's "acceptance" for formal processing which includes a minimum 30-day public review period. A 6-month review period is not the standard NPS processing timeline.
44 On page 1-21, this whole topic of Vegetation assumes that there is a homogeneous covering in species and forms in the particular ecological habitats at hand. Again I strongly state that there are many isolated species which do not follow this type of mapping or coverage. Drosera annua, and Utricularia subulata are examples here, found mainly around the west part of the Grasslands Nature Trail. Do we know that these plants cover other areas as well? I don't beleive so. I have found other isolated plants in my travels across the island that have not been found in other areas. Thus the need to physically check the area at hand before any determination can be made is important here.	43. The reference to D. Shaver 1997 was the latest and most up-to-date document published for the Kemp's Ridley sea turtle project on-going at Padre Island National Seashore.
On page 1-23, under the heading of Mammals - there is a general mention of the mammals present. However there is not a statement of the particular species here. I have found that certain species - Kangaroo Rats in particular, have been evolving and are changing into a particular new species. A study had been done by a graduate student some years ago. There are also been discovered new generas and species of moths that have been collected and studied here by a Lepidopterist. These have been written and described in Journals. Thus we have a habitat and environment that has and is still producing species that we may be unaware of. 45 Further studies and investigations need to be carried out here before destruction of habitats are carried out.	44. Description of the diverse plant communities are not intended to include a complete survey of all vegetative types found throughout the park, but rather a description of those species that are the dominant species found in those described community classifications. Nonfederal oil and gas plans of operations are required to include a biological survey of the areas that would be impacted, which would identify specific vegetative species.
On page 1-24 covers Avifauna in a general sense. Yes, there is a large number of species that at one time or another are found here. The White Pelican group is a unique population of birds here. They are the only marine nesting Pelicans in the United States. We have done some studies on them, but do not know the reason or factors determining this situation. There may be other very rare species that occur from time to time, as the Flamingo that I caught sight of and reported. This came back to the spoil island out from Bird Island Basin for several years. Still others occur also such as Frigate Birds, Boobies, and others. 46 There needs to be given consideration for unusual species since we are in the Tamolitechan Biological Province and various species will wander, move, or come into this area from the south.	45. Prior to any surface disturbance, such as pad construction and/or road building, a biological survey is conducted to identify the species diversity and density for vegetation, describe fish and wildlife, etc. This information is used to design a reclamation plan and measure reclamation success at the termination of operations. Habitat disturbance is minimized to the smallest area possible. 46. We agree.
On page 2-9, in the Sensitive Resource Areas in Acres and Percent of Park Table. There (I gather) is given acreage for the Colonial Waterbird Rookeries in the table. 47 Yet this has to be carefully reckoned with. Species can be found on a spoil island for some years and then disappear in a matter of a year of so. Habitat change, vegetation change, predators, plus other impacts cause this change. I have seen this during my years of monitoring the rookeries and birds during their nesting. I could give species and reasons if you like but the reason and importance remains here.	47. You are correct. This acreage includes all acreage comprised of spoil islands and the two natural islands, in addition to their 1,000-foot protective buffers. All of these islands provide nesting habitat for waterbirds. Padre Island National Seashore has been directly involved in the colonial waterbird survey for over 15 years. The utmost protection of species that utilize the colonial waterbird island is considered in all decisionmaking that could possibly affect the rookery islands.

COMMENTS	RESPONSES
48 On page 2-54, under the heading of Protection of Cultural Resources, there is no mention of the many Indian Sites that have been found, recorded, and written in a study. Dr. Campbell had done this some years ago. Thus we can tell in a general sense on a map where these are, if a group wanted to go in and impact the area. Louis Rawalt had wandered across and down the island for many years, collected many artifacts, and made maps of many sites on the island. I am still trying to get these materials from his son. Louis has since passed away.	48. Refer to the discussions of cultural resources in Chapters 2 and 3, in which Dr. Campbell is referenced.
On page 3-21, there is indicated in paragraph 4 at the end, a short listing of marine grasses. There are more of course, but there is also a great richness of various kinds of algae in places that can be greatly impacted. These are of many species and types. They represent a most unique feature of the hypersaline waters of the Laguna Madre. These grasses and vegetation species are a prime resource in the Laguna Madre. 49 Any silting, or impact can cause these species to disappear and have a tremendous impact on shrimp and fisheries resources. I have worried about this for many years.	49. We agree. See Response #24.
On page 3-32, under the Historic Structures section, there is mentioned The Novillo Line Camp. This Camp is unique in the Cattle and Ranching Operation in South Texas. Mr. Dunn operated this ranch he acquired with free grazing on the length of the island. He established Line Camps every 15 miles donw island and made these camps out of the drift lumber found on the beaches. There needs to be a careful review of the Historic Structures Report and change the status made there. An event unfortunately occurred some years ago, as one of the cabins burned down due to a vagrant who made a fire inside it. The old windmill that Burton Dunn put up has deteriorated and is no longer present. Further work on preserving and protecting this valuable cultural site should be undertaken. I had all the wood painted with Cupernol Preservative and a roof put on the one bunk house to preserve it. The interpretive plans sound most commendable here and I hope they are carried out. Any oil or gas operations in the vicinity would certainly decrease and make the site a far less meaningful place if viewed.	
50 On page 3-48, Section under Rookery Islands - Check on the comments made on the Colonial Waterbirds and their Rookery Islands that I made earlier. This directly pertains to this section.	50. See Response #47.
On page 4-24, Section under Impacts to Cultural Resources. See my comments dealing earlier with this subject. There has been an Archaeological Survey made by Dr. Campbell. 51 There also has been sightings of a Spanish Galleon inshore by Louis Rawalt.	51. Comment noted.
On page 4-30, Section Impacts to Visitor Experiences Common	

COMMENTS	RESPONSES
to Alternative. It is interesting to note here that the great majority of visitors and their recreational pursuits are carried out only on the thin strip of beach front. Any other area would have little impact for visitors due to this. (Outside of Malaquite Beach area) On page H-13, In Case of A Spill. There is a great concern on my part that a oil spill is not covered by any plan, by any other support group, or by the S.W.R.O. I say this because I was Coordinator for the Park during the Ixtoc I Oil spill of 1979. It was a horrible situation that I had to deal with over some months, and received no support. I carried out all activities on my own. I had hired Jim Woods at the time and he assisted me. True, this was from Mexico, but it could happen again, and from the off shore oil platform wells. The U.S. Coast Guard at the time told me that there were no plans or support to help us out. They did boom the entrance to Mansfield Channel. The impact on the beach, on visitor use, and on the resources was very great here due to this situation. I know that I may have carried out items in the above in perhaps more detail that you may be interested in. I appreciate the opportunity to express these comments. The plan is indeed a good one, and I support the Alternative A, with the comments made. Thank you for the work that you have done on this project and plan. Sincerely, Robert G. Whistler 3221 Coveway Drive Corpus Christi, Texas 78418	

COMMENTS

28 April 1999

Superintendent
Padre Island National Seashore
Corpus Christi, TX

Dear Sir,

This letter concerns the Oil and Gas Management Plan and my comments about it. First, I think that the group responsible did a very commendable job on such a controversial subject. The three plans to handle the problem seem to cover all aspects. Since I am a biologist and have worked on the fauna and flora of Padre Island for the last 40 years, I would prefer plan C over your Plan A. I did encounter a few specific items in my short perusal of the document:

52 PP2-5 - Although the suggested drill sites are hypothetical, I am concerned about the placement of RFD#1 and RFD#3.
RFD#1 - I could condone the barge concept, but to suggest a drilling site on the western side of Padre or production facilities on a terrestrial site on Padre, I cannot. This area includes an extensive mud flat, to quote ECOSERVICES, 1995 – "This mudflat was filled with feeding and loafing birds at all times except when it was completely inundated by high tides". Piping Plover used this area more than any other, 80% of the birds counted were found on this mud flat. If I am not mistaken, Withers (1993) found an over-wintering group of Piping Plover on this mud flat.
RFD#3 – If the extensive mud flats are included as a part of the drilling and storage facilities, I must object to this location for much the same reasons as for #1. ECOSERVICES (1995) indicated that there were two sites favored by birds in the south section of the study area, one located at Yarborough Pass. This mud flat would fall within the area indicated on your figure 2.1. Piping Plover were located there, except during April. Least Tern were abundant on this southern mud flat, 84% of their total counted were located there. Snowy Plover often congregated near the mud flat by Yarborough Pass road. I could see re-establishment of the facilities that were recently removed, just so it did not involve the mud and wind tidal flats.

53 PP3-25 The higher salinity of the upper Laguna Madre prohibits the establishment of turtle grass

54 PP3-48 First paragraph – *Dipodomys* is misspelled as is *Holbrookia*. I would omit "and the insular dunes at Sarita, Texas." This lizard is found in sandy areas throughout south Texas.
Second paragraph – Snowy plover should be *alexandrinus*.
Fourth paragraph – American White Pelican should be *Pelecanus erythrorhynchos*
Last paragraph – "These islands— to a point (north east) of Point of Rocks." Omit "along the north shore' "2 to 40 acres and have a flat topography" (add –with a small central elevation.)
There is practically no yucca on the islands – prickly pear (*Opuntia lindheimeri*) is much more abundant and occurs on most of your islands

55 Again, a fine job, but I was disappointed that ECOSERVICES was not mentioned in your Organizations and Businesses

Sincerely,

Allan H. Chaney, Emeritus Professor
Texas A&M University @ Kingsville TX.

RESPONSES

52. The NPS shares your concerns. Refer to Responses #24 and #41 describing changes to Seagrass Bed and Wind-Tidal Flat SRAs. The wind-tidal flats are very important as habitat to piping plovers and is a sensitive environment. We have therefore further defined and developed operating restrictions under the Proposed Action, Alternative A. Any proposed development on sand, mud, and/or tidal flats would require coordination and evaluation with the U.S. Fish and Wildlife and other state and federal resource trustee and permitting agencies. Impacts to these flats would have to take into account impacts to those species of shore birds that utilize those areas for resting, loafing, feeding and nesting. All other alternatives would be carefully considered prior to siting operations on flats.

53. The occurrence of turtle grass has been documented in the upper Laguna Madre.

54. All recommended corrections have been made in the FEIS.

55. This has been corrected in the FEIS.

May 11, 1999

Superintendent, Padre Island National Seashore
P.O. Box 181300
Corpus Christi, TX 78480-1300
Fax: (361) 949-8023

Re: Oil and Gas Management Plan/EIS for Padre Island National Seashore

We have considered the various alternatives listed in the EIS and we urge you to choose Alternative C, the maximum resource protection alternative. We would, of course, prefer that no oil and gas exploration or development be allowed in the National Seashore, but we do recognize that the enabling legislation which led to the its creation did not transfer mineral rights. We will highlight two of our most important concerns below.

We have spent time on the National Seashore ever since 1970. During the past 10 years we have spent part of practically every weekend there. Much of that time has been spent in the grasslands and the dunes on the Laguna Madre side of the island in the vicinity of Bird Island Basin and the large pond to the South. We have watched with wonder as the island has recovered from grazing. We have seen vegetation increase, both in amount and variety. We have watched the numbers and variety of animal life increase as conditions have improved. There are always the ubiquitous deer and the amazing variety of birds. Coyotes have been reasonably accepting of our presence, and we watched a Peregrine Falcon who remained all winter. In fact, a "bad" wildlife watching day on the island is an excellent day almost anywhere else. We were clearly not pleased to see all of the seismic testing in our little paradise; we will be extremely upset if drilling occurs in the area and destroys what is so dear to us.

And what is all this testing drilling for? According to the EIS there is only an estimated 80 billion cu ft of gas to be found in the National Seashore, which would be pumped out over 30 years (p. S-5, 1-15). Assuming that the volume of gas was recovered evenly over the 30 years, this would amount to about 3 billion cu ft /yr or approximately 0.014% of the United States' consumption of 22 trillion cu ft in 1996. Said differently, this amounts to about 72 minutes of natural gas consumption in the United States! Even if it was all recovered in one year, it would only be about 36 hours worth of gas. It seems ludicrous to us that even one acre of Padre Island National Seashore should be sacrificed for this piddling amount of gas. Obviously our objections would hold even if there was five times as much gas (highly unlikely but obviously why 3-D seismic testing is being carried out). It is also difficult for us to believe that there is a profit in this little bit of gas. However, we are not in the oil and gas business so we have no knowledge in that area.

The National Seashore is a jewel and it belongs to everyone. It is not in the spirit of the National Park system to allow activities such as oil and gas extraction. However, since mineral rights were not transferred with the park, such intrusion should

COMMENTS	RESPONSES
be kept to an absolute minimum. We once again urge you to choose alternative C which would minimize impact. We respectfully submit our concerns and we hope they will be considered in your deliberations. Sincerely, Jerry D. Unruh Diana P. Unruh Jerry and Diana Unruh 622 Bradshaw Dr. Corpus Christi, TX 78412	

COMMENTS

Olin Anderson
303 ½ W Green St.
Urbana, IL 61801
May 11, 1999

Superintendent
Padre Island National Seashore
Attn: Linda Dansby, EIS Team Leader
Intermountain Support Office – Santa Fe
P.O. Box 728
Santa Fe, NM 87504-0728

To Whom It May Concern,

I have reviewed the Draft Oil and Gas Management Plan/Environmental Impact Statement (EIS) for your facility. In general I find it to be a thorough document.

Alternatives A and B seem to differ only by formal identification of sensitive resource areas (SRAs) and applying consistent standards to oil and gas exploration. Under a conservation-minded review of managed access provisions, the national park could possibly have better wilderness protection under the no-action Alternative B. These differences are visible in the *Impacts to Wetlands*, on page 4-21, paragraph 2, line 1, and page 4-22, paragraph 5, line 1. Wetlands compose 60% of the islands landcover, and thus the impacts to them is perhaps the greatest component of the management plan. It is appealing to apply a more conservative approach (Alternative C) as shown on page 23, paragraph 7, line 1.

56 This document does not present scientific evidence whether wide-tracked vehicles may cause undo destruction of wetlands, such as killing vegetation, reducing fish populations, and imbalancing predatory relationships from habitat modification. Damaged vegetation might open cover for predatory or competitive species to decimate a population of certain species. This sort of information is needed to make an educated decision between the alternatives regarding the impact of exploration vehicle access

Protection of the foredunes is crucial for the continued physical existence of the island (page S-4, paragraph 3, line 4). The relationship of landscape and natural forces is remarkable in this zone of the island, as the dunes may be destroyed by greater storm events. The dunes receive greatest protection in Alternative C, which may be the most logical choice as storm events are inevitable.

57 Aside from road building, damage to dune vegetation cover from exploration in Alternative A could be significant, particularly if visitors illegally use the exploration paths and worsen habitat damage.

58 Vegetative damage may be a cause of concern, perhaps requiring greater consideration. Although the scale of direct occupancy is small, 0.2 percent (page 1-22, paragraph 1, line 3), a 3-D seismic survey of the park could impact it through vehicular operation in a grid, spaced 20.3 to 66 feet apart (page 2-50, paragraph 1, line 4). Additionally, the terrestrial scale and environmental disruption of seismic surveying may also cause disruption of the mammals living on the island The potential exists in this activity to "herd" them into an undersized habitat area and/or stress and endanger their survival. More should be presented about this potential impact.

RESPONSES

56. NPS resource managers evaluated impacts from track vehicles used for a seismic survey conducted at the Aransas Wildlife Refuge, wintering home of the Whooping Crane, in 1997. The impacts from wide track aluminum drill buggies were acceptable. Rutting was minimal through marsh and open ponds. There tends to be a more visual impact from vegetation that has been laid over. However, if vegetative roots are not disturbed, vegetative recovery occurs within months. Laying of geophones on the foredunes by foot for receiving is not likely to promote visitor social trails.

57. Comment noted.

58. Geophysical exploration that utilizes least-damaging methods may be the most environmentally-compatible of all oil and gas exploration techniques. Impacts are mostly visual and recover within months. A detailed impact analysis is provided under the heading "Impacts to Vegetation" in Chapter 4, Environmental Consequences.

COMMENTS		RESPONSES
59	Damage to man-made structures from inevitable events of nature are worthy of consideration. Have there been any pipeline leakages due to hurricane disruption? Have wildfires or hurricanes threatened wellhead integrity? The magnitude of effort required on page 2-58, paragraph 7, line 1, leads me to believe that hurricane conditions have serious impacts. These impacts should be identified, and the short-term and long-term effects of potential failures should be presented.	59. There is no documentation in the park to indicate that Hurricane Allen, which struck the island in 1980, resulted in pipeline ruptures or other spill incidents at oil and gas facilities; however, the park's visitor center which was located on the Gulf side of the foredunes was totally destroyed. More recently, in August 1999, Hurricane Bret struck the island in the area from the 32.5 mile marker south to the 56.8 mile marker. Storm surge created 21 washover channels from the Gulf of Mexico to the Laguna Madre. There are currently no oil and gas operations in this area of the National Seashore. Since most of the island with the exception of high dune ridges along the Gulf beach lies within the 100-year coastal floodplain, the potential for future hurricanes and flooding is a serious consideration. Before approving a Plan of Operations, the NPS complies with Executive Order 11988, Floodplain Management, and the NPS's implementing guidelines for the EO, found in Special Directive 93-4. Operations may be sited in the regulatory floodplains only if there is no other practicable alternative, and only if least-damaging methods are utilized to protect the beneficial values of floodplains, and to minimize harm to life and property. These requirements are described in Chapter 2, Part II, Current Legal and Policy Requirements, under the heading "Protection of Floodplain Values/Hurricane Preparedness." A discussion of potential impacts is provided under "Impacts to Floodplains" in Chapter 4, Environmental Consequences. Please also see Response # 33.
60	Settling and subsidence could be relevant to oil and gas extraction. I did not find reference to settling and subsidence issues except mention worthiness inclusion in a plan of operations on page 2-27, paragraph 1, line 6. If it is known for certain that no subsidence will occur from underground extraction, formal mention of it would clarify this issue. The effect of subsidence would be catastrophic to the very existence of the island.	60. The discussion of potential subsidence as a result of withdrawing large quantities of fluids during production operations is provided in Chapter 4, Environmental Consequences, under the heading "Impacts to Soils and Water Resources Common to All Alternatives," under the section "Production."
61	Cost-benefit issues, as raised on page 1-9, paragraph 10, line 1, may not have been fully addressed. Padre Island is America's longest undeveloped barrier island - certainly there is justification in analyzing it's potential to remain undeveloped. This would require purchasing the oil and gas claims in the area, as the National Park Service is authorized under 36 CFR Part 9B and described on page 2-17, paragraph 4, line 11, and page 2-48, paragraph 5, line 1. This report should help to identify if such conditions are met, but it does not provide many quantitative measures of potential catastrophic scenarios under best management practices for resource extraction. An example of this omission is the statement about oil spills on page 4-22, paragraph 1, line 1. This vague identification of wetland impacts seems to be serious and apply to all of the analyzed scenarios, not just Alternative B. The whole issue of pollutant-wetland interaction needs to be identified. Although the exact number of accidental spills cannot be known, potential effects could be estimated over the effective lifespan of the wells through comparison of the effects of a conservative number of spills, a high number of spills, and some intermediate number. Failure statistics certainly must be available about wells, pipelines and storage structures. By knowing potential losses of wildlife through development, the issue of no-development can be better addressed.	61. The issue of accidents, spills and releases of product is a serious concern. Careful siting of operations, proper secondary containment and good maintenance practices would reduce the potential for releases. Chapter 2, Part II, Current Legal and Policy Requirements, under the heading "Control of Contaminating and Hazardous Substances," describes operating standards to minimize the potential for leaks and spills of contaminating and hazardous substances. Impact analyses are presented in Chapter 4.
62	Each of the three alternatives accommodate current trends in furthering resource extraction on Padre Island, which reduces "...a portion of the diminishing seashore of the United States that remains undeveloped..." (page S-1, paragraph 5, line 4). Of the three, it appears that A and C are more useful in identifying sensitive resource areas. Alternative C provides the most sensitive approach to the sensitive areas. The impact of widespread seismic testing, catastrophic natural events and human accidents need to be further quantified to understand whether the National Park Service should pursue full protection of the habitats of seven federally endangered and four federally threatened species.	62. That is the purpose of the Plan/EIS.

Sincerely,

Olin Anderson

Olin Anderson
Graduate Student in Landscape Architecture,
University of Illinois, Urbana-Champaign

CHAPTER 6

PREPARERS AND CONSULTANTS

CHAPTER 6
PREPARERS AND CONSULTANTS

PREPARERS

Name	Responsibility	Education	Years Related Experience
Linda Dansby	EIS Team Leader Summary Introduction Plan Alternatives and Current Legal and Policy Requirements Environmental Consequences -Air Quality -Soils and Water Resources -Floodplains -Fish and Wildlife -Threatened and Endangered Species and Their Habitats -Cultural Resources	BS-Biology	NPS-21 yrs Environmental Protection Specialist
Darrell Echols	Affected Environment -Natural Resources ArcView Maps	BS-Biology	NPS-11 yrs Natural Resource Management Specialist
Pat O'Dell	RFD Scenario, Introduction -Local and Regional Economies Ch 2, Part II, CLPR -Overview of 36 CFR 9B Process Environmental Consequences -Oil and Gas Exploration and Development Appendix D, Types of Oil and Gas Operations	BS-Petroleum Engineering	NPS-8 yrs Petroleum Engineer Industry-10 yrs Petroleum Engineer
Paul Eubank	Affected Environment -Oil and Gas Exploration and Development	BS-Biology	NPS-25 yrs Environmental Protection Specialist
Jim Bradford	Affected Environment -Archeology Environmental Consequences -Cultural Resources	BS-Archeology/ Anthropology	NPS-21 yrs Cultural Resource Mgt. Private Sector-6 yrs
Alexa Roberts	Affected Environment -Ethnography	PhD-Anthropology	NPS-5 yrs Ethnographer Navajo Nation-8 yrs Private Sector-4 yrs
Catherine Colby	Affected Environment -Historic Structures	MA Architecture	NPS-16 yrs Historical Architect
Jill Cowley	Affected Environment -Cultural Landscapes	Masters in Landscape Architecture	NPS-11 yrs Landscape Architect

Name	Responsibility	Education	Years Related Experience
Lysa Wegman-French	Environmental Consequences -Cultural Resources	MA-History/ MLS Library Science	NPS-8 yrs Historian
Carol Mcoy	Introduction -NPS Nonfederal Oil and Gas Rights Regulations, 36 CFR 9B Appendix C, Federal Laws, Regulations, Executive Orders, Policies, and Guidelines that Apply to Nonfederal Oil and Gas Activities	BA-Environmental Studies MPP-Masters of Public Policy with emphasis on Environmental Management JD	NPS-20 yrs Regulatory/Policy Specialist EPA-3yrs Regulatory/Policy Specialist
Edward Kassman, Jr.	Introduction -NPS Nonfederal Oil and Gas Rights Regulations, 36 CFR 9B	JD	NPS-7 yrs Regulatory/Policy Specialist Private-2 yrs
Lisa Norby	Appendix C, Federal Laws, Regulations, Executive Orders, Policies, and Guidelines that Apply to Nonfederal Oil and Gas Activities	BS/MS-Geology MEPM-Masters of Environmental Policy and Management	NPS-7 yrs Petroleum Geologist/Natural Resource Specialist Industry-12 yrs Geophysicist & Geologist
Sandy Hamilton	Appendix C, Federal Laws, Regulations, Executive Orders, Policies, and Guidelines that Apply to Nonfederal Oil and Gas Activities	MS-Ecology JD LLM-Candidate	NPS/University of Denver Student Partner-7 mos
Loreen Lithgow	Affected Environment -Vegetation	MS-Environmental Science & Mgt.	NPS/New Mexico Highlands University Partner-8 mos
Bob DuBey	Affected Environment and Environmental Consequences -Fish and Wildlife -T&E Species	MS-Life Science	NPS-9 mos. Natural Resource Spec. Industry-10 yrs
Victoria Barela	Copy-Editing/Formatting		NPS-12 years Program Assistant
Linda Lutz-Ryan	Graphics and Publication Support	MFA - Fine Arts	NPS-11 years Visual Info. Specialist/Park Ranger

The following individuals provided contracted products and services:

Name	Responsibility	Education	Years Related Experience
Nancy Van Dyke	EIS Technical Support Environmental Consequences -Vegetation -Visitor Experience	BA-Biology/Geog. MS-Env. Sciences	Environmental Consulting - 20 yrs President, Van Dyke Environmental, LLC
Elijah W. Ramsey Stephen C. Laine	Landcover Classes Map		USGS, National Wetlands Research Center, Lafayette, LA
Chris Schenk R. Charpentier R. Corvelli and J.W. Schmoker	Appendix E, Remaining Oil and Gas Resources Beneath Padre Island National Seashore, USGS Assessment Methodology		USGS, Denver, CO
Jim Foch	Affected Environment -Sound Measurements	PhD	Livermore Laboratory
Bob Lessard	Environmental Consequences -Soils and Water Resources	MS-Geology PhD-Hydrology PhD-Paleontology	New Mexico Highlands Univ., Professor of Geology
Rex Wahl	Environmental Consequences -Wetlands	MS-Biology	Sr. Environmental Planner, Entranco

CONSULTANTS

Padre Island National Seashore
Jock Whitworth, Superintendent
Dave McGinnis, Acting Superintendent (May-September 1998)
Pat McCrary, Superintendent (1996 - 1998)
Butch Farabee, Superintendent (1991 - 1996)
John Miller, Chief, Resources Management, Science and Interpretation

Big Thicket National Preserve
Pete Peterson, Superintendent
Rick Strahan, Chief, Resources Management Division
Doug Hutter, Resources Management Specialist
Kim Hebert, GIS Specialist
Roy Zipp, Resources Management Specialist

Lake Meredith National Recreation Area/Alibates Flint Quarries National Monument
John Benjamin, Superintendent
Jim Rancier, Chief, Resources Management
Wes Phillips, Environmental Protection Specialist

Geologic Resources Division, Natural Resource Program Center, Denver, Colorado
Jim Woods, Chief, Minerals Operations Branch
Bruce Heise, Geologist, Mineral Operations Branch

Water Resources Division, Fort Collins and Denver, Colorado
Mark Flora, Chief, Planning and Evaluation Branch
Leslie Krueger, Natural Resource Specialist
Gary Rosenlieb, Hydrologist
Mark VanMouwerik, Research Associate
Roy Irwin, Contaminant Specialist
Mike Martin, Hydrologist

Intermountain Support Office - Denver
Chris Turk, Environmental Quality Officer
William Schreier, Threatened and Endangered Species Coordinator

Intermountain Support Office - Santa Fe
Joe Sovick, Chief, Recreation and Partnerships Team
Julian Trujillo, Realty Officer, Lands

Washington Office
Jake Hoogland, Chief, Environmental Quality
Mike Soukup, Associate Director, Natural Resources Management

APPENDIXES A THROUGH J

REFERENCES

GLOSSARY

INDEX

APPENDIX A

PUBLIC LAW 87-712
ENABLING LEGISLATION FOR
PADRE ISLAND NATIONAL SEASHORE

Establishment authorized by Act of September 28, 1962

An Act To provide for the establishment of the Padre Island National Seashore, approved September 28, 1962 (76 Stat. 650)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to save and preserve, for purposes of public recreation, benefit, and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped, the Secretary of the Interior shall take appropriate action in the public interest toward the establishment of the following described lands and waters as the Padre Island National Seashore: Beginning at a point one statute mile northerly of North Bird Island on the easterly line of the Intracoastal Waterway; thence due east to a point on Padre Island one statute mile west of the mean high water line of the Gulf of Mexico; thence southwesterly paralleling the said mean high water line of the Gulf of Mexico a distance of about three and five-tenths statute miles; thence due east to the two-fathom line on the east side of Padre Island as depicted on United States Coast and Geodetic Survey chart numbered 1286; thence along the said two-fathom line on the east side of Padre Island as depicted on United States Coast and Geodetic Survey charts numbered 1286, 1287, and 1288 to the Willacy-Cameron County line extended; thence westerly along said county line to a point 1,500 feet west of the mean high water line of the Gulf of Mexico as that line was determined by the survey of J. S. Boyles and is depicted on sections 9, and 10 of the map entitled a "Survey of Padre Island made for the office of the Attorney General of the State of Texas", dated August 7 to 11, 1941, and August 11, 13 and 14, 1941 respectively; thence northerly along a line parallel to said survey line of J. S. Boyles and distant therefrom 1.500 feet west to a point on the centerline of the Port Mansfield Channel; thence westerly along said centerline to a point three statute miles west of the said two-fathom line; thence northerly parallel with said two-fathom line to 27 degrees 20 minutes north latitude; thence westerly along said latitude to the easterly line of the Intracoastal Waterway; thence northerly following the easterly line of the Intracoastal waterway as indicated by channel markers in the Laguna Madre to the point of beginning.

Sec. 2. (a) The Secretary of the Interior (hereinafter referred to as the "Secretary") is authorized to acquire by donation, purchase with donated or appropriated funds, condemnation, transfer, from any Federal agency, exchange, or otherwise, the land, waters, and other property, and improvements thereon and any interest therein, within the areas described in the first section of this Act or which lie within the boundaries of the seashore as established under section 3 of this Act (hereinafter referred to as "such area"). Any property, or interest therein, owned by the State of Texas or political subdivision thereof may be acquired only with the concurrence of such owner. Notwithstanding any other provision of law, any Federal property located within such area may, with the concurrence of the agency having custody thereof, be transferred without consideration to the administrative jurisdiction of the Secretary for use by him in carrying out the provisions of this Act.

(b) The Secretary is authorized to pay for any acquisitions which he makes by purchase under this Act their fair market value, as determined by the Secretary, who may in his discretion base his determination on an independent appraisal obtained by him.

(c) In exercising his authority to acquire property by exchange, the Secretary may accept title to any non-Federal property located within such area and convey to the grantor of such property any federally owned property under the jurisdiction of the Secretary within such area. The properties so exchanged shall be approximately equal in fair market value: Provided, That the Secretary may accept cash from or pay cash to the grantor in such an exchange in order to equalize the values of the properties exchanged.

Sec. 3. (a) As soon as practicable after the date of enactment of this Act and following the acquisition by the Secretary of an acreage in the area described in section 1 of this Act, that is in the opinion of the Secretary efficiently administrable to carry out the purposes of this Act, the Secretary shall establish the area as a national seashore by the publication of notice thereof in the Federal Register.

(b) Such notice referred to in subsection (a) of this section shall contain a detailed description of the boundaries of the seashore which shall encompass an area as nearly as practicable identical to the area described in section 1 of this Act. The Secretary shall forthwith after the date of publication of such notice in the Federal Register (1) send a copy of such notice, together with a map showing such boundaries, by registered or certified mail to the Governor of the State and to the governing body of each of the political subdivisions involved; (2) cause a copy of such notice and map to be published in one or more newspapers which circulate in each of the localities; and (3) cause a certified copy of such notice, a copy of such map, and a copy of this Act to be recorded at the registry of deeds for the county involved.

Sec. 4. (a) When acquiring land, waters, or interests therein, the Secretary shall permit a reservation by the grantor of all or any part of the oil and gas minerals in such land or waters and of other minerals therein which can be removed by similar means, with the right of occupation and use of so much of the surface of the land or waters as may be required for all purposes reasonably incident to the mining or removal of such from beneath the surface of these lands and waters and the lands and waters adjacent thereto, under such regulations as may be prescribed by the Secretary with respect to such mining or removal.

(b) Any acquisition hereunder shall exclude and shall not diminish any right of occupation or use of the surface under grants, leases, or easements existing on April 11, 1961, which are reasonably necessary for the exploration, development, production, storing, processing, or transporting of oil and gas minerals that are removed from outside the boundaries of the national seashore and the Secretary may grant additional rights of occupation or use of the surface for the purposes aforesaid upon the terms and under such regulations as may be prescribed by him.

Sec. 5. Except as otherwise provided in this Act, the property acquired by the Secretary, subject to the provisions of the Act entitled "An Act to establish a National Park Service and for other purposes", approved August 25, 1916 (39 Stat. 535), as amended and supplemented, and in accordance with other laws of general application relating to the areas administered and supervised by the Secretary through the National Park Service; except that authority otherwise available to the Secretary for the conservation and management of natural resources may be utilized to the extent he finds such authority will further the purposes of this Act.

Sec. 6. The Secretary may provide for roadways from the north and south boundaries of such public recreation area to the access highways from the mainland to Padre Island.

Sec. 7. The Secretary of the Interior shall enter into such administrative agreements with the Secretary of the Navy as the Secretary of the Navy may deem necessary to assure that the Secretary of the Interior will not exercise any authority granted by this Act so as to interfere with the use by the Department of the Navy of any aerial gunnery or bombing range located in the vicinity of Padre Island.

Sec. 8. There are authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act; except that no more than $5,000.000 shall be appropriated for the acquisition of land and waters and improvements thereon, and interests therein, and incidental costs relating thereto, in accordance with the provisions of this Act.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

NATIONAL PARK SERVICE
NONFEDERAL OIL AND GAS RIGHTS REGULATIONS
36 CFR 9B

Subpart--B--Non-Federal Oil and Gas Rights

AUTHORITY: Act of August 25, 1916, 39 Stat. 535 (16 U.S.C. 1, et seq.); and the acts establishing the units of the National Park System, including but not limited to: Act of April 25, 1947, 61 Stat. 54 (16 U.S.C. 241, et seq.); Act of July 2, 1958, 72 Stat. 285 (16 U.S.C. 410, et seq.); Act of October 27, 1972, 86 Stat. 1312 (16 U.S.C. 460dd, et seq.); Act of October 11,1974, 88 Stat. 1256 (16 U.S.C. 98-698e); Act of October 11, 1974, 88 Stat. 1258 (16 U.S.C. 698f-698m); Act of December 27, 1974, 88 Stat. 1787 (16 U.S.C. 460ff et seq.).

SOURCE: 43 FR 57825, Dec. 8, 1978, unless otherwise noted.

§ 9.30 Purpose and scope.

(a) These regulations control all activities within any unit of the National Park System in the exercise of rights to oil and gas not owned by the United States where access is on, across or through federally owned or controlled lands or waters. Such rights arise most frequently in one of two situations: (1) When the land is owned in fee, including the right to the oil and gas, or (2) When in a transfer of the surface estate to the United States, the grantor reserved the rights to the oil and gas. These regulations are designed to insure that activities undertaken pursuant to these rights are conducted in a manner consistent with the purposes for which the National Park System and each unit thereof were created, to prevent or minimize damage to the environment and other resource values, and to insure to the extent feasible that all units of the National Park System are left unimpaired for the enjoyment of future generations.

These regulations are not intended to result in the taking of a property interest, but rather to impose reasonable regulations on activities which involve and affect federally-owned lands.

(b) Regulations controlling the exercise of minerals rights obtained under the Mining Law of 1872 in units of the National Park System can be found at 36 CFR Part 9, Subpart A. In areas where oil and gas are owned by the United States, and leasing is authorized, the applicable regulations can be found at 43 CFR, Group 3100.

(c) These regulations allow operators the flexibility to design plans of operations only for that phase of operations contemplated. Each plan need only describe those functions for which the operator wants immediate approval. For instance, it is impossible to define, at the beginning of exploratory activity, the design that production facilities might take. For this reason, an operator may submit a plan which applies only to the exploratory phase, allowing careful preparation of a plan for the production phase after exploration is completed. This allows for phased reclamation and bonding at a level commensurate with the level of operations approved. However, it must be noted that because of potential cumulative impacts, and because of qualitative differences in the nature of the operations, approval of a plan of operations covering one phase of operations does not guarantee later approval of a plan of operations covering a subsequent phase.

[43 FR 57825, Dec. 8, 1978, as amended at 44 FR 37914, June 29, 1979]

§9.31 Definitions.

The terms used in this Subpart shall have the following meanings:

(a) *Secretary.* The Secretary of the Interior.

(b) *Director.* The Director of the National Park Service or his designee.

(c) *Operations.* All functions, work and activities within a unit in connection with exploration for and development of oil and gas resources, the right to which is not owned by the United States, including: gathering basic information required to comply with this Subpart, prospecting, exploration, surveying, preproduction development and production; gathering, onsite storage, transport or processing of petroleum products; surveillance, inspection, monitoring, or maintenance of equipment; reclamation of the surface disturbed by such activities; and all activities and uses reasonably incident thereto performed within a unit, including construction or use of roads, pipelines, or other means of access or transportation on, across, or through federally owned or controlled lands and waters, regardless of whether such activities and uses take place on Federal, State or private lands.

(d) *Operator.* A person conducting or proposing to conduct operations.

(e) *Person.* Any individual, firm, partnership, corporation, association, or other entity.

(f) *Superintendent.* The Superintendent, or his designee, of the unit of the National Park System containing lands subject to the rights covered by these regulations.

(g) *Commercial Vehicle.* Any motorized equipment used in direct or indirect support of operations.

(h) *Unit.* Any National Park System area.

(i) *Owner.* The owner, or his legal representative, of the rights to oil and gas being exercised.

(j) *Regional Director.* The Regional Director, or his designee, for the National Park Service region in which the given unit is located.

(k) *Designated Roads.* Those existing roads determined by the Superintendent in accordance with 36 CFR 1.5 and § 4.19 to be open for the use of the general public or for the exclusive use of an operator.

(l) *Oil.* Any viscous combustible liquid hydrocarbon or solid hydrocarbon substance easily liquifiable on warming which occurs naturally in the earth, including drip gasoline or other natural condensates recovered from gas without resort to manufacturing process.

(m) *Gas.* Any fluid, either combustible or noncombustible, which is produced in a natural state from the earth and which maintains a gaseous or rarefied state at ordinary temperature and pressure conditions.

(n) *Site.* Those lands or waters on which operations are to be carried out.

(o) *Contaminating substances.* Those substances, including but not limited to, salt water or any other injurious or toxic chemical, waste oil or waste emulsified oil, basic sediment, mud with injurious or toxic additives, or injurious or toxic substances produced or used in the drilling, development, production, transportation, or on-site storage, refining, and processing of oil and gas.

(p) *Statement for Management.* A National Park Service planning document used to guide short- and long-term management of a unit; to determine the nature and extent of planning required to meet the unit's management objectives; and, in the absence of more specific planning documents, to provide a general framework for directing park operations and communicating park objectives to the public.

[43 F R 57825, Dec. 8, 1978: 44 FR 37914, June 29, 1979]

§ 9.32 Access.

(a) No access on, across or through lands or waters owned or controlled by the United States to a site for operations will be granted except for operations covered by § 9.33 and, except as provided by § 9.38, until the operator has filed a plan of operations pursuant to § 9.36 and has had the plan of operations approved in accordance with § 9.37. An approved plan of operations serves as the operator's access permit.

(b) No operations shall be conducted on a site within a unit, access to which is on, across or through federally owned or controlled lands or waters except in accordance with an approved plan of operations, the terms of § 9.33 or approval under § 9.38.

(c) Any operator intending to use aircraft of any kind for access to a federally-owned or controlled site must comply with these regulations. Failure of an operator to receive the proper approval under these regulations prior to using aircraft in this manner is a violation of both these regulations and 36 CFR 2.17.

(d) No access to a site outside a unit will be permitted across unit lands unless such access is by foot, pack animal, or designated road. Persons using designated roads for access to such a site must comply with the terms of § 9.50 where applicable.

(e) Any operator on a site outside the boundaries of a unit must comply with these regulations if he is using directional drilling techniques which result in the drill hole crossing into the unit and passing under any land or water the surface of which is owned by the United States. Except, that the operator need not comply in those areas where, upon application of the operator or upon his own action, the Regional Director is able to determine from available data, that such operations pose no significant threat of damage to park resources, both surface and subsurface, resulting from surface subsidence fracture of geological formations with resultant fresh water aquifer contamination, or natural gas escape, or the like.

§ 9.33 Existing operations.

(a) Any person conducting operations on January 8, 1979 in accordance with a Federal or State issued permit may continue to do so as provided by this section. After expiration of such existing permits no operations shall be conducted except under an approved plan of operations, unless access is granted by the Regional Director under § 9.38.

(1) All Federal special use permits dealing with access on, across or through lands or waters owned or controlled by the United States to a site for the conduct of operations within any unit issued

prior to January 8, 1979 shall expire according to their terms and shall not be renewed, unless by the terms of the existing permit it must be renewed.

(2) All operations on a site in a unit access to which is on, across, or through federally owned or controlled lands or waters conducted pursuant to a valid State access permit may be continued for the term of that permit, exclusive of any renewal period whether mandatory or discretionary, if conducted in accordance with the permit.

(b) Any person conducting operations on January 8, 1979 in a unit where Federal or State permits were not required prior to January 8, 1979 may continue those operations pendng a final decision on his plan of operations; *Provided,* That:

(1) The operator (within thirty (30) days of January 8, 1979), notifies the Superintendent in writing of the nature and location of the operations; and

(2) Within sixty (60) days after such notification, the operator submits, in accordance with these regulations, a substantially complete proposed plan of operations for those operations;

(3) Failure to comply with § 9.33(b) (1) and (2) shall constitute grounds for the suspension of operations.

(c) At any time when operations which are allowed to continue under § 9.33 (a) and (b) pose an immediate threat of significant injury to federaly owned or controlled lands or waters, the Superintendent shall require the operator to suspend operations immediately until the threat is removed or remedied. The Superintendent must, within five (5) days of this suspension notify the operator in writing of the reasons for the suspension and of his right to appeal the suspension under § 9.49.

[43 FR 57825, Dec. 8, 1978; 44 FR 37914, June 29, 1979]

§ 9.34 Transfers of interest.

(a) Whenever an owner of rights being exercised under an approved plan of operations sells, assigns, bequeaths, or otherwise conveys all or any part of those rights, he, his agent, executor, or representative must notify the Superintendent within sixty (60) days of the transfer of: the site(s) involved; the name and address of the person to whom an interest has been conveyed; and a description of the interest transferred. Failure to so notify the Superintendent shall render the approval of any previously approved plan of operations void.

(b) The transferring owner shall remain responsible for compliance with the plan of operations and shall remain liable under his bond until such time as the Superintendent is notified of the transfer in accordance with paragraph (a). At that time the Superintendent will prohibit the new owner from operating until such time as the new owner has filed with the Superintendent: (1) A statement ratifying the existing plan of operations and stating his intent to be bound thereby, or a new plan of operations, and (2) a suitable substitute performance bond which complies with the requirements of § 9.48.

§ 9.35 Use of water.

No operator may use for operations any water from a point of diversion which is within the boundaries of any unit unless authorized in writing by the Regional Director. The Regional Director shall not approve a plan of operations requiring the use of water from such source unless the operator shows either that his right to the use of the water is superior to any claim of the United States to the water, or where the operator's claim to the water is subordinate to that of the United States that the removal of the water from the water system will not damage the unit's resources. In either situation, the operator's use of water must comply with appropriate State water laws.

§ 9.36 Plan of operations.

(a) The proposed plan of operations shall include, as appropriate to the proposed operations, the following:

(1) The names and legal addresses of the following persons: The operator and the owner(s) or lessee(s) (if rights are State-owned) other than the operator;

(2) Copy of the lease, deed, designation of operator, or assignment of rights upon which the operator's right to conduct operations is based;

(3) A map or maps showing the location of the perimeter of the area where the operator has the right to conduct operations, as described in § 9.36(a)(2), referenced to the State plane coordinate system or other public land survey as acceptable to the Superintendent;

(4) A map or maps showing the location, as determined by a registered land surveyor or civil engineer, of a point within a site of operations showing its relationship to the perimeter of the area described in § 9.36(a)(2) and to the perimeter of the site of operations; the location of existing and proposed access roads or routes to the site; the boundaries of proposed surface disturbance; the location of proposed drilling; location and description of all surface facilities including sumps, reserve pits and ponds; location of tank batteries, production facilities and gathering, service and transmission lines; wellsite layout; sources of construction materials such as fill; and the location of ancillary facilities such as camps, sanitary facilities, water supply and disposal facilities, and airstrips. The point within the site of operations identified by registered land surveyor or civil engineer shall be marked with a permanent ground monument acceptable to the Superintendent, shall contain the point's State plane coordinate values, and shall be placed at least to an accuracy of third order, class I, unless otherwise authorized by the Superintendent;

(5) A description of the major equipment to be used in the operations, including a description of equipment and methods to be used for the transport of all waters used in or produced by operations, and of the proposed method of transporting such equipment to and from the site;

(6) An estimated timetable for any phase of operations for which approval is sought and the anticipated date of operation completion;

(7) The geologic name of the surface formation;

(8) The proposed drilling depth, and the estimated tops of importantgeologic markers;

(9) The estimated depths at which anticipated water, brines, oil, gas, or other mineral bearing formations are expected to be encountered;

(10) The nature and extent of the known deposit or reservoir to be produced and a description of the proposed operations, including:

(i) The proposed casing program, including the size, grade, and weight of each string, and whether it is new or used;

(ii) The proposed setting depth of each casing string, and the amount of type of cement, including additives, to be used;

(iii) The operator's minimum specifications for pressure control equipment which is to be used, a schematic diagram thereof showing sizes, pressure ratings, and the testing procedures and testing frequency;

(iv) The type and characteristics of the proposed circulating medium or mediums to be employed for rotary drilling and the quantities and types of mud and weighting material to be maintained;

(v) The testing, logging, and coring programs to be followed;

(vi) Anticipated abnormal pressures or temperatures expected to be encountered; or potential hazards to persons and the environment such as hydrogen sulfide gas or oil spills, along with plans for mitigation of such hazards;

(11) A description of the steps to be taken to comply with the applicable operating standards of § 9.41 of this subpart;

(12) Provisions for reclamation which will result in compliance with the requirements of § 9.39;

(13) A breakdown of the estimated costs to be incurred during the implementation of the reclamation plan;

(14) Methods for disposal of all rubbish and other solid and liquid wastes, and contaminating substances;

(15) An affidavit stating that the operations planned are in compliance with all applicable Federal, State and local laws and regulations;

(16) Background information, including:

(i) A description of the natural, cultural, social and economic environments to be affected by operations, including a description and/or map(s) of the location of all water, abandoned, temporarily abandoned, disposal, production, and drilling wells of public record within a two-mile radius of the proposed site. Where such information is available from documents identified in § 9.36(d), specific reference to the document and the location within the document where such information can be found will be sufficient to satisfy this requirement

(ii) The anticipated direct and indirect effects of the operations on the unit's natural, cultural, social, and economic environment;

(iii) Steps to be taken to insure minimum surface disturbance and to mitigate any adverse environmental effects, and a discussion of the impacts which cannot be mitigated;

(iv) Measures to protect surface and subsurface waters by means of casing and cement, etc.;

(v) All reasonable technologically feasible alternative methods of operations, their costs, and their environmental effects; and

(vi) The effects of the steps to be taken to achieve reclamation.

(17) Any other facets of the proposed operations which the operator wishes to point out for consideration; and

(18) Any additional information that is required to enable the Superintendent to establish whether the operator has the right to conduct operations as specified in the plan of operations; to effectively analyze the effects that the operations will have on the preservation, management and public use of the unit, and to make a recommendation to the Regional Director regarding approval or disapproval of the plan of operations and the amount of the performance bond to be posted.

(b) Where any information required to be submitted as part of a proposed plan of operations has been submitted to the Superintendent in substantially the same form in a prior approved plan of operations, a specific cross-reference to that information contained in the prior approved plan of operations will be sufficient to incorporate it into the proposed plan and will satisfy the applicable requirement of this section.

(c) Information and materials submitted in compliance with this section will not constitute a plan of operations until information required by § 9.36(a) (1) through (18), which the Superintendent determines as pertinent to the type of operations proposed, has been submitted to and determined adequate by the Regional Director.

(d) In all cases the plan of operations must consider and discuss the unit's Statement for Management and other planning documents as furnished by the Superintendent, and activities to control, minimize or prevent damage to the recreational, biological physical, scientific, cultural, and scenic resources of the unit, and any reclamation procedures suggested by the Superintendent.

[43 FR 57825, Dec. 8, 1978; 44 FR 37914, June 29, 1979]

§ 9.37 Plan of operations approval.

(a) The Regional Director shall not approve a plan of operations:

(1) Until the operator shows that the operations will be conducted in a manner which utilizes technologically feasible methods least damaging to the federally-owned or controlled lands, waters and resources of the unit while assuring the protection of public health and safety.

(2) For operations at a site the surface estate of which is not owned by the federal government, where operations would constitute a nuisance to federal lands or waters in the vicinity of the operations, would significantly injure federally-owned or controlled lands and waters; or

(3) For operations at a site the surface estate of which is owned or controlled by the federal government, where operations would substantially interfere with management of the unit to ensure the preservation of its natural and ecological integrity in perpetuity, or would significantly injure the federally-owned or controlled lands or waters; *Provided, however,* That if the application of this standard would under applicable law, constitute a taking of a property interest rather than an appropriate exercise of regulatory authority, the plan of operations may be approved if the operations would be conducted in accordance with paragraph (a)(1) of this section, unless a decision is made to acquire the mineral interest.

(4) Where the plan of operations does not satisfy each of the requirements of § 9.36 applicable to the operations proposed.

(b) Within sixty (60) days of the receipt of a plan of operations, the Regional Director shall make an environmental analysis of such plan, and:

(1) Notify the operator that the plan of operations has been approved or rejected, and, if rejected, the reasons for the rejection; or

(2) Notify the operator that the plan of operations has been conditionally approved, subject to the operator's acceptance of specific provisions and stipulations; or

(3) Notify the operator of any modification of the plan of operations which is necessary before such plan will be approved or of additional information needed to effectively analyze the effects that the operations will have on the preservation, management and use of the unit, and to make a decision regarding approval or disapproval of the plan of operations and the amount of the performance bond to be posted; or

(4) Notify the operator that the plan of operations is being reviewed, but that more time, not to exceed an additional thirty days, is necessary to complete such review, and setting forth the reasons why additional time is required. *Provided, however,* That days during which the area of operations is inaccessible for such reasons as inclement weather, natural catastrophe acts of God, etc., for inspection shall not be included when computing either this time period, or that in subsection (b) above; or

(5) Notify the operator that the plan of operations has been reviewed, but cannot be considered for approval until forty-five (45) days after a final environmental statement has been prepared and filed with the Environmental Protection Agency; or

(6) Notify the operator that the plan of operations is being reviewed, but that more time to provide opportunities for public participation in the plan of operations review and to provide sufficient time to analyze public comments received is necessary. Within thirty (30) days after closure of the public comment period specified by the Regional Director, he shall comply with § 9.37(b) (1) through (5).

(c) The Regional Director shall act as expeditiously as possible upon a proposed plan of operations consistent with the nature and scope of the operations proposed. Failure to act within the time limits specified in this section shall constitute a rejection of the plan of operations from which the operator shall have a right to appeal under § 9.49.

(d) The Regional Director's analysis shall include:

(1) An examination of all information submitted by the operator;

(2) An evaluation of measures and timing required to comply with reclamation requirements;

(3) An evaluation of necessary conditions and amount of the bond or security deposit (See § 9.48);

(4) An evaluation of the need for any additional requirements in the plan;

(5) A determination regarding the impact of this operation and cumulative impacts of all proposed and existing operations on the management of the unit; and

(6) A determination whether implementation by the operator of an approved plan of operations would be a major Federal action significantly affecting the quality of the human environment or would be sufficiently controversial to warrant preparation of an environmental statement pursuant to section 102(2)(c) of the National Environmental Policy Act of 1969.

(e) Prior to approval of a plan of operations, the Regional Director shall determine whether any properties included in, or eligible for inclusion in the National Register of Historic Places or National Registry of Natural Landmarks may be affected by the proposed operations. This determination will require the acquisition of adequate information, such as that resulting from field surveys, in order to properly determine the presence and significance of cultural resources within the areas to be affected by operations. Whenever National Register properties or properties eligible for inclusion in the National Register would be affected by operations, the Regional Director shall comply with Section 106 of the Historic Preservations Act of 1966 as implemented by 36 CFR Part 800.

(f) Approval of each plan of operations is expressly conditioned upon the Superintendent having such reasonable access to the site as is necessary to properly monitor and insure compliance with the plan of operations.

[43 FR 57825, Dec. 8, 1978; 44 FR 37914, June 29, 1979]

§ 9.38 Temporary approval.

(a) The Regional Director may approve on a temporary basis:

(1) Access on, across or through federally-owned or controlled lands or waters for the purpose of collecting basic information necessary to enable timely compliance with these regulations. Such temporary approval shall be for a period not in excess of sixty (60) days.

(2) The continuance of existing operations, if their suspension would result in an unreasonable economic burden or injury to the operator; provided that such operations must be conducted in accordance with all applicable laws, and in a manner prescribed by the Regional Director designed to minimize or prevent significant environmental damage; and provided that within sixty (60) days of the granting of such temporary approval the operator either:

(i) Submits an initial substantially complete plan of operations; or

(ii) If a proposed plan of operations has been submitted, responds to any outstanding requests for additional information.

(b) The Regional Director may approve new operations on a temporary basis only when:

(1) The Regional Director finds that the operations will not cause significant environmental damage or result in significant new or additional surface disturbance to the unit; and either

(2) The operator can demonstrate a compelling reason for the failure to have had timely approval of a proposed plan of operations; or

(3) The operator can demonstrate that failure to grant such approval will result in an unreasonable economic burden or injury to the operator.

[43 FR 57825, Dec. 8, 1978, as amended at 44 FR 37914, June 29, 1979]

§ 9.39 Reclamation requirements.

(a) Within the time specified by the reclamation provisions of the plan of operations, which shall be as soon as possible after completion of approved operations and shall not be later than six (6) months thereafter unless a longer period of time is authorized in writing by the Regional Director, each operator shall initiate reclamation as follows:

(1) Where the Federal government does not own the surface estate, the operator shall at a minimum:

(i) Remove or neutralize any contaminating substances; and

(ii) Rehabilitate the area of operations to a condition which would not constitute a nuisance or would not adversely affect, injure, or damage federally-owned lands or waters, including removal of above ground structures and equipment used for operations, except that such structures and equipment may remain where they are to be used for continuing operations which are the subject of another approved plan of operations or of a plan which has been submitted for approval.

(2) On any site where the surface estate is owned or controlled by the Federal government, each operator must take steps to restore natural conditions and processes. These steps shall include but are not limited to:

(i) Removing all above ground structures, equipment and roads used for operations, except that such structures, equipment and roads may remain where they are to be used for continuing operations which are the subject of another approved plan of operations or of a plan which has been submitted for approval, or unless otherwise authorized by the Regional Director consistent with the unit purpose and management objectives;

(ii) Removing all other man-made debris resulting from operations;

(iii) Removing or neutralizing any contaminating substances;

(iv) Plugging and capping all nonproductive wells and filling dump holes, ditches, reserve pits and other excavations;

(v) Grading to reasonably conform the contour of the area of operations to a contour similar to that which existed prior to the initiation of operations, where such grading will not jeopardize reclamation;

(vi) Replacing the natural topsoil necessary for vegetative restoration; and

(vii) Reestablishing native vegetative communities.

(b) Reclamation under paragraph (a)(2) of this section is unacceptable unless it provides for the safe movement of native wildlife, the reestablishment of native vegetative communities, the normal flow of surface and reasonable flow of subsurface waters, and the return of the area to a condition which does not jeopardize visitor safety or public use of the unit.

§ 9.40 Supplementation or revision of plan of operations.

(a) A proposal to supplement or revise an approved plan of operations may be made by either the operator or the Regional Director to adjust the plan to changed conditions or to address conditions not previously contemplated by notifying the appropriate party in writing of the proposed alteration and the justification therefore.

(b) Any proposed supplementation or revision of a plan of operations intiated under paragraph (a) of this section by either party shall be reviewed and acted on by the Regional Director in accordance with § 9.37. If failure to implement proposed changes would not pose an immediate threat of significant injury to federally-owned or controlled lands or waters, the operator will be notified in writing sixty (60) days prior to the date such changes become effective, during which time the operator may submit comments on proposed changes. If failure to implement proposed changes would pose immediate threat of significant injury to federally-owned or controlled lands or waters, the provisions of § 9.33(c) apply.

§ 9.41 Operating Standards.

The following standards shall apply to operations within a unit:

(a) Surface operations shall at no time be conducted within 500 feet of the banks of perennial, intermittent or ephemeral watercourses; or within 500 feet of the high pool shoreline of natural or man-made impoundments; or within 500 feet of the mean high tide line; or within 500 feet of any structure or facility (excluding roads) used for unit interpretation, public recreation or for administration of the unit unless specifically authorized by an approved plan of operations.

(b) The operator shall protect all survey monuments, witness corners, reference monuments and bearing trees against destruction, obliteration, or damage from operations and shall be responsible for the reestablishment, restoration, or referencing of any monuments, corners and bearing trees which are destroyed, obliterated, or damaged by such operations.

(c) Whenever drilling or producing operations are suspended for 24 hours or more, but less than 30 days, the wells shall be shut in by closing wellhead valves or blowout prevention equipment. When producing operations are suspended for 30 days or more, a suitable plug or other fittings acceptable to the Superintendent shall be used to close the wells.

(d) The operator shall mark each and every operating derrick or well in a conspicuous place with his name or the name of the owner, and the number and location of the well, and shall take all necessary means and precautions to preserve these markings.

(e) Around existing or future installations, e.g., well, storage tanks, all high pressure facilities, fences shall be built for protection of unit visitors and wildlife, and protection of said facilities unless otherwise authorized by the Superintendent. Fences erected for protection of unit visitors and wildlife shall be of a design and material acceptable to the Superintendent, and where appropriate, shall have at least one gate which is of sufficient width to allow access by fire trucks. Hazards within visitor use areas will be clearly marked with warning signs acceptable to the Superintendent.

(f) The operator shall carry on all operations and maintain the site at all times in a safe and workmanlike manner, having due regard for the preservation of the environment of the unit. The operator shall take reasonable steps to prevent and shall remove accumulations of oil or other materials deemed to be fire hazards from the vicinity of well locations and lease tanks, and shall remove from the property or store in an orderly manner all scrap or other materials not in use.

(g) Operators will be held fully accountable for their contractor's or subcontractors's compliance with the requirements of the approved plan of operations.

[43 FR 57825, Dec. 8, 1978; 44 FR 37915, June 29, 1979]

§ 9.42 Well records and reports, plots and maps, samples, tests and surveys.

Any technical data gathered during the drilling of any well, including daily drilling reports and geological reports, which are submitted to the State pursuant to State regulations, or to any other bureau or agency of the Federal government shall be available for inspection by the Superintendent upon his request.

§ 9.43 Precautions necessary in areas where high pressures are likely to exist.

When drilling in "wildcat" territory, or in any field where high pressures are likely to exist, the operator shall take all necessary precautions for keeping the well under control at all times and shall install and maintain the proper high-pressure fittings and equipment to assure proper well cortrol. Under such conditions the surface string must be cemented through its length, unless another procedure is authorized or prescribed by the Superintendent, and all strings of casing must be securely anchored.

§ 9.44 Open flows and control of "wild" wells.

The operator shall take all technologically feasible precautions to prevent any oil, gas, or water well from blowing open or becoming "wild," and shall take immediate steps and exercise due diligence to bring under control any "wild" well, or burning oil or gas well.

§ 9.45 Handling of wastes.

Oilfield brine, and all other waste and contaminating substances must be kept in the smallest practicable area, must be confined so as to prevent escape as a result of percolation, rain high water or other causes, and such wastes must be stored and disposed of or removed from the area as quickly as practicable in such a manner as to prevent contamination, pollution, damage or injury to the lands, water (surface and subsurface), facilities, cultural resources, wildlife, and vegetation of or visitors of the unit.

§ 9.46 Accidents and fires.

The operator shall take technologically feasible precautions to prevent accidents and fires, shall notify the Superintendent within 24 hours of all accidents involving serious personal injury or death, or fires on the site, and shall submit a full written report thereon within ninety (90) days. This report supersedes the requirement outlined in 36 CFR 2.17, but does not relieve persons from the responsibility of making any other accident reports which may be required under State or local laws.

§ 9.47 Cultural resource protection.

(a) Where the surface estate of the site is owned by the United States, the operator shall not, without written authorization of the Superintendent, injure, alter, destroy, or collect any site, structure, object, or other value of historical, archeological, or other cultural scientific importance in violation of the Antiquities Act (16 U.S.C. 431-433 (See 43 CFR Part 3).

(b) Once approved operations have commenced, the operator shall immediately bring to the attention of the Superintendent any cultural or scientific resource encountered that might be altered or destroyed by his operation and shall leave such discovery intact until told to proceed by the Superintendent. The Superintendent will evaluate the discoveries brought to his attention, and will determine within ten (10) working days what action will be taken with respect to such discoveries.

§ 9.48 Performance bond.

(a) Prior to approval of a plan of operations, the operator shall be required to file a suitable performance bond with satisfactory surety, payable to the Secretary or his designee. The bond shall be conditioned upon faithful compliance with applicable regulations, and the plan of operations as approved, revised or supplemented. This performance bond is in addition to and not in lieu of any bond or security deposit required by other regulatory authorities.

(b) In lieu of a performance bond, an operator may elect to deposit with the Secretary or his designee, cash or negotiable bonds of the U.S. Government. The cash deposit or the market value of such securities shall be at least equal to the required sum of the bond. When bonds are to serve as security, there must be provided to the Secretary a power of attorney.

(c) In the event that an approved plan of operations is revised or supplemented in accordance with § 9.40, the Regional Director may adjust the amount of the bond or security deposit to conform to the modified plan of operations.

(d) The bond or security deposit shall be in an amount:

(1) Equal to the estimated cost of reclaiming the site, either in its entirety or in phases, that has been damaged or destroyed as a result of operations conducted in accordance with an approved, supplemented, plan of operations; plus

(2) An amount set by the Superintendent consistent with the type of operations proposed, to bond against the liability imposed by § 9.51(a); to provide the means for rapid and effective cleanup; and to minimize damages resulting from an oil spill, the escape of gas, wastes, contaminating substances, or fire caused by operations. This amount shall not exceed twenty-five thousand dollars ($25,000) for geophysical surveys when using more than one field party or five thousand dollars ($5,000) when operating with only one field party, and shall not exceed fifty thousand dollars ($50,000) for each wellsite or other operation.

(3) When an operator's total bond or security deposit with the National Park Service amounts to two hundred thousand dollars ($200,000) for activities conducted within a given unit, no further bond requirements shall be collected for additional activities conducted within that unit, and the operator may substitute a blanket bond of two hundred thousand dollars ($200,000) for all operations conducted within the unit.

(e) The operator's and his surety's responsibility and liability under the bond or security deposit shall continue until such time as the Superintendent determines that successful reclamation of the area of operations has occurred and, where a well has been drilled, the well has been properly plugged and abandoned. If all efforts to secure the operator's compliance with pertinent provisions of the approved plan of operations are unsuccessful, the operator's surety company will be required to perform reclamation in accordance with the approved plan of operations.

(f) Within thirty (30) days after determining that all reclamation requirements of an approved plan of operations are completed, including proper abandonment of the well, the Regional Director shall notify the operator that the period of liability under the bond or security deposit has been terminated.

[43 FR 57825, Dec. 8, 1978; 44 FR 37915 June 29, 1979]

§ 9.49 Appeals.

(a) Any operator aggrieved by a decision of the Regional Director in connection with the regulations in this Subpart may file with the Regional Director a written statement setting forth in detail the respects in which the decision is contrary to, or is in conflict with the facts, the law, or these regulations, or is otherwise in error. No such appeal will be considered unless it is filed with the Regional Director within thirty (30) days after the date of notification to the operator of the action or decision complained of. Upon receipt of such written statement from the aggrieved operator, the Regional Director shall promptly review the action or decision and either reverse his original decision or prepare his own statement, explaining that decision and the reasons therefore, and forward the statement and record on appeal to the Director for review and decision. Copies of the Regional Director's statement shall be furnished to the aggrieved operator, who shall have thirty (30) days within which to file exceptions to the Regional Director's decision. The Department has the discretion to initiate a hearing before the Office of Hearing and Appeals in a particular case (See 43 CFR 4.700).

(c) The official files of the National Park Service on the proposed plan of operations and any testimony and documents submitted by the parties on which the decision of the Regional Director was based shall constitute the record on appeal. The Regional Director shall maintain the record under separate cover and shall certify that it was the record on which his decision was based at the time it was forwarded to the Director of the National Park Service. The National Park Service shall make the record available to the operator upon request.

(c) If the Director considers the record inadequate to support the decision on appeal, he may provide for the production of such additional evidence or information as may be appropriate, or may remand the case to the Regional Director, with appropriate instructions for further action.

(d) On or before the expiration of forty-five (45) days after his receipt of the exceptions to the Regional Director's decision, the Director shall make his decision in writing: provided however, that if more than forty-five (45) days are required for a decision after the exceptions are received, the Director shall notify the parties to the appeal and specify the reason(s) for delay. The decision of the Director shall include: (1) A statement of facts; (2) conclusions; and (3) reasons upon which the conclusions are based. The decision of the Director shall be the final administrative action of the agency on a proposed plan of operations.

(e) A decision of the Regional Director from which an appeal is taken shall not be automatically stayed by the filing of a statement of appeal. A request for a stay may accompany the statement of appeal or may be directed to the Director. The Director shall promptly rule on requests for stays. A decision of the Director on request for a stay shall constitute a final administrative decision.

(f) Where, under this Subpart, the Superintendent has the authority to make the original decision, appeals may be taken in the manner provided by this section, as if the decision had been made by the Regional Director, except that the original statement of appeal shall be filed with the Superintendent, and if he decides not to reverse his original decision, the Regional Director shall have, except as noted below, the final review authority. The only decision of a Regional Director under this paragraph which shall be appealable by the Director is an appeal from a suspension under § 9.51(b). Such an appeal shall follow the procedure ofparagraphs (a)-(3) of this section.

§ 9.50 Use of roads by commercial vehicles.

(a) After January 8, 1978, no commercial vehicle shall use roads administered by the National Park Service without being registered with the Superintendent. Roads must be used in accordance with procedures outlined in an approved plan of operations.

(1) A fee shall be charged for such registration and use based upon a posted fee schedule. The fee schedule posted shall be subject to change upon sixty (60) days of notice.

(2) An adjustment of the fee may be made at the discretion of the Superintendent where a cooperative maintenance agreement is entered into with the operator.

(b) No commercial vehicle which exceeds roadway load limits specified by the Superintendent shall be used on roads administered by the National Park Service unless authorized in writing by the Superintendent, or unless authorized by an approved plan of operations.

(c) Should a commercial vehicle used in operations cause damage to roads, resources or other facilities of the National Park Service, the operator shall be liable for all damages so caused.

§ 9.51 Damages and penalties.

(a) The operator shall be held liable for any damages to federally-owned or controlled lands, waters, or resources resulting from his failure to comply with either his plan of operations, or where operations are continued pursuant to § 9.33, failure to comply with the applicable permit or, where operations are temporarily approved under § 9.38, failure to comply with the terms of that approval.

(b) The operator agrees, as a condition for receiving an approved plan of operations, that he will hold harmless the United States and its employees from any damages or claims for injury or death of persons and damage or loss of property by any person or persons arising out of any acts or omissions by the operator, his agents, employees or subcontractors done in the course of operations.

(c) Undertaking any operations within the boundaries of any unit in violation of this Subpart shall be deemed a trespass against the United States and shall be cause for revocation of approval of the plan of operations.

(1) When a violation by an operator under an approved plan of operations is discovered, and if it does not pose an immediate threat of significant injury to federally-owned or controlled lands or waters, the operator will be notified in writing by the Superintendent and will be given ten (10) days to correct the violation; if the violation is not corrected within ten (10) days approval of the plan of operations will be suspended until such time as the violation is corrected.

(2) If the violation poses an immediate threat of significant injury to federally-owned or controlled lands or waters, approval of the plan of operations will be immediately suspended until such time as the violation is corrected. The operator will be notified in writing within five (5) days of any suspension and shall have the right to appeal that decision under § 9.48.

(3) Failure to correct any violation or damage to federally owned or controlled lands, waters or resources caused by such violations will result in revocation of plan of operations approval.

[43 FR 57825, Dec. 8, 1978; 44 FR 37915, June 29, 1979]

§ 9.52 Public inspection of documents.

(a) When a Superintendent receives a request for permission for access on, across or through federally-owned or controlled lands or waters for the purpose of conducting operations, the Superintendent shall publish a notice of this request in a newspaper of general circulation in the county(s) in which the lands are situated, or in such publications as deemed appropriate by the Superintendent.

(b) Upon receipt of the plan of operations in accordance with § 9.35(c), the Superintendent shall publish a notice in the FEDERAL REGISTER advising the availability of the plan for public review and comment. Written comments received within thirty (30) days will become a part of the official record. As a result of comments received or if otherwise deemed appropriate by the Superintendent, he may provide additional opportunity for public participation to review the plan of operations.

(c) Any document required to be submitted pursuant to the regulations in this Subpart shall be made available for public inspection at the office of the Superintendent during normal business hours, unless otherwise available pursuant to § 9.51(b). This does not include those records only made available for the Superintendent's inspection under § 9.41 of this Subpart or those records determined by the Superintendent to contain proprietary or confidential information. The availability of such records for inspection shall be governed by the rules and regulations found at 43 CFR Part 2.

[43 FR 57825, Dec. 8, 1978; 44 FR 37915, June 29, 1979]

APPENDIX C

FEDERAL LAWS, REGULATIONS, EXECUTIVE ORDERS, POLICIES, AND GUIDELINES THAT APPLY TO NONFEDERAL OIL AND GAS ACTIVITIES

Appendix C summarizes many, but not all, of the legal and policy mandates that currently govern the exercise of nonfederal oil and gas rights in units of the National Park System. The first three laws pertain specifically to the National Park Service. They are followed by:

- Other Federal laws and regulations, organized in alphabetical order,
- Executive orders, arranged in numerical order,
- NPS policies, guidelines, and procedures, and
- Selected Texas law and regulations.

This appendix supplements information presented throughout the DEIS. Table 1.1 in Chapter 1 (Introduction) lists the requirements presented below. Part II of Chapter 2 (Alternatives) lists applicable legal and policy requirements, describes NPS management policies and performance standards for each resource that may be affected in the Preserve by nonfederal oil and gas operations. Part III of Chapter 2 describes required operating stipulations and recommended mitigation measures for each type of oil and gas operation. The following summaries further explain the various legal and policy requirements. These summaries are intended to acquaint the reader with many of the relevant laws and are not meant as legal interpretations. They cannot be relied upon to create any rights, substantive or procedural, enforceable by any party in litigation with the United States. Congress may change statutes and agencies may update their regulations and policies. During project planning, operators are responsible for ensuring they have current and complete information on legal and policy requirements for nonfederal oil and gas operations on NPS lands.

NATIONAL PARK SERVICE LAWS

ORGANIC ACT, as amended, 16 U.S.C. §1 *et seq.*

Resources afforded protection: all, e.g. air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, endangered and threatened species, visitor use and experience, visual resources
Applicable regulation(s): 36 CFR Parts 1-10, 12-14, 20, 21, 25, 28, 30, 34, 51

In 1916 Congress created the National Park Service within the Department of the Interior tomanage national parks, monuments and reservations. Congress established units of the National Park System to preserve certain natural, cultural, scenic and recreational resources of exceptional quality and national significance. The Organic Act charges the NPS with providing for the present enjoyment of the parks, monuments and reservations in a way that will leave them unimpaired for the enjoyment of future generations. The General Authorities Act of 1970 (16 U.S.C. §1a-1) extended the Organic Act to all units of the National Park System.

NPS has promulgated regulations at 36 CFR Part 9B that control all activities within any unit of the NPS in the exercise of rights to oil and gas not owned by the United States where access is on, across or through federally owned or controlled lands or waters.

NPS does not intend the regulations to result in the taking of a property interest, but rather to impose reasonable regulations on activities that involve and affect Federally owned lands. The regulations are designed to insure that activities undertaken pursuant to oil and gas rights are conducted in a manner consistent with the purposes for which the NPS unit was created, to prevent or minimize damage to the environment and other resource values, and to insure, to the extent feasible, that all units of the NPS are left unimpaired for the enjoyment of future generations.

PARK SYSTEM RESOURCE PROTECTION ACT, as amended, 16 U.S.C. §19jj

Resources afforded protection: any living or non-living resource that is located within the boundaries of a unit of the National Park System, except for resources owned by a non-Federal entity
Applicable regulation(s): none

The Park System Resource Protection Act makes any person who destroys, causes the loss of, or injures any park system resource liable to the United States for response costs and damages resulting from such destruction, loss, or injury. A park system resource is any living or non-living resource that is located within the boundaries of a unit of the National Park System, except for resources owned by a non-Federal entity. The Act is a strict liability statute; negligence is not required for a party to be liable. The only defenses to liability are:

(1) the damage was due solely to an act of God or war,
(2) the owner/operator acted with due care and the damage was caused solely by a third party who was not an employee or agent of the owner/operator, and
(3) the damage was caused by an activity authorized by Federal or State law.

The Park System Resource Protection Act authorizes the Secretary of the Interior to request the Department of Justice to file a civil action for cost recovery for:

- Replacing, restoring or acquiring the equivalent of a park system resource,
- The value of any significant loss of use of a park system resource pending its restoration or replacement or the acquisition of an equivalent resource (or the value of the resource if it can't be replaced or restored),
- Damage assessments, and
- Response costs (NPS actions taken to prevent or minimize destruction or loss of or injury to park system resources or to abate or minimize the imminent risk of destruction, loss, or injury; or to monitor ongoing effects of incidents causing such destruction, loss, or injury).

The Park System Resource Protection Act applies to nonfederal oil and gas activities on National Park System units. Operators need to ensure that they conduct business within the specifications of their approved 9B plan; that they comply with all other relevant legal requirements, particularly with respect to safety, maintenance, and resource protection; and that they take precautions to avoid actions, accidental or otherwise, which damage park system resources.

OTHER APPLICABLE FEDERAL LAWS AND REGULATIONS

AMERICAN INDIAN RELIGIOUS FREEDOM ACT OF 1978, as amended, 42 U.S.C. §§1996–1996a

Resources afforded protection: cultural and historic resources
Applicable regulation(s): 43 CFR Part 7

This Act makes it a policy of the Federal government to protect and preserve for Native Americans, Eskimos, Aleuts, and Native Hawaiians their inherent right of freedom to believe, express and exercise their traditional religions. It allows them access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. It further directs various Federal departments, agencies, and others responsible for administering relevant laws to evaluate their policies and procedures in consultation with native traditional religious leaders to determine changes necessary to protect and preserve Native American religious cultural rights and practices. NPS managers consult NPS Special Directive 78-1, Policy Guidelines for Native American Cultural Resource Management when making decisions that may affect Native American religious practices.

If NPS anticipates a conflict between proposed oil and gas operations and tribal religious rights, it will consult with the tribe as part of the 9B plan approval process.

ANTIQUITIES ACT OF 1906, 16 U.S.C. §§431-433

Resources afforded protection: cultural, historic, archeological and paleontological resources
Applicable regulation(s): 43 CFR Part 3

As the forerunner of the Archeological Resources Protection Act, the Antiquities Act was the first general act providing protection for archeological resources. It protects all historic and prehistoric ruins or monuments on Federal lands, and prohibits their excavation, destruction, injury or appropriation, without the permission of the secretary of the department having jurisdiction. It also authorizes the President of the Unites States to declare by public proclamation national monuments that are public lands having historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest. The Antiquities Act also authorizes the President to reserve Federal lands, to accept private lands, and to accept relinquishment of unperfected claims for that purpose.

The Act authorizes the secretary having jurisdiction to issue permits to qualified institutions to examine ruins, excavate archeological sites, and gather objects of antiquity. Regulations at 43 CFR Part 3 establish procedures for permitting the excavation or collection of prehistoric and historic objects on Federal lands. For activities requiring an ARPA permit, described below, the ARPA permit replaces the permit under the Antiquities Act.

Operators on Federal lands engaged in mineral activities without, or contrary to, an approved plan of operations, who excavate, injure, destroy or appropriate any "object of antiquity" in the process, violate the Antiquities Act and are subject to its penalties.

ARCHEOLOGICAL RESOURCES PROTECTION ACT OF 1979, 16 U.S.C. §§470aa – 470mm

Resources afforded protection: archeological resources
Applicable regulation(s): 43 CFR Part 7

The Archeological Resources Protection Act (ARPA) was enacted to preserve and protect archeological resources and sites on Federal and Indian lands. The law makes it illegal to excavate or remove from Federal or Indian lands any archeological resources without a permit from the land manager. It also prohibits the removal, sale, receipt, and interstate transportation of archeological resources obtained illegally (i.e., without permits) from Federal or Indian lands.

Agencies may issue permits only to educational or scientific institutions, and only if the resulting activities will increase knowledge about archeological resources. The law defines archeological resources to be any material remains of past human life or activities that are of archeological interest and are at least 100 years old. All materials collected on Federal lands as a result of permitted activities remain the property of the United States. Those excavated from Indian lands remain the property of the Indian or Indian tribe having rights of ownership over such resources. Congress amended the law in 1988 to require development of plans for surveying public lands for archeological resources and systems for reporting incidents of suspected violations.

ARPA also fosters cooperation between governmental authorities, professionals, and the public. The purpose of the ARPA permit process is to ensure that individuals and organizations wishing to work with Federal resources have the necessary professional qualifications, and that Federal standards and guidelines for research and curation are followed. The process allows the State Historic Preservation Officer (SHPO) to review and comment on ARPA permit applications. Federal agencies do not issue ARPA permits to themselves or to their contractors. The Scope of Work and contractor's proposal, which constitute the contract, insures that contractors comply with Federal standards and guidelines. The ARPA permit replaces the permit required by the Antiquities Act of 1906.

ARPA imposes severe criminal and civil penalties on anyone that excavates, removes, damages or otherwise alters or defaces archeological resources (or attempts to) without a permit. However, ARPA applies only to lands owned by the United States and lands held in trust by the United States for Indian tribes and individual Indians. ARPA does not apply on the nonfederal surface estate.

A contractor hired by an operator to conduct a cultural resource survey that involves any collection of archeological resources, whether or not excavation or subsurface testing is involved, must obtain an ARPA permit. Operations under an approved 9B plan do not need an ARPA permit for incidental disturbance of archeological resources because these operations are exclusively for purposes other than excavation or removal of archeological resources. General earth-moving excavations performed under an approved plan of operations are not considered "excavation or removal" of archeological resources. However, an ARPA permit is required before an operator under 36 CFR Part 9B salvages previously unknown archeological resources, discovered during operations.

ARPA regulations appear at 43 CFR Part 7, Subparts A and B. Subpart A, "Protection of Archeological Resources, Uniform Regulations," promulgated pursuant to section 10(a) of ARPA jointly by the Secretaries of the Interior, Agriculture, Defense and the Chairman of the Board of the TVA, establishes the uniform definitions, standards and procedures to be followed by all Federal land managers in providing protection for archeological resources located on public lands and on Indian lands of the United States. Subpart B, "Department of the Interior Supplemental Regulations," provides definitions, standards, and procedures for Federal land managers to protect archeological resources and provides further guidance for Interior bureaus on definitions, permitting procedures, and civil penalty hearings. In addition, NPS regulations at 36 CFR §9.47 discuss 9B plans and archeological resources.

Operators without, or contrary to, an approved plan of operations, who remove, excavate, damage, alter or deface archeological resources on Federal property, violate ARPA and are subject both to its civil and criminal penalties.

CLEAN AIR ACT, as amended, 42 U.S.C. §§7401-7671q

Resources afforded protection: air resources
Applicable regulation(s): 40 CFR Parts 50, 58, 60, 61, 82, 93, and 48 CFR Part 23

The purposes of the Clean Air Act (CAA) are to "protect and enhance":

- the quality of the nation's air resources,
- to promote the human health and welfare and the productive capacity of its population,
- to initiate and accelerate a national research and development program to achieve the prevention and control of air pollution,
- to provide technical and financial assistance to State and local governments for aid in their development and execution of air pollution programs, and

- to encourage and assist the development and operation of regional air pollution control programs.

The Act requires the U.S. Environmental Protection Agency (EPA) to establish national primary standards to protect human health and more stringent national secondary standards to protect human welfare (National Ambient Air Quality Standards or NAAQS). States and local governments are responsible for the prevention or control of air pollution. NAAQS exist for sulfur dioxide, particulate matter, ozone, nitrogen dioxide, carbon monoxide and lead.

States are divided into air quality control regions and are required to submit State Implementation Plans for EPA approval. These plans provide strategies for the implementation, maintenance, and enforcement of national primary and secondary ambient air quality standards for each air quality control region.

Other provisions of the Act include: standards of performance for new stationary sources, motor vehicle emission and fuel standards, national emission standards for hazardous air pollutants, a study of particulate emissions from motor vehicles, and a study of the cumulative effect of all substances and activities which may affect the stratosphere, especially ozone in the stratosphere.

Federal agencies and all sources of air pollution (whether publicly or privately owned) must meet all Federal, State, and local requirements under the CAA. In most cases, States and local authorities regulate air pollution control. For the National Park Service, the most important CAA sections are Prevention of Significant Deterioration of Air Quality (PSD) (42 U.S.C. §§7470-7475) and Visibility Protection (42 U.S.C. §7479).

The PSD provisions establish a classification system for the clean air areas of the United States. These clean air areas may be designated as Class I, Class II or Class III. This classification indicates the additional increment of air quality degradation from particulate matter and sulfur dioxide (SO_2) that will be allowed in that area. Only a very small increment of new pollution is allowed in a Class I area, while a substantial air pollution increase may be allowed in a Class III area.

National Park System units are designated as Class I or II areas. There are specific requirements of the PSD program relating to National Parks and wilderness areas within National Park System units. As part of the PSD program, Congress designated many National Parks and designated wilderness areas (including U.S. Fish and Wildlife Service and U.S. Forest Service wilderness areas) as automatic Class I areas, thereby providing those areas with maximum protection from future air quality degradation.

All other parts of the country where air quality did not violate the national ambient air quality standards were designated Class II areas in which only moderate pollution increases are allowed. Most of the Class II areas may be further classified downward by States or Indian tribes to Class III, allowing significant pollution increases. However, certain Class II areas, such as national monuments, national recreation areas and many other types of units, by law, may never be designated as Class III. They may only be designated as Class II, or at the option of the State in which they are located, they may be given added air quality protection by upgrading to Class I.

An operator of a facility seeking a new source permit for location or expansion in a clean air area must meet several standards including:

- National Ambient Air Quality Standards,
- PSD Classes I, II and III air pollution increments, and
- A special "adverse impact determination" for Class I areas, a determination that involves an important, legally defined role for the Secretary of the Interior as manager of NPS-administered Class I areas.

Visibility protection provisions require the NPS to estimate the visibility impacts resulting from emissions of new sources, control of emissions from existing major air pollution sources, and the development of a strategy to control other sources that may be responsible for causing significant visibility impairment.

In recognition of the need to protect the scenic value of visibility in National Parks and wilderness areas, Congress established a national visibility goal in Section 169A of the CAA. The goal states that existing pollution is reduced and future pollution is prevented if it interferes with visibility in Class I areas. Under EPA regulations, the thirty-six states with Class I areas must assure reasonable progress toward this national visibility goal. The States must require existing major stationary sources, whose emissions may be determined to cause or contribute to impairment of visibility within a class I area, to install the Best Available Retrofit Technology (BART) to control pollutants that impair visibility.

Because major emissions of air pollution from oil and gas operations in National Parks are not likely to occur, application of the PSD and visibility provisions of the CAA on a plan of operations is rare. In most cases, the NPS simply stipulates that the operators must follow all the air quality laws of the State and local governments.

CLEAN WATER ACT OF 1977, 33 U.S.C. §1251 *et seq.*

Resources afforded protection: water resources, wetlands, and waters of the U.S.
Applicable regulation(s): 33 CFR 320-330, 40 CFR Parts 110, 112, 116, 117, 230-232, 323, 328

In 1977 the Clean Water Act (CWA) amended and expanded the Federal Water Pollution Control Act of 1972 (FWPCA). The first water pollution act, the FWPCA established a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters; to enhance the quality of water resources; and to prevent, control and abate water pollution.

The CWA also strives to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. To achieve this objective, the CWA establishes the national goal of eliminating the discharge of pollutants into navigable waters of the United States. and the interim goal that water quality provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water. The CWA created five national policies:

- Prohibit the discharge of toxic pollutants in toxic amounts,
- Provide Federal assistance to construct publicly owned waste treatment works,
- Develop and implement area-wide waste treatment management processes to assure adequate control of source pollutants in each State,
- Make a major research and demonstration effort to develop technology necessary to eliminate the discharge of pollutants into navigable waters, waters of the contiguous zone, and the oceans, and
- Develop and implement programs for the control of nonpoint sources of pollution to control both point and nonpoint sources of pollution.

The CWA attempts to achieve its goals through a system of water quality standards, discharge limitations and permits. The act authorizes the EPA to require owners and operators of point source discharges to monitor, sample, and maintain effluent records.

The most important sections of the CWA for oil and gas operators in National Parks are:

- Section 311 - Spill reporting and spill control
- Section 401 - State certification of project compliance
- Section 402 - National Pollutant Discharge Elimination System (NPDES)
- Section 404 - Corps of Engineers dredge and fill permits

Section 311 (33 U.S.C. §1321)
Section 311 makes it illegal to discharge oil or hazardous substances in "quantities that may be harmful" into waters of the United States. Discharges of "reportable quantities" must be reported to the Coast Guard or EPA depending on where the spill occurs. Oil discharges are defined as harmful (and thus reportable) when they cause a film, sheen, sludge, or emulsion on the water or shoreline.

Hazardous substances are handled differently. Title 40 CFR Part 116 lists about 300 hazardous substances. Title 40 CFR Part 117 defines the reportable quantities for each substance. The reporting requirements of 40 CFR Part 117 do not apply to permitted discharges. (See Section 402 permits below.) Failure to report a discharge can result in criminal penalties including fines and imprisonment. Section 311 also provides for Federal cleanup of the spill and places the costs of cleanup on the entity that caused the spill. The section also protects the person in charge who reports the spill from criminal prosecution. There is no immunity from civil penalties that may apply.

Under Section 311, EPA issued regulations (40 CFR Part 112) to prevent the discharge of oil and hazardous substances into the navigable waters of the United States. These regulations require that any of the facilities described below prepare a Spill Prevention Control and Countermeasure Plan (SPCCP).

The SPCCP requirement applies to non-transportation related onshore and offshore facilities engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing or consuming oil or oil products, and which due to their location, could reasonably be expected to discharge oil in harmful quantities into or on the navigable waters of the United States or the adjoining shoreline. (Note: facilities with an underground storage capacity less than 42,000 gallons, or facilities with an above-ground storage capacity less than 1,320 gallons, are exempt from this requirement.)

Under its regulations at 36 CFR Part 9B, the NPS requires a nonfederal oil and gas operator to submit a plan to deal with oil spills and other environmental hazards. A copy of the SPCCP, if one is required under 40 CFR Part 112, will often meet the requirement for oil spill plans under 36 CFR Part 9B.

Section 401 Water Quality Certification (33 U.S.C. §1341)
Section 401 requires certification from the State or interstate water control agencies that a proposed water resources project complies with established effluent limitations and water quality standards. Applicants for Federal permits or licenses must obtain this certification.

Section 402 Permits (33 U.S.C. §1342)
The National Pollutant Discharge Elimination System (NPDES) controls the discharge of materials from their point of origin into waters of the United States by using a permitting system. A "point of origin" could be a tank battery, for example. Everyone discharging waste flows into U. S. waters needs a NDPES permit. EPA or States with EPA-approved programs issue NDPES permits.

The NPDES permit sets specific discharge limits. The limits are based on most recent pollution control technology, water quality standards, and government imposed schedules for installation of new pollution control equipment. The permit gives directions to the operator for monitoring and reporting discharges. The regulations provide for individual permits, group permits for like facilities, and general permits.

The Water Quality Act of 1987 amended the CWA to address stormwater runoff from industrial facilities. An NPDES stormwater runoff permit is now required for runoff that may come in contact with machinery or contaminated material onsite and cause contamination of adjacent property. Industrial facilities include oil and gas exploration, production and development operations. The

EPA published its rule on NPDES permit application regulations for storm water discharges at 55 FR 47990 (November 16, 1990).

The CWA exempts mining, oil and gas operations from the Section 402 stormwater permit requirements if,

> "...discharges of stormwater runoff from mining operations, oil and gas exploration, production, processing, or treatment operations or transmission facilities, [are] composed entirely of flows which are from conveyances or systems of conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and...are not contaminated by contact with, or do not come into contact with, any overburden, raw material, intermediate products, finished product, by-product, or waste products located on the site of such operations." (33 U.S.C. §1342(l)(2))

"Contaminated storm water runoff" includes runoff which:

- contains a hazardous substance in excess of reporting quantities established at 40 CFR §117.3 or 40 CFR §302.4, or
- contains oil in excess of the reporting quantity established at 40 CFR §110.3 (e.g., causes a visible sheen), or
- contributes to a violation of a water quality standard.

Section 404 Permits (33 U.S.C. §1344)

Under Section 404, anyone who discharges dredge or fill material into navigable waters needs a permit from the U.S. Army Corps of Engineers. "Navigable waters" are defined in 33 CFR 329.4 as "...those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events which impede or destroy navigable capacity." The Corps of Engineers defines wetlands as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions...." (33 CFR 328.3(b). The Corps of Engineers may issue individual permits or general permits on a State, regional, or nationwide basis. General permits are for certain kinds of similar activities in wetlands that will cause only minimal adverse effects on the environment. General permits do not cover many operators of nonfederal oil and gas properties in National Parks. They must obtain an individual "404" permit to conduct any operations that involve dredging or discharge of fill material into wetlands.

Before the issuance of either a NPDES or Section 404 permit, the applicant must obtain a section 401 certification. This declaration states that any discharge complies with all applicable effluent limitations and water quality standards.

The NPS cannot waive CWA requirements for mineral operators. The operator has full responsibility for obtaining section 402 (NPDES) or section 404 (dredge and fill) permits and for reporting oil or hazardous substance spills.

COASTAL ZONE MANAGEMENT ACT OF 1972, as amended, (16 U.S.C. §1451 *et seq.*)
Resources afforded protection: coastal waters and adjacent shoreline areas, coastal uses and natural resources
Applicable regulation(s): 15 CFR Parts 923, 930, 933

Congress enacted the Coastal Zone Management Act (CZMA) to preserve, protect, develop, and, where possible, restore or enhance" the resources of the Nation's coastal zone. The purpose of the Act is to improve the nation's management of coastal resources, which have been irretrievably damaged or lost due to poorly planned development. Specific concerns were the loss of living marine resources and wildlife habitat, decreasing open space for public use, and shoreline erosion. Congress also recognized the need to resolve conflicts between various uses that were competing for coastal lands and waters (USDOC, NOAA, 1988a). The "coastal zone" means the coastal waters and the adjacent shorelands of the United States. It also includes coastal zones of the Great Lakes.

The CZMA establishes a State-Federal partnership in which the States take the lead in managing their coastal resources by developing State CZM programs and plans, while the Federal government provides financial and technical assistance. In section 109, the CZMA encourages each State, through a Coastal Zone Enhancement Grants Program, to improve continually its CZM program in one or more of eight identified national priority areas:

- coastal wetlands management and protection,
- natural hazards management (including potential sea and Great Lakes level rise),
- public access improvements,
- reduction in marine debris,
- assessment of cumulative and secondary impacts of coastal growth and development,
- special area management planning,
- ocean resource planning, and
- siting of coastal energy and government facilities.

Approved State CZM programs must provide a mechanism for public participation in permitting processes, consistency determinations and other similar decisions. They must also provide a mechanism to ensure that all State agencies will adhere to the program, and contain enforceable policies and mechanisms to implement the applicable requirements of the State's Coastal Nonpoint Pollution Control Program.

The CZMA requires Federal agencies to act in a manner consistent with federally approved State management programs. Federal consistency under the CZMA means that Federal actions that are reasonably likely to affect any land or water use or natural resource of the coastal zone be consistent with the enforceable policies of a coastal State's or territory's Federally approved coastal management program. In States that do not have a coastal zone management program approved by the Secretary of Commerce, the requirement for a consistency review and State concurrence does not apply.

The National Oceanic and Atmospheric Administration's coastal zone management program regulations (15 CFR 923) require that the boundary of a State's coastal zone must exclude Federal lands. Units of the National Park System such as Big Thicket National Preserve are excluded from the boundaries of a State's coastal zone. However, in 1990, the Coastal Zone Reauthorization Amendments amended the federal consistency provisions to counter the Supreme Court's 1984 decision in Secretary of the Interior v. California. This clarified that all federal agency activities, whether in or outside of the coastal zone, are subject to the consistency requirements of Section 307(c)(a) of the CZMA if the activities affect natural resources, land uses, or water uses in the coastal zone. Additionally, the Texas Coastal Management Program/Final Environmental Impact Statement, prepared in 1996 by the National Oceanic and the Atmospheric Administration's Office of Ocean and Coastal Resource Management and the State of Texas Coastal Coordination Council states that, "While activities on excluded federal lands are not required to comply with the TCMP goals and policies, an activity that has spillover effects on CNRAs is subject to the federal consistency requirement (Part II, 2-5)".

The new provisions encourage each state, under a Coastal Zone Enhancement Grants Program in Section 309, to improve continually its CZM program in one or more of eight identified national priority areas: coastal wetlands management and protection; natural hazards management (including potential sea and Great Lakes level rise); public access improvements; reduction in marine debris; assessment of cumulative and secondary impacts of coastal growth and development; special area management planning; ocean resource planning; and siting of coastal energy and government facilities. Three new program approval requirements were also added in Section 306(d)(14), (15), and (16), addressing public participation in permitting processes; consistency determinations, providing a mechanism to ensure that all state agencies will adhere to the program; and requiring enforceable policies and mechanisms to implement the applicable requirements of the new Coastal Nonpoint Pollution Control Programs, respectively.

The NPS Management Policies provide that NPS will comply with provisions of State coastal zone management plans prepared under the Coastal Zone Management Act when such provisions are more environmentally restrictive than NPS management zoning (Management Policies, Chapter 4:20). Few mineral rights in National Park System units are located in the coastal zone. Jean Lafitte National Historical Park and a segment of the Beaumont Unit of Big Thicket National Preserve are examples of units that contain nonfederal oil and gas rights located in the coastal zone.

In the event that the NPS is considering issuing an access or surface use permit through the approval of a Plan of Operations, and the proposed nonfederal oil and gas operation may have a spillover effect on CNRAs, the NPS will consult with the Texas General Land Office for a consistency determination. In these cases, the Coastal Coordination Council must refer a consistency certification within 45 days of receipt by the Council Secretary of an administratively complete consistency certification, or the action is conclusively presumed to be consistent.

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT, as amended, 42 U.S.C. §§9601-9675

Resources afforded protection: human health and welfare and the environment
Applicable regulation(s): 40 CFR Parts 300, 302, 355, 373

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as "Superfund," provides for cleanup of sites contaminated by hazardous substances in the United States. CERCLA defines "hazardous substance" as any substance:

- listed under the Resources Conservation and Recovery Act (42 U.S.C. §6921) as hazardous waste or having the characteristics identified under that section,
- listed under the Clean Water Act (33 U.S.C. §1321(b)(2)(a)) as a hazardous substance or (33 U.S.C. 1317(a)) as a toxic pollutant,
- listed under the Clean Air Act (42 U.S.C. §7412) as a hazardous air pollutant,
- listed under the Toxic Substances Control Act (15 U.S.C. §2606) as an imminently hazardous chemical substance or mixture, or
- listed under CERCLA (42 U.S.C. §9602) as a hazardous substance.

CERCLA explicitly excludes petroleum from the definition of hazardous substance, including crude oil or any fraction of petroleum that is not otherwise specifically listed or designated as a hazardous substance under statutory provisions listed above. It also excludes natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable as fuel from the definition of hazardous substances. (42 U.S.C. §9601(14)).

Owners or operators of a facility at which hazardous substances have been stored, treated, or disposed of must notify EPA of the location and type of waste at the site. EPA puts the most seriously contaminated sites on a National Priorities List (NPL) and updates it annually. Sites on the NPL are eligible for long-term clean up actions funded by the EPA administered Superfund program.

CERCLA also includes reporting requirements for spills or other releases of hazardous substances. CERCLA requires persons in charge of a vessel or facility to report to the National Response Center releases (except federally permitted releases) of hazardous substances into the environment. If releases are less than the reportable quantity established by EPA (40 CFR §302.4) they do not have to be reported. "Release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, dumping or disposing into the environment. "Release" includes the abandonment of barrels or containers that contain hazardous substances. Failure to report is punishable by a fine of up to $10,000 and imprisonment not to exceed one year (42 U.S.C. §9603).

CERCLA directs the President to revise and publish a National Contingency Plan (NCP) for the cleanup of petroleum and hazardous waste spills. EPA developed the original NCP under Section 311 of the Clean Water Act. The NCP details how the EPA will respond to spills of oil or hazardous substances regulated under CERCLA and/or the Clean Water Act. EPA publishes the plan, called the National Oil and Hazardous Substances Pollution Contingency Plan, at 40 CFR Part 300.

CERCLA authorizes the EPA to clean up sites using the Superfund, to issue administrative orders requiring potentially responsible parties (PRPs) to clean up sites, and to obtain court orders requiring PRPs to clean up sites. If EPA uses the Superfund, CERCLA then authorizes EPA to sue PRPs to recover costs of the cleanup. PRPs who have incurred costs cleaning up may sue other PRP's to recover part of the cost of the cleanup.
Under CERCLA, the EPA tries to find all PRPs. The following persons are liable for response costs under CERCLA:

- The present owner or operator of a vessel or facility from which there is a release or threatened release,
- Past owners or operators of a vessel or facility at the time of disposal of the hazardous substance,
- Persons who arranged for disposal of the hazardous substance at the facility, and
- Persons who transported a hazardous substance to the facility, if they selected the facility.

However, there is no liability if the PRP can establish that the release or threatened release and the resulting damages were caused solely by an act of God, an act of war, or an unforeseen act or omission of a third party who was not an agent or employee of the PRP. CERCLA provides an innocent landowner defense under limited circumstances.

Persons who are liable under CERCLA are responsible for all response costs incurred by the United States, a State or an Indian tribe, which are not inconsistent with the NCP. They may also be responsible for damages for injury to, destruction of, or loss of natural resources, including the reasonable costs of assessing the injury, destruction or loss of natural resources. Furthermore they may be responsible for costs of certain health assessments or studies.

CERCLA imposes strict liability, i.e. without any requirement that the person intended to release, was negligent in releasing, or caused the release of a hazardous substance into the environment. Moreover, in most cases, any of the liable parties may be held responsible for the entire cost of the cleanup. To recover part of the cleanup costs, the party would then have to sue other liable parties for contribution.

Operators and their contractors should thoroughly investigate waste disposal sites before sending hazardous substances there. They should check to make sure disposal sites have the relevant State/Federal permits and that the disposal company has provided enough money to properly close the site. If a release occurs from the disposal site, the persons who disposed of hazardous substances there could be liable for large cleanup bills.

Operators should avoid releases of hazardous substances. Release of the bond required by NPS regulations does not affect possible subsequent liability under CERCLA for releases of a hazardous substance into the environment.

ENDANGERED SPECIES ACT OF 1973, as amended, 16 U.S.C. §§1531-1544

Resources afforded protection: plant and animal species or subspecies and their habitat, which have been listed as threatened or endangered by the U.S. Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS). Distinct population segments of species of vertebrate fish or wildlife, which interbreed when mature, may also be listed as threatened or endangeredand are afforded protection.
Applicable regulation(s): 50 CFR Parts 402, 450

The Endangered Species Act of 1973 (ESA) protects plants and animals that are in danger of becoming extinct throughout all or a significant part of their range. The FWS/NMFS administer the Act. The ESA makes it illegal to "take" an endangered species of fish or wildlife without a permit from the FWS/NMFS. “Taking” includes direct killing, hurting, trapping, or harassing. It also includes disrupting a habitat critical to the species' survival. Protective regulations issued at the time of listing for a threatened species of fish or wildlife may also prohibit or limit taking of the species without a permit.

Other Federal agencies must formally consult with the FWS/MFS when there is reason to believe that their own actions (including permitting) may affect a listed or proposed threatened or endangered (T & E) species. The ESA prohibits agency actions within the United States that jeopardize the continued existence of a T & E species and/or destroy or adversely affect designated critical habitat necessary for the species’ survival.

When a proposed plan of operations is submitted, the NPS and operators must comply with the requirements of the Endangered Species Act and the regulations FWS/NMFS have promulgated to implement it (50 CFR Part 402). First, the NPS asks the FWS/NMFS for a list of proposed or listed species and proposed or designated critical habitat in the area to be affected by the operator or applicant's proposal. If the FWS/NMFS advises the NPS that listed or proposed T&E species may be present, the NPS must prepare a biological assessment (BA). The BA evaluates the potential effects of the action on listed and proposed species and designated and proposed critical habitat. It determines whether any such species or habitat is likely to be adversely affected by the action. NPS and FWS/NMFS use the BA to determine whether formal consultation or a conference is necessary. (The agencies use a conference for proposed species and formal consultation for listed species.)

The BA must be included with the environmental assessment that is required under the National Environmental Policy Act. The BA should include a list of listed and proposed threatened or endangered species occurring in the project area; what impacts the project could have on these species and their habitat; project measures intended to mitigate, or reduce adverse impacts to these T&E species; and a description of the formal and informal consultation with the FWS/NMFS, if appropriate.

If the BA indicates there are no listed species or designated critical habitat present that are likely to be adversely affected by the action, and the FWS/NMFS concurs, then formal consultation is not required. If the BA indicates that the action is not likely to jeopardize the continued existence of proposed species or result in the destruction or adverse modification of proposed critical habitat, and FWS/NMFS concurs, then a conference is not required.

However, if the BA indicates listed species or critical habitat is likely to be adversely affected by the action, the NPS must formally consult with the FWS/NMFS. At the end of consultation the FWS/NMFS provides the NPS and the applicant with its "biological opinion." If the opinion finds the proposed action is likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of designated critical habitat, the FWS/NMFS must suggest reasonable and prudent alternatives to the proposed action that the NPS and the operator can use. If the FWS/NMFS is unable to develop any reasonable and prudent alternatives, it will indicate that to the best of its knowledge there are no reasonable and prudent alternatives. The FWS/NMFS may also formulate conservation recommendations, which will help the NPS reduce or eliminate the impacts the proposed action may have on listed species or designated critical habitat. The NPS will comply with prescribed alternatives when approving the plan of operations or implementing any other related action. The NPS and operator must include the FWS/NMFS recommendations in the plan of operations or as stipulations to the plan. Operators must conduct their mineral activities in National Parks in a way that protects T & E species

As stated in NPS-66, “Minerals Management Guideline,” the NPS cannot approve a plan of operations if the FWS/NMFS has found that, no matter how modified, the action will result in "jeopardy” to a listed species or "destruction or adverse modification to habitat" critical to a listed species. Jeopardizing a listed species, or habitat critical to a listed species' survival, is a "significant injury to federal lands” in the meaning of 36 CFR Part 9B. The 36 CFR Part 9B regulations do not allow the NPS to approve proposed plans that will result in a "significant injury to federal lands.”

FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT, as amended by the FEDERAL ENVIRONMENTAL PESTICIDE CONTROL ACT AND FIFRA AMENDMENTS OF 1975, 1978, 1980, 1988, 1996, 7 U.S.C. §136 *et. seq.*

Resources afforded protection: human health and safety, and the environment
Applicable regulation(s): 40 CFR Parts 152-180, except Part 157

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended, is the basic law regulating pesticides in the United States. FIFRA prohibits the distribution or sale of unregistered pesticides, with limited exceptions, and establishes procedures for registering pesticides with the EPA. EPA has the authority to suspend or cancel registrations for pesticides, which cause unreasonable adverse effects on the environment. To be approved for registration, a pesticide must meet EPA criteria regarding efficacy, labeling, and whether it can be used without unreasonable adverse effects on the environment. It is unlawful for anyone to use a pesticide in a manner inconsistent with its labeling. EPA determines whether pesticides should be classified for general or restricted use. Pesticides classified for restricted use may only be applied under the direct supervision of a certified applicator or subject to other restrictions imposed by regulation.

FIFRA also requires EPA to establish regulations for the storage and disposal of pesticide containers, excess pesticides and pesticides for which registration has been canceled. The Act also outlines penalties, indemnities, and administrative procedures. In addition, EPA may exempt any Federal or State agency from any provision of Act, if it determines emergency conditions, requiring such exemption, exist.

The appropriate NPS pesticide specialist must review and approve use of pesticides, including herbicides and rodenticides, before they may be used on units of the National Park system, including those where nonfederal oil and gas operations are proposed or operating under a 9B plan. For example, proposed use of herbicides for clearing areas for oil and gas operations, must be reviewed and approved before use by an NPS Integrated Pest Management specialist. The Parks follow Department of the Interior Departmental Manual - 517; Director’s Order – 77, Natural Resources; and NPS Procedures for Pesticide Use Requests when considering proposals for pesticide use.

FEDERAL LAND POLICY AND MANAGEMENT ACT OF 1976, 43 U.S.C. §1701 *et seq.*

Resources afforded protection: Federal lands and resources administered by the Bureau of Land Management
Applicable regulation(s): 43 CFR Part 2200 for land exchanges, various other parts for other BLM activities

The Federal Land Policy and Management Act (FLPMA), also known as the BLM Organic Act, controls Bureau of Land Management (BLM) administration of over three hundred million acres of Federal lands in Alaska and the western United States. FLPMA also contains a land exchange authority (43 U.S.C. §1716) that permits the exchange of Federal lands, or interests in lands, outside National Park System lands for nonfederal lands, or interests in land, within National Park System units. The NPS and BLM may use this exchange authority to acquire private mineral interests in National Park System units when appropriate.

BLM regulations at 43 CFR Part 2200 govern Federal land exchanges authorized by FLPMA. However, if the enabling or exchange act for a unit of the National Park system is inconsistent with these regulations, then the enabling or exchange act applies. Otherwise these regulations govern exchanges, including those involving mineral interests, in the National Park System. They describe the appraisal and other procedures BLM uses in conducting exchanges.

HAZARDOUS LIQUID PIPELINE SAFETY ACT OF 1979, 49 U.S.C. §2001 *et seq.*

Resources afforded protection: human health and safety and the environment
Applicable regulation(s): 49 CFR Parts 190, 195

The Hazardous Liquid Pipeline Safety Act of 1979 (HLPSA) comprises comprehensive safety legislation governing the transportation of hazardous liquids by pipeline. The HLPSA expanded the existing statutory authority for safety regulation, which was limited to transportation by common carriers in interstate and foreign commerce, to transportation through facilities used in or affecting interstate or foreign commerce. It also added civil penalty, compliance order, and injunctive enforcement authorities to the existing criminal sanctions. The HLPSA provides for a national hazardous liquid pipeline safety program with national, uniform, minimal standards and with enforcement and administration through a Federal/State partnership.

The Department of Transportation's regulations implementing the HLSPA provide procedures for developing and implementing safety programs and for carrying out enforcement activities (40 CFR Part 190). They also provide guidance on responding to accidents and safety related conditions, design requirements, construction requirements, pressure testing, and operation and maintenance (40 CFR Part 195).

Operators of oil and gas pipelines crossing units of the National Park System must comply with the HLPSA. Pipelines for oil and gas exist within several units of the National Park System. NPS regulations at 36 CFR 9B require an 9B plan for construction or use of oil and gas pipelines in connection with nonfederal oil and gas operations within a unit, or on a pipeline right-of-way that predates the unit, if

- The proposed pipeline is on, through or across Federally owned or controlled lands or waters in the unit, or
- The pipeline does not qualify as an existing operation exempted from a plan of operations by 36 CFR §9.33.

HAZARDOUS MATERIALS TRANSPORTATION ACT, as amended, 49 U.S.C. §5101 *et seq.*

Resources afforded protection: human health and safety
Applicable regulation(s): none

This Act governs the transportation of hazardous materials in the United States. Hazardous materials include but are not limited to: solvents, asbestos, PCBs, paints, pesticides, and hazardous wastes. The purpose of the Act is to improve the regulatory and enforcement authority of the Secretary of Transportation to protect the nation adequately against the risks to life and property, which are inherent in the transportation of hazardous materials in commerce.

HISTORIC SITES, BUILDINGS, AND ANTIQUITIES ACT (HISTORIC SITES ACT OF 1935), 16 U.S.C. §461- 467

Resources afforded protection: historic sites, buildings and objects
Applicable regulation(s): 36 CFR 65

This Act establishes a national policy "to preserve for public use, historic sites, buildings, and objects of national significance for the inspiration and benefit" of the American people. The Act authorizes the designation of national historic sites and landmarks, authorizes interagency efforts to preserve historic resources, and establishes fines for violations of the Act. It authorizes surveys of historic and archeological sites, buildings, and objects to determine which are significant, and provides for the restoration, reconstruction, rehabilitation, preservation, and maintenance of historic and prehistoric properties of national significance. The Act authorizes the Secretary of the Interior, through the National Park Service, to conduct surveys and studies, collect information, and purchase significant historic properties. The Secretary may also restore, preserve, maintain, and rehabilitate structures and sites; establish museums; and operate and manage historic sites, and develop educational programs.

LACEY ACT, as amended, 16 U.S.C. §3371 *et seq.*

Resources afforded protection: fish and wildlife, vegetation
Applicable regulation(s): 50 CFR Parts 10-12

The Lacey Act prohibits the import, export, transport, sales, receipt, acquisition, or purchase of fish, wildlife, or plants that are taken, possessed, transported, or sold in violation of any Federal law, treaty, regulation or Indian tribal law. It is also illegal to import, export, transport, sell, receive, acquire or purchase, in interstate or foreign commerce, fish, wildlife or plants taken, possessed, transported or sold in violation of a State law or State regulation (or foreign law for fish and wildlife, but not for plants). The Act also establishes marking requirements for containers or packages containing fish or wildlife.

The 1981 amendments to the Act strengthened Federal laws and improved Federal assistance to States and foreign governments for enforcement of fish and wildlife laws. The Act has significant civil and criminal penalties for violations and has become a vital tool in efforts to control smuggling and trade in illegally taken fish and wildlife.

The U.S. Fish and Wildlife Service regulations implementing the Lacey Act and other related laws describe the procedures for the assessment of civil penalties (50 CFR Part 11) and requirements for government seizure and forfeiture (50 CFR Part 12).

MIGRATORY BIRD TREATY ACT, as amended, 16 U.S.C. §§703-712
Resources afforded protection: migratory birds
Applicable regulation(s): 50 CFR Parts 10, 12, 20, 21

The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the United States and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Unless permitted by regulations, under the MBTA it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, body part (e.g. feathers), nest, egg or product, manufactured or not. The U.S. Fish and Wildlife Service regulations provide procedures for obtaining a migratory bird permit (50 CFR Part 21). Regulations at 50 CFR Part 20 cover hunting of migratory birds, and regulations at 50 CFR Part 12 cover their seizure and forfeiture.

Operators and their employees should avoid actions with respect to migratory birds that could violate the Migratory Bird Treaty Act (e.g. destroying nests and eggs or picking up dead birds).

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969, 42 U.S.C. §4321 *et seq.*
Resources afforded protection: the human environment (e.g. cultural and historic resources, natural resources, biodiversity, human health and safety, socioeconomic environment, visitor use and experience)
Applicable regulation(s): 40 CFR 1500-1508

The National Environmental Policy Act (NEPA) passed in 1969, mandates that federal agencies assess the environmental effects of a proposed action and engage the public in the analyses of environmental impacts, before agencies make decisions affecting the human environment. NEPA requires that the information be an integral part of the decision-making process. A key feature of NEPA is that the federal agency must complete all analyses, public input and documentation in time to be a useful part of decision-making and before committing federal resources to the action. Initiating or completing environmental analysis after making a decision, whether formally or informally, violates both the spirit and the letter of the law.

Besides setting environmental planning policy goals, NEPA created the Council on Environmental Quality (CEQ), an agency of the President's office, as the "caretaker" of NEPA. CEQ published NEPA regulations in 1978 (40 CFR Parts 1500-1508). The CEQ regulations apply to all Federal agencies and require each Federal agency to "implement procedures to make the NEPA process more useful to agency decision-makers and the public" (40 CFR 1500.2). Agencies must review and update their regulations as necessary. In 1981 CEQ also published a guidance document titled "Forty Most Asked Questions Concerning CEQ's NEPA Regulations (46 Fed. Reg. 18026, (1981)). Director's Order 12, to be finalized in 2000 is the National Park Service's guidance on implementing NEPA.

The NEPA process is an essential component of planning for conservation and resource management and of integrating scientific and technical information into management decisions, rather than an after-the-fact "compliance" effort. A well done NEPA analysis provides useful information on environmental pros and cons (i.e. impacts) of a variety of reasonable choices (alternatives), much like economic cost-benefit analysis or technical or logistical planning. It is an essential prelude to the effective management of park resources.

NEPA is a procedural, or process-oriented, rather than a substantive, or substance-oriented, law. It is up to the decision-maker how he or she will use the NEPA analyses. NEPA does allow agencies to choose an alternative with the potential for severe adverse environmental impacts. However, other substantive laws may prevent an agency from taking action or pieces of an action which have "too great" an impact on a particular resource. Within the NPS, the process of environmental analysis under NEPA provides the needed information to make substantive decisions for the long-term conservation of resources.

NEPA has a broad reach. NPS consideration of an action, which could have impacts on the human environment, whether generated by NPS, or by a private individual or other Federal, State or local agency applicant, triggers NEPA. Although the CEQ regulations, give less emphasis to the socioeconomic environment than the physical or natural environment, NPS considers it an integral part of the human environment and will do NEPA analysis even if the impacts that would occur as a result of the proposal are primarily those of a socioeconomic nature. Socioeconomic impacts include those to minority and low-income communities as specified in the Environmental Justice Executive Order (EO 12898; Feb. 11, 1994).

The National Park Service undertakes its environmental analyses in a number of ways. Some actions or types of proposals fall under a "Categorical Exclusion." This means that the proposal meets specific criteria defined under Department of the Interior regulations and NPS Director's Order 12, excluding the proposal from further environmental analyses since the types of activities listed in the criteria do not have the potential for measurable impacts on park resources. If the proposal does not meet the criteria for a Categorical Exclusion, then an Environmental Assessment (EA) or Environmental Impact Statement (EIS) is prepared to further analyze the impacts and alternatives to the proposal.

NPS is responsible for meeting environmental responsibilities under NEPA for the leasing, licensing or permitting of nonfederal oil and gas operations. It is not the responsibility of the mineral owners, lessees, or operators to prepare the NEPA document. With information provided by the operator in a Plan of Operations, the NPS prepares the appropriate NEPA documentation. NPS follows the detailed guidance on preparing EAs and EISs provided in Director's Order-12, National Environmental Policy Act Guidelines, at Part 516 of the Department of the Interior Manual (DM 516), and in the CEQ regulations.

NATIONAL HISTORIC PRESERVATION ACT OF 1966, as amended, 16 U.S.C. §§470-470x-6

Resources afforded protection: cultural and historic properties listed in or determined to be eligible for listing in the National Register of Historic Places
Applicable regulation(s): 36 CFR 60, 63, 78, 79, 800

The National Historic Preservation Act (NHPA) declared a national policy of historic preservation. It encouraged preservation on the State and private levels; authorized the Secretary of the Interior to expand and maintain a National Register of Historic Places; established the Advisory Council on Historic Preservation; and required Federal agencies to conduct studies of potential effects of their proposed actions on National Register properties and to provide the Advisory Council opportunities to comment (§106). The Advisory Council has promulgated regulations, "Protection of Historic and Cultural Properties," at 36 CFR 800, to implement Section 106 and the Presidential directives issued under it.

The NHPA also required Federal agencies to identify, evaluate, and nominate cultural resources to the National Register and to manage for preservation those National Register eligible or listed properties that are under their jurisdiction or control.

In 1980 Congress passed a series of amendments to the NHPA and other preservation legislation. These include:

- codification of portions of Executive Order 11593, requiring an inventory of Federal resources and Federal agency programs to protect historic resources,

- clarification that Federal agencies can consider inventory and evaluation of resources to be excluded from the one percent fund limit under the 1974 amendments to the Reservoir Salvage Act (only actual data recovery activities must be included within the one per cent), and
- authorization for Federal agencies to charge Federal permitees and licensees reasonable costs for protection activities (This last provision resolved a controversy about whether agencies could require private interests to pay costs of protecting archeological and historic resources that the private interests' activities would otherwise destroy).

The NPS must consider the potential effects of any proposed mineral activities on cultural resources listed on or eligible for the National Register. This responsibility cannot be assigned to nonfederal parties. NPS regulations at 36 CFR §9.37(e) provide that the Regional Director may not approve a proposed plan of operations until the NPS complies with the NHPA. NPS regulations also require that operators provide the information needed for the NPS to make the determinations required under the NHPA. Operators must submit, as part of the environmental report in the proposed plan of operations, a description of the environment to be affected, including the natural and cultural environment.

In general, the NPS will have surveyed its lands as required by Section 110 of the NHPA. The NPS cultural resource survey is typically a careful inspection of the ground surface. The NPS uses standard archeological methodology that may include exploratory subsurface testing. The purpose of the survey is to determine whether the lands are eligible for listing on the National Register. Operators may obtain data gathered by the NPS surveys for the environmental report section of the proposed plan.

When an operator submits a proposed plan of operations, the NPS reviews the cultural resources section. Based upon that review, staff knowledge of the affected area's history and prehistory, and NPS cultural resource surveys, the Regional Director determines if the operations would affect a property listed or eligible for listing on the National Register.

If the NPS finds that the operations would not affect a property listed or eligible for listing, the NPS consults with the State Historic Preservation Officer (SHPO) to obtain agreement. If the SHPO agrees with the NPS, the Regional Director may issue an archeological clearance for any ground-disturbing operations on Federal park lands.

If the NPS finds that operations would affect listed or eligible properties, then the NPS prepares an "Assessment of Effect on Cultural Resources." The NPS then consults with the SHPO to determine what steps to take to protect the site. If the NPS and the SHPO cannot agree on a course of action, the matter goes to the Advisory Council on Historic Preservation. If the operation may affect a Park that is also designated a National Historic Landmark, the NPS must automatically consult with the Advisory Council.

Private surface owners may take any lawful action they want on their property, even if the property is listed on the National Register. However, under the authority of the NPS Organic Act and certain unit enabling legislation, directing the NPS to regulate mineral activity to protect natural and cultural resources, the NPS can include stipulations in its plan approval to protect cultural resources on private property inside unit boundaries during the course of mineral operations.

NPS regulations at 36 CFR §9.47 require operators to stop all operations and notify the Superintendent if operations reveal previously unknown cultural resources. For the NPS to meet its obligations under the NHPA and the NPS Organic Act, an operator must notify the NPS of previously unknown cultural resources that may be destroyed by NPS-approved mineral activity. The notification requirement applies even though the operator may own the cultural resources. Notification gives the NPS an opportunity to judge the historic value of the resources, and, if warranted, acquire them from the owner.

An operator under 36 CFR Part 9B may be required to salvage cultural resources discovered in the course of operations. The operator may salvage the resources only after the NPS, in consultation with the SHPO, has approved a mitigation and salvage plan, and has chosen a salvage contractor.

NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT OF 1990, 25 U.S.C. §§3001-3013

Resources afforded protection: Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony
Applicable regulation(s): 43 CFR Part 10

The Native American Graves Protection and Repatriation Act (NAGPRA), provides for the protection of Native American and Native Hawaiian cultural items, and establishes a process for the authorized removal of human remains, funerary objects, sacred objects, and objects of cultural patrimony for sites located on lands owned or controlled by the Federal government. The Act also provides for the transfer of ownership of cultural objects to Native American or Native Hawaiian individuals (e.g., direct lineage or cultural descendents), organizations, or tribes. It addresses the recovery, treatment, and repatriation of Native American and Native Hawaiian cultural items by Federal agencies and museums. NAGPRA contains data gathering, reporting, consultation, and permitting provisions. The Act emphasizes consultation with Native American and Native Hawaiian organizations to ensure that these entities play a major role in the treatment of specific cultural objects.

Regulations at 43 CFR Part 10 address the rights of lineal descendants, Indian tribes, and Native Hawaiian organizations to Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony. They require Federal agencies and institutions that receive Federal funds to provide information about these items to lineal descendants, Indian tribes and Native Hawaiian organizations and, upon presentation of a valid request, to dispose of or repatriate these objects to them. Section 10.4 describes the regulatory requirements under NAGPRA for inadvertent discoveries of human remains, funerary objects, sacred objects, and objects of cultural patrimony.

NPS-specific guidance for implementing NAGPRA is in Appendix R, “NAGPRA Compliance,” of NPS-28 – Cultural Resources Management Guideline. If NPS anticipates an operation may impact Native American human remains, funerary objects, sacred objects, or objects of cultural patrimony protected by NAGPRA, it will consult with the appropriate Native American or Native Hawaiian organization as part of the 9B plan approval process.

NATURAL GAS PIPELINE SAFETY ACT OF 1968, as amended, 49 U.S.C. §1671 *et seq.*

Resources afforded protection: human health and safety, the environment
Applicable regulation(s): 49 CFR Parts 190-193

The Natural Gas Pipeline Safety Act of 1968 (NGPSA) provides for a national natural gas pipeline safety program with national, uniform, minimal standards and with enforcement through a Federal/State partnership.

The Department of Transportation’s regulations implementing the NGPSA provide procedures for developing and implementing safety programs and for carrying out enforcement activities (40 CFR Part 190). They also prescribe procedures for:

- annual reports, incident reports, and safety related condition reports (40 CFR Part 191),
- minimum Federal safety standards (40 CFR Part 192), and
- Federal safety standards for liquefied natural gas facilities (40 CFR Part 193).

Operators of gas pipelines crossing units of the National Park System must comply with the NGPSA. Gas pipelines exist within several units of the National Park System. NPS regulations at 36 CFR 9B require a 9B plan for construction or use of oil and gas pipelines in connection with nonfederal oil and gas operations within a unit, or on a pipeline right-of-way that predates the unit, if

- The proposed pipeline is on, through or across Federally owned or controlled lands or waters in the unit, or
- The pipeline does not qualify as an existing operation exempted from a plan of operations by 36 CFR §9.33.

NOISE CONTROL ACT OF 1972, 42 U.S.C. §§4901-4918

Resources afforded protection: human health and welfare
Applicable regulation(s): none

The Act establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. To accomplish this, the Act provides for the coordination of Federal research and activities to control noise; authorizes the establishment of Federal noise emission standards for products distributed in commerce; and provides information to the public respecting the noise emission reduction characteristics of such products.

The Act authorizes and directs that Federal agencies, to the fullest extent consistent with their authority under Federal laws administered by them, carry out the programs within their control in such a manner as to further the policies declared in the Act. Agencies having jurisdiction over any property or facility or engaged in any activity resulting, or which may result in, the emission of noise must comply with Federal, State, interstate, or local requirements respecting control and abatement of environmental noise. Agencies must, upon request, furnish information to the EPA regarding the nature, scope, and results of noise research and noise control programs of the agency and must consult with EPA, as required, in prescribing standards or regulations respecting noise.

The Act also provides for citizen suits. Any person may commence civil action against the United States or any government instrumentality or agency that is alleged to be in violation of any noise control requirement.

Operators are responsible for ensuring their facilities, equipment, and operations comply with any applicable Federal, State, interstate, or local noise emission requirements. NPS management policies provide that the NPS will strive to preserve the natural quiet and natural sounds associated with the physical and biological resources of the parks (e.g. the sound of waves breaking on the shore or wind in the trees, or the call of the loon). NPS policy is to prevent or minimize unnatural sounds that adversely affect park resources or values or visitors' enjoyment of them.

OIL POLLUTION ACT, 33 U.S.C. §§2701-2761

Resources afforded protection: water resources, natural resources
Applicable regulation(s): 40 CFR Part 112; 33 CFR Parts 135, 137, 150; 49 CFR Part 106; 15 CFR Part 990; 33 CFR Part 135; 33 CFR Part 137

The Oil Pollution Act of 1990 (OPA) is the result of 15 years of congressional effort to reach a consensus on comprehensive Federal oil spill legislation. The Act has six major provisions:

- an expanded Federal role in spill response,
- contingency planning requirements for vessels and certain facilities,
- establishment of the Oil Spill Liability Trust Fund,
- increase of liability for spills of oil or hazardous substances from vessels and facilities,
- requirements for double hulls on new tankers, and

- requirements for increased research and development into spill response technologies.

OPA imposes liability for removal costs and damages resulting from discharge of oil into navigable waters (defined as waters of the United States) or adjoining shorelines or the exclusive economic zone. Damages include injuries to natural resources, loss of natural resources, and loss of the use of natural resources. Natural resources include land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other resources belonging to the United States, State, local, foreign governments or Indian tribes.

Liability does not apply to discharges allowed by a permit issued under a Federal, State or local law. In addition, liability does not apply if the responsible party establishes that the discharge, damages, or removal costs were caused solely by an act of God, an act of war, or a third party who is not an agent or employee of the responsible party. However the responsible party is still liable, irrespective of these defenses, if he fails to report the incident, fails to cooperate or help as requested, or fails to comply with certain orders.

OPA increased penalties for regulatory noncompliance, broadened the response and enforcement authorities of the Federal government, and preserved State authority to establish law governing oil spill prevention and response.

OPA also provided new requirements for government and industry oil spill contingency planning. The "National Oil and Hazardous Substances Pollution Contingency Plan" (NCP) expanded to encompass a three-tiered approach. The Federal government directs all public and private response efforts for certain types of spill events. Area Committees, composed of Federal, State, and local government officials, must develop detailed, location-specific Area Contingency Plans. Owners or operators of vessels and certain facilities that pose a serious threat to the environment must prepare their own facility response plans.

OPA may require some nonfederal oil and gas operations on units of the National Park System to develop contingency plans. Contingency plans developed to meet the requirements of OPA may also satisfy the NPS 9B requirement for a contingency plan. NPS would determine if the OPA required plan meets NPS requirements as part of the 9B plan approval process.

RESOURCE CONSERVATION AND RECOVERY ACT, 42 U.S.C. §6901 *et seq.*

Resources afforded protection: natural resources, human health and safety
Applicable regulation(s): 40 CFR 240-280, 49 CFR 171-179

The objectives of the Resource Conservation and Recovery Act (RCRA) are to promote the protection of health and the environment and to conserve valuable material and energy resources. The passage of this Act was the first serious Federal attempt to address the problems of solid waste and hazardous waste management. RCRA regulates the management of hazardous waste from generation to final disposal. The law consists of nine subtitles. Two of the subtitles create significant regulatory programs: Subtitle C and Subtitle D. Subtitle C established a hazardous waste program from generation to disposal. Subtitle D addresses disposal of nonhazardous solid waste. "Solid waste" is defined broadly to include garbage, refuse, and other discarded materials. It includes solids, liquids, and containerized gases.

The requirements of Subtitle C apply if the waste falls under EPA's criteria governing hazardous waste. The regulatory criteria for hazardous waste are found at 40 CFR Parts 260 and 261. EPA lists of hazardous wastes (known as listed wastes) are in Subpart D of Part 261. Subpart C of Part 261 establishes the criteria for determining if a solid waste is a hazardous waste because it has the characteristic of corrosivity, reactivity, ignitability, or toxicity (known as characteristic waste). Solid waste may be regulated as hazardous waste either because it is a listed hazardous waste or a characteristic hazardous waste.

The 1980 amendments to RCRA excluded certain oil, gas, and geothermal drilling and production wastes from the hazardous waste requirements of Subtitle C. The amendments specifically exempt drilling fluids, produced water, and other drilling and production wastes. In 1988, the EPA decided to keep the exemption for exploration and production wastes. State agencies regulate the exempted wastes under the less strict Subtitle D governing nonhazardous waste.

It is very important for oilfield workers to understand how RCRA works because mistakes can be costly for operators. The major rule to remember is whenever any Subtitle C waste is mixed with Subtitle D waste, the mixture becomes Subtitle C hazardous waste. It doesn't matter if the mixture loses all of its hazardous characteristics. For example, if the rig mechanic dumps used motor oil into the reserve pit, the entire volume of drilling muds, cuttings, rig wash, excess cement, and harmless completion fluids would be reclassified as hazardous waste. The mixture is reclassified as hazardous even if it does not exhibit hazardous properties.

RCRA also provides for strict civil and criminal penalties. Persons who don't comply with RCRA can be fined up to $25,000 per day for a violation. It doesn't matter if the person has been served with a compliance order or not. It is up to the operator to know and comply with RCRA. The operator cannot rely on the EPA to tell him when he is in violation, then make corrections to avoid a penalty. Also, RCRA has criminal penalties of up to $50,000 and 2 years in prison for people who "knowingly" cause transportation of hazardous materials without a manifest.

In addition, the RCRA exemption from Subtitle C for oil and gas drilling and production waste does not exclude these wastes from the operation of RCRA section 7003. Section 7003 provides that, if the past or present handling, storage, treatment, transportation or disposal of a solid or hazardous waste may present an imminent and substantial endangerment to health or the environment, EPA may compel any person, who has contributed or is contributing to the handling, storage, treatment, transportation or disposal of the waste, to take whatever action is necessary to protect human health and the environment. Because this can include expensive cleanup actions to protect human health and the environment, operators should handle waste from their operations in such a way that it does not contaminate the environment, now or in the future.

Regardless of RCRA exemption from Subtitle C regulation for exploration and production wastes, the NPS will likely require operators to dispose of all forms of waste outside of the park. Any NPS requirements for waste disposal in an operator's plan of operations will provide for the strict protection of park resources and values.

RIVERS AND HARBORS APPROPRIATION ACT OF 1899, as amended, 33 U.S.C. §401 *et seq.*

Resources afforded protection: shorelines and navigable waterways, tidal waters, wetlands
Applicable regulation(s): 33 CFR 322

Section 10 of the Rivers and Harbors Act of 1899 prohibits the unauthorized obstruction or alternation of any navigable waterway of the United States. The construction of any structure in or over any waters of the U.S., excavation or deposit of materials in such waters, and various types of work performed in or affecting such waters including fill and stream channelization, are examples of activities requiring an Army Corps of Engineers permit.

SAFE DRINKING WATER ACT OF 1974, 42 U.S.C. §300f *et seq.*

Resources afforded protection: human health, water resources
Applicable regulation(s): 40 CFR 141 - 148

The Safe Drinking Water Act (SDWA) provides for the safety of drinking water supplies throughout the United States by establishing national standards that States are responsible for enforcing. The Act provides for the establishment of primary regulations to protect human health, and secondary regulations relating to the taste, odor, and appearance of drinking water. Primary drinking water regulations, by definition, include either a maximum contaminant level (MCL) or, when an MCL is not economical or technologically feasible, a prescribed treatment technique that would prevent adverse health effects to humans. An MCL is the permissible level of a contaminant in water that is delivered to any user of a public water system.

The Act's 1986 amendments require EPA to publish every three years a list of contaminants, which are known or are anticipated to occur in public water systems.

The Act also provides measures to protect underground drinking water sources through State underground injection control programs. State programs protect drinking water from surface placement of fluids from well operations.

The most important part of the SDWA as far as the NPS and petroleum operators are concerned is the Underground Injection Control (UIC) permit program. Under the program, the EPA regulates underground injection of wastes or other materials. The EPA has authorized many states to administer the UIC permit program.

Owners of underground injection wells must obtain permits or be authorized by rule under the UIC program to operate the wells. The permit holder must prove to the State or Federal permitting agency that the underground injection will not endanger drinking water sources.

The NPS will approve a plan of operations involving underground injection only when the wells have valid UIC permits. The UIC program defines five classes of underground injection wells. Class II wells may relate to mineral operations in National Parks.

Class II wells inject:

- fluids brought to the surface with conventional oil and gas operations and may be combined with waste waters from gas plants,
- fluids used for enhanced recovery of oil and natural gas, and
- fluids for below ground storage of hydrocarbons.

EXECUTIVE ORDERS

EXECUTIVE ORDER 11593 – PROTECTION AND ENHANCEMENT OF THE CULTURAL ENVIRONMENT, 36 FR 8921 (1971)

Resources afforded protection: cultural resources

EO 11593 instructed all Federal agencies to support the preservation of cultural properties. It directed them to identify and nominate to the National Register cultural properties under their jurisdiction and to "exercise caution…to assure that any Federally owned property that might qualify for nomination is not inadvertently transferred, sold, demolished, or substantially altered."

EXECUTIVE ORDER 11988 - FLOODPLAIN MANAGEMENT, 3 CFR 1977 Comp. p. 117, amended by EO 12418, 3 CFR 1979 Comp. p. 412
Resources afforded protection: floodplains, human health, safety, and welfare

The purpose of EO 11988 is to avoid, where practicable alternatives exist, the short- and long-term adverse impacts associated with floodplain development. In carrying out agency responsibilities, Federal agencies are required to reduce the risk of flood loss, minimize the impacts of floods on human safety, health and welfare, and restore and preserve the natural and beneficial values served by floodplains. If an agency proposes an action in a floodplain, the agency must consider alternatives to avoid adverse effects and incompatible development in the floodplain. Agencies must also provide opportunity for early public review of any plans for actions in floodplains.

EXECUTIVE ORDER 11990 – PROTECTION OF WETLANDS, 3 CFR 1977 Comp. p. 121, amended by EO 12608, 3 CFR Comp. p. 245
Resources afforded protection: wetlands

EO 11990 seeks to avoid adverse impacts on wetlands wherever there is a practicable alternative. Executive agencies, in carrying out their land management responsibilities, must minimize the destruction, loss, or degradation of wetlands, and preserve and enhance the natural and beneficial values of wetlands. Agencies also must minimize the loss of wetlands in carrying out agency responsibilities for conducting related land resources planning.

EXECUTIVE ORDER 12088 – FEDERAL COMPLIANCE WITH POLLUTION CONTROL STANDARDS, 3 CFR 1978 Comp. 243, amended by EO 12580, 3 CFR 1987 Comp. p. 193
Resources afforded protection: natural resources, human health and safety

EO 12088 delegates to the head of each executive agency responsibility for taking all necessary actions to prevent, control, and abate environmental pollution. It gives the EPA authority to conduct reviews and inspections for the purpose of monitoring Federal facility compliance with pollution control standards. Section 1-201 requires Federal agencies to cooperate with State, interstate, and local agencies to prevent, control and abate environmental pollution. Section 1-101 requires prevention, control, and abatement of pollution from Federal facilities.

EXECUTIVE ORDER 12630 – GOVERNMENTAL ACTIONS AND INTERFERENCE WITH CONSTITUTIONALLY PROTECTED PROPERTY RIGHTS, 3 CFR 1988 Comp. p. 554
Resources afforded protection: private property rights, public funds
The purposes of EO 12630 are:

- to assist agencies in reviewing their actions to prevent unnecessary takings and in proposing, planning, and implementing agency actions with due regard for the constitutional protections provided by the Fifth Amendment to the Constitution of the U.S.,
- to account in decision-making for those takings necessitated by statutory mandate, and
- to reduce the risk of undue or inadvertent burdens on the federal treasury resulting from lawful government action.

When an agency requires a private party to obtain a permit to undertake a specific use of, or action with respect to, private property, any conditions imposed on the granting of the permit must serve the same purpose that would have been served by a prohibition of the use or action and substantially advance that purpose. The time must be kept to the minimum necessary for permitting processes that interfere with the use of private property during the process.

NPS 36 CFR 9B regulations which control nonfederal oil and gas activities in units of the National Park System are designed to impose reasonable regulations on activities which involve and affect Federally owned lands and are not intended to result in the taking of a property interest.

EXECUTIVE ORDER 12898 – FEDERAL ACTIONS TO ADDRESS ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW-INCOME POPULATIONS, 1994 (amended by EO 12948 (January 30, 1995)

Resources afforded protection: human health and safety

This Order requires that federal agencies make achieving environmental justice part of their mission. Environmental justice is a movement promoting the fair treatment of people of all races, income, and culture with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of the negative environmental impacts resulting from the execution of this country's domestic and foreign policy programs.

EXECUTIVE ORDER 13007 – INDIAN SACRED SITES, 61 FR 26771 (1996)

Resources afforded protection: American Indian sacred sites

This EO instructs all Federal land management agencies, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites.

If a proposed plan of operations might affect the physical integrity of sacred sites, or access to and ceremonial use of these sites by American Indian religious practitioners in Federally recognized tribes, the Superintendent will consult with the tribe as part of the 9B approval process.

EXECUTIVE ORDER 13112 – CONTROL OF INVASIVE SPECIES, (1999)

Resources afforded protection: vegetation, wildlife

The Executive Order goals are to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts which invasive species cause. The Order outlines Federal agency duties, creates a new Invasive Species Council and defines its duties, and directs creation of an Invasive Species Management Plan. Executive Order 13112 creates a framework for planning and coordination involving all stakeholders, defined to include State, tribal, local government agencies, academic institutions, the scientific community, non-governmental entities including environmental, agricultural, and conservation organizations, trade groups, commercial interests, and private landowners.

Federal agencies will be expected to use programs and authorities to: (1) prevent the introduction of invasive species; (2) detect and respond rapidly and to control populations of such species in a cost-effective and environmentally sound manner; (3) monitor invasive species populations accurately and reliably; (4) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (5) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (6) promote public education on invasive species and the means to address them.

The order directs agencies not to authorize, fund or carry out any action likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere. Of course, agencies can make a public determination that the benefits outweigh the potential harm and then make sure that prudent measures to minimize harm will be taken concurrently. Federal agencies are expected to consult with the Invasive Species Council and undertake actions consistent with the Invasive Species Management Plan and in cooperation with stakeholders.

POLICIES, GUIDELINES AND PROCEDURES

NATIONAL PARK SERVICE MANAGEMENT POLICIES (1988)

Resources afforded protection: all, e.g. air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, endangered and threatened species, visitor use and experience, visual resources

The NPS Management Policies are the basic Servicewide policy document of the National Park Service. They provide the overall foundation, set the framework, and provide direction for management decisions within the NPS. Management policy direction may be general or specific. It may prescribe the process by which decisions are made, how an action is to be accomplished, or the results to be achieved. The purpose of the Management Policies is to guide NPS staff to manage National Park System units consistently and professionally to achieve the Congressional mandate of the National Park System.

These policies cover Park System planning, land protection, natural resource management, cultural resource management, wilderness preservation and management, interpretation and education, use of the parks, park facilities, and concessions management.

DEPARTMENT OF THE INTERIOR, DEPARTMENTAL MANUAL, DM 516 – NEPA POLICIES

Resources afforded protection: all, e.g. cultural and historic resources, natural resources, human health and safety

This section of the Departmental Manual establishes the Department of the Interior's policies for implementing the National Environmental Policy Act. It includes policies on initiating the NEPA process, categorical exclusions, and preparing environmental assessments and environmental impact statements.

DEPARTMENT OF THE INTERIOR, DEPARTMENTAL MANUAL DM 517 – PESTICIDES

Resources afforded protection: human health and safety and the environment
DM 517 establishes Department of the Interior policy for the use of pesticides on the lands and waters under its jurisdiction and for compliance with FIFRA.

DEPARTMENT OF THE INTERIOR, DEPARTMENTAL MANUAL DM 519 – PROTECTION OF THE CULTURAL ENVIRONMENT

Resources afforded protection: archeological, prehistoric and historic resources, Native American human remains and cultural objects

DM 519 describes the policies and responsibilities of the Department of the Interior for managing, preserving, and protecting prehistoric and historic resources and Native American human remains and cultural objects that are located on Indian lands and public lands which the Department administers.

NPS DIRECTOR'S ORDER - 12 NATIONAL ENVIRONMENTAL POLICY ACT (Draft)

Resources afforded protection: all, e.g. natural and cultural resources, human health and safety, socioeconomic environment, visitor use

NPS issued NEPA guidelines in 1982 (NPS-12) and will soon issue a revised Director's Order (DO-12). The guidelines are derived from CEQ's NEPA regulations, and Departmental NEPA guidance. The Guidelines also add some requirements beyond those imposed by CEQ to help facilitate the requirements of the Organic Act and other laws and policies that guide National Park Service actions.

NPS DIRECTOR'S ORDER 28 – CULTURAL RESOURCE MANAGEMENT

Resources afforded protection: cultural, historic, and ethnographic resources

Approved in 1998, Director's Order 28 is the comprehensive guideline for management of cultural resources in units of the National Park Service. It elaborates on the Policies articulated in the "NPS Management Policies" and offers guidance in applying Federal laws and the Secretary's Standards to establish, maintain, and refine park cultural resource programs. Director's Order 28 establishes procedures for complying with NHPA sections 10 and 106.

Director's Order 28, Appendix R: NAGPRA Compliance, provides guidance on complying with the Native American Graves Protection and Repatriation Act. Appendix R requires that an operator who inadvertently discovers human remains, funerary objects, sacred objects, or objects of cultural patrimony must immediately notify the Park Superintendent by telephone, with a written confirmation, stop activity in the area of the discovery for a specified time, and make a reasonable effort to protect the human remains or objects. The Superintendent will notify the appropriate Indian tribes or Native Hawaiian organizations and begin consultation about the disposition of the human remains or objects.

NPS 66 – MINERALS MANAGEMENT GUIDELINE

Resources afforded protection: natural resources, human health and safety

To protect unit resources, Federal lands within the National Park System are almost always removed from the operation of Federal laws that allow for development and disposal of minerals. In addition, the NPS acquires nonfederal lands and waters, and mineral interests within unit boundaries to protect park unit resources and values. Nonetheless, many National Park System units contain nonfederally owned property or interests, including mineral interests, in property within their boundaries.

The Minerals Management Guideline provides basic background information on a broad array of minerals management issues. It discusses the NPS legislative mandate and minerals management policy, including the authority to acquire mineral interests. For mining claims, federal mineral leases, nonfederal oil and gas (Chapter 5), and nonfederal minerals other than oil and gas, the Guideline provides information on general laws, laws specific to the resource in National Park System units, applicability of State and local laws, and NPS responsibilities.

In addition, the Guideline covers other minerals management issues: federal mineral materials, collection of minerals for noncommercial purposes, mineral assessments and research in National Park System units, electric power transmission lines, and oil and gas pipelines. The Guideline also discusses the NPS planning process and how it incorporates minerals management, and describes those NPS divisions and offices that have minerals management responsibilities.

Chapter 5 of NPS 66, "NPS Responsibilities Regarding Nonfederal Oil and Gas," provides guidance to the parks on evaluating proposed plans of operations, enforcing the nonfederal oil and gas regulations, and considering acquisition of nonfederal oil and gas interests.

NPS 77 – NATURAL RESOURCES MANAGEMENT GUIDELINE

Resources afforded protection: natural resources

NPS 77 is a comprehensive guideline on natural resource management that combines existing guidance with documentation of practices and procedures of NPS resource management. It guides the actions of park managers so that natural resource activities comply with Federal law and regulation and the Department of the Interior and National Park Service policy. Natural resources are features and values including native plants and animals, water, air, soils, topographic features, geologic features, paleontologic resources, natural quiet, and clear night skies. NPS is updating these polices in 2000.

NPS DIRECTOR'S ORDER 77-1 – WETLAND PROTECTION

Resources afforded protection: wetlands

NPS Director's Order 77-1 and Procedural Manual implement EO11990, Protection of Wetlands, by establishing policies, requirements and standards to protect wetlands. Operators must perform a wetlands delineation when proposed operations could potentially cause direct and/or indirect impacts to wetlands. The Corps of Engineers and the NPS review the wetlands delineation for adequacy. When proposed operations cannot avoid direct and/or indirect impacts on wetlands, the operator must compensate for direct and indirect impacts to wetlands by restoring a disturbed wetlands area in the unit, at a minimum 1:1 compensation ratio. The compensation ratio can be greater if the functional values of the site being impacted are high and the restored wetlands will be of lower functional value. Compensation must be performed before or at the same time impacts associated with approved oil and gas operations occur. At the time when the operations area is reclaimed, the operator must restore the site to the pre-impact wetlands condition.

NPS must comply with EO 11990 and the NPS Wetland Management Guideline (Do-77.-1) as part of the 36 CFR 9B procedure for approving a plan of operations for nonfederal oil and gas operations within a unit of the National Park System.

NPS SPECIAL DIRECTIVE 93-4 – FLOODPLAIN MANAGEMENT GUIDELINE

Resources afforded protection: floodplains

This guideline provides NPS policies and specific procedures for implementing EO 11988, Floodplain Management. NPS policy is to:

- Restore and preserve natural floodplain values,
- Avoid to the extent possible, the long and short-term environmental impacts associated with the occupancy and modification of floodplains, and avoid direct and indirect support of floodplain development, wherever there is a practicable alternative,
- Minimize risk to life and property by design or modification of actions in floodplains, using nonstructural methods when possible, where it is not otherwise practical to place structures and human activities outside of the floodplain, and
- Require structures and facilities which must be in floodplains to be designed so as to be consistent with the intent of the Standards and Criteria of the National Flood Insurance Program.

According to the Guideline's procedures, proposed actions are classified into one of three action classes. Depending on the action class, either the 100-year, 500-year or extreme regulatory floodplain applies. If a preliminary floodplain assessment shows that there is any chance the site might be subject to flooding, then the applicable regulatory floodplain is delineated on a map and information on flood conditions and hazards is developed.

NPS identifies and evaluates sites that are not prone to flooding for all proposed actions in a regulatory floodplain. If practicable alternative sites are identified, NPS policy gives preference to locating the proposed action at an alternative site outside the regulatory floodplain. If no practicable alternative site is available, and the importance of the location clearly outweighs NPS floodplain policies, then NPS may apply mitigation measures to actions located in the regulatory floodplain.

NPS must comply with EO 11988 and the NPS Floodplain Management Guideline as part of the 36 CFR 9B procedure for approving a plan of operations for nonfederal oil and gas operations within a unit of the National Park System.

SECRETARY OF THE INTERIOR'S "STANDARDS AND GUIDELINES FOR ARCHEOLOGY AND HISTORIC PRESERVATION" 48 FR 44716 (1983) (also published as Appendix C OF NPS DIRECTOR'S ORDER 28 – CULTURAL RESOURCE MANAGEMENT)

Resources afforded protection: cultural and historic resources

Prepared under the authority of sections 101(f), (g), and (h) and 110 of the National Historic Preservation Act, the Standards and Guidelines provide basic technical standards, guidelines and advice about archeological and historical preservation activities and methods. The standards and guidelines are not regulatory, but NPS Director's Order 28 requires the NPS to comply with their substantive and procedural requirements.

GOVERNMENT-TO-GOVERNMENT RELATIONS WITH NATIVE AMERICAN TRIBAL GOVERNMENTS, Presidential Memorandum signed APRIL 29, 1994.

Resources afforded protection: Native Americans

In order to ensure that rights of sovereign tribal governments are recognized and respected, the memorandum instructs each executive department and agency to operate in a government-to-government relationship with federally recognized tribes, and to consult with tribal governments prior to taking any action that might affect them. The memorandum directs agencies to assess the impacts of their programs and policies on tribes and to take their right and concerns into consideration during development of any plan, programs or projects, and to remove any impediments to working directly with tribal governments in designing agency plans, programs and projects. Finally, it instructs agencies to try to work cooperatively to carry out the intent of the memorandum and to tailor federal programs to meet the unique needs of tribal communities.

SELECTED TEXAS LAWS AND REGULATIONS

TEXAS NATURAL RESOURCES CODE
TITLE 2. CHAPTER 40

Resources afforded protection: human health and safety, natural resources

This chapter codifies the Oil Spill Prevention and Response Act of 1991. Section 111 covers oil and gas pipelines and Section 117 covers hazardous liquid or CO_2 pipelines. This chapter also provides for liability for natural resources damages from spills.

TEXAS NATURAL RESOURCES CODE
TITLE 3. CHAPTERS 81 THROUGH 85

Resources afforded protection: human health and safety, natural resources
Applicable regulation(s): "Rules Having Statewide General Application to Oil, Gas and Geothermal Resource Operations within the State of Texas" (TAC tit. 16, part 1, § 3)

The Railroad Commission of Texas has State responsibility for regulating oil and gas operations. Its rules, regulations and forms, published in the "Rules Having Statewide General Application to Oil, Gas and Geothermal Resource Operations within the State of Texas," apply to all fields and districts within the State. However, if the "Rules" conflict with the special rules governing any field or district, then the special rules govern.

TEXAS ADMINISTRATIVE CODE
TITLE 16. ECONOMIC REGULATION, PART 1. RAILROAD COMMISSSION OF TEXAS, CHAPTER 3. OIL AND GAS DIVISION

Resources afforded protection: human health and safety, natural resources

Oil and Gas rules (regulations) were promulgated for the State of Texas by the Railroad Commission of Texas in 1991. The oil and gas statewide rules are a statement of general applicability that implements, interprets, or prescribes law or policy, or that describes the Commission's procedure or practice requirements. The rules emphasize maximizing hydrocarbon production, eliminating wasteful field practices of reserves, protecting human health and safety and natural resources, and reporting and information collection requirements. The following list of statewide rules is applicable to protecting natural resources and human health and safety. Additional statewide rules that are not listed below would be required in conjunction with other relevant legal and policy mandates.

§3.8 – Water Protection.
§3.9 – Disposal Wells.
§3.13 – Casing Cementing, Drilling, and Completion Requirements.
§3.14 – Plugging.
§3.20 – Notification of Fire, Breaks, Leaks, or Blow-outs.
§3.21– Fire Prevention and Swabbing.
§3.22 – Protection of Birds.
§3.24 – Check Valves Required.
§3.36 – Oil, Gas, or Geothermal Resource Operation in Hydrogen Sulfide Areas.
§3.46 – Fluid Injection into Productive Reservoirs.
§3.57 – Reclaiming Tank Bottoms, Other Hydrocarbon Wastes, and Other Waste Materials.
§3.70 – Pipeline Permits Required.
§3.91 – Cleanup of Soil Contaminated by a Crude Oil Spill.
§3.93 – Water Quality Certification.
§3.94 – Disposal of Oil and Gas NORM Waste.
§3.99 – Cathodic Protection Wells.
§3.100 – Seismic Holes and Core Holes.

APPENDIX D

TYPES OF OIL AND GAS OPERATIONS

Prepared by
Pat O'Dell, Petroleum Engineer
Geologic Resources Division
National Park Service
Denver, Colorado

The petroleum industry is a continuous cycle of searching for new oil and gas reservoirs, developing and producing them, and finally abandoning the property once the hydrocarbons are depleted.

There are four general phases of petroleum development. The phases are (1) exploration, (2) drilling, (3) production, and (4) abandonment/reclamation. Surface uses vary for each phase in terms of intensity and duration. Also, operations related to one or all of the phases may be occurring in the same area at any given time.

To be of interest to the petroleum industry, petroleum deposits must be commercially valuable. There must be a reasonable chance of making a profit on the eventual sale of the oil and gas. Factors such as the market price of oil and gas, the amount of recoverable petroleum, the expected production rates, and the cost of drilling wells, producing, and transporting the product to market all determine the economic viability of developing a deposit once it is discovered.

The following sections are meant to provide the reader with a general understanding of common activities associated with each phase of oil and gas development.

EXPLORATION OPERATIONS

Occurrence of Petroleum

Petroleum deposits are not large underground caverns filled with oil and gas as the term reservoir might suggest. Rather, petroleum accumulates in tiny spaces within the buried rock layers. Most scientists today agree that petroleum was formed from large amounts of very small plant and animal life. These organic materials accumulated in ancient seas, which, over great periods of time, have covered much of the present land area. As time passed, sediments rich in organic matter were buried deeper and deeper. The increased pressure and temperature caused these organic remains to change into oil and natural gas. Once formed, the oil and gas migrated upward until certain forms and shapes of underground rocks halted the upward movement, trapping the hydrocarbons in large quantities. The search for these traps is the focus of the first phase of oil and gas development and exploration.

Geological Exploration

The search for oil and gas often begins with geological exploration. The exploration geologist is looking for clues on the surface that would suggest the possibility of petroleum deposits below.

Surface studies comprise the first stage of exploratory fieldwork. Geological surveys of the land surface are made using aerial photographs, satellite photographs, maps of surface outcrops of specific formations or rock types, and geochemical analyses. Field crews map surface attributes and collect surface samples of rock for analysis.

Creating maps of surface outcrops and geochemical analyses requires fieldwork. Little equipment is needed other than surveying gear and rock and soil sampling supplies. These activities require a small field party of two to four persons who can work out of a single vehicle or on foot. Access to remote areas can be gained by a four-wheel-drive vehicle, small all-terrain vehicles, helicopter, pack animals, or by walking. A small boat may access shallow estuarial and near-shore areas. Constructing road or digging channels for boats in shallow water areas is not required at this early stage.

Geochemical analysis often requires subsurface samples to be taken from a ditch or a shallow corehole. The coreholes are not usually big, but may generate some cuttings.

Geophysical Exploration

Geological exploration can narrow the area being searched, but subsurface geology may or may not be accurately indicated by surface outcrops. Geophysical prospecting extends the search beneath the earth's surface. The surveys identify and map characteristics favorable to oil and gas accumulation deep underground. Geophysical operations include gravitational, magnetic, and seismic surveys. Of these, the seismic survey is most common.

Gravitational and Magnetic Surveys

Gravitational and magnetic field studies yield regional or reconnaissance-type data. These surveys detect variation in gravitational attractions and magnetic fields of the various types of rock below the surface.

Gravity surveys are generally done with small, portable instruments called gravity meters or gravimeters. The number and placement of measurement points in a gravity survey depend on the site's characteristics. These include feasibility of access and the spacing pattern necessary to detail the features selected for mapping. The field party required is not large, usually 3 to 6 people. Travel on foot is possible with the smaller portable gravimeters. Progress, however, is slow, so most surveys use four-wheel-drive vehicles. In marshy areas, the use of special swamp or marsh buggies is quite common with gravity survey crews. Airborne survey operations are not yet practical due to present instrument limitations and the relatively large and rapid changes in altitude and acceleration characteristic to aircraft.

The objective of most surveys can be achieved when gravity stations are confined to existing roads or waterways. Where roads or waterways do not exist, a large level of latitude in positioning stations is possible to account for logistical or environmental constraints. Disturbance of the land surface is minimal when established access is already available. Methods of access to roadless areas are similar to those required for geological explorations described above. The surveying technique itself does not require any physical disturbance of the surface.

Magnetic surveys are often used in place of or to supplement gravity surveys. These surveys are done with relatively small airborne or portable ground instruments called magnetometers. Flight patterns usually consist of a series of parallel lines at 1- to 2-mile intervals.

Airborne surveys require geodetic and ground control points. These must be installed on the ground before the survey can take place, if not already present. A majority of the lower 48 states have been surveyed, so these points are already in place. If not, however, the area must be accessed by overland vehicles or helicopters. The size of the field party required is not large. The access to roadless areas is similar to that required for geological exploration described above. The surveying technique itself does not require any physical disturbance of the surface.

Seismic Surveys

Whereas gravity and magnetic surveys provide regional information, seismic survey can provide enough subsurface detail to locate potential oil and gas traps.

A seismic survey gathers subsurface geological information by recording impulses from an artificially generated shock wave. The energy waves travel downward toward underground formations. A series of sensitive instruments, called geophones, set out at surveyed points on the ground, record the energy waves as they are reflected off the subsurface formations and back to the surface. Cables or radio transmitters transfer information from the geophones to a recorder truck that receives and records the reflected seismic energy. Sophisticated computers analyze the data and generate a "picture" of the rocks underground. Each survey line provides a cross-section of the rock formations beneath it, and many lines may be run to create a complete picture.

In remote areas where there is little known subsurface data, a series of short seismic lines may be required to determine the attitude of the subsurface formations. After this, the pattern of seismic lines or grids is designed to make the final data more accurate and valuable. Although alignment is fairly critical, some source and recording stations may be moved or skipped for environmental or logistical reasons without seriously affecting the results of the investigation.

A more recent technique called 3-D Seismic works on the same principle as conventional seismic, but energy and recording stations are placed at a much denser spaced grid. There may be up to 150 energy source locations and 200 recording stations per square mile on a 3-D seismic project. Surveys commonly exceed a 25-square-mile-area. The 3D-Seismic surveys can provide enough detail to locate traps that have been "missed" by conventional geophysical methods and exploratory drilling. Even in areas that have been heavily explored and developed, 3D-Seismic is helping to optimize new field development and find new targets within producing fields. New life is being brought to areas thought to have been played out.

Seismic methods are usually referred to by the various methods of generating the shock wave. These include weight drop, vibrators, dinoseis, and explosives. No matter what method of generating energy is used, the procedures for preparing the line and recording the data are relatively similar. The procedure for "shooting" a line consists of first surveying and flagging the locations for the geophones and the positions of the energy sources. Second, the geophones and the connecting cable are laid down. The cable is either connected with more cable to the recording truck or to a radio transmitter to send the data to the recording truck. Normally the recording truck will be within a short distance of the transmitter or within line of sight. Once the geophones and ground cable are in place, the energy source is put in place. The detonation of the energy source, whether by truck or by explosive, is controlled by the recording truck. The shock wave is set off, and the seismic signal recorded. Once the signal is recorded, the cable is picked up and the entire process is repeated on the next segment of the line.

The most common energy source in seismic work is explosives placed in holes drilled to depths of up to 200 feet. Explosives may range from ½- to 50-pound charges. Drills can be mounted on trucks, boats, or specially designed airboats or ATVs, depending on the type of access required. In rugged topography, or to reduce surface disturbance associated with access, portable drills are sometimes carried by helicopter or by hand. Other field equipment can include vehicles to carry water for drilling operations, personnel, surveying equipment, recording equipment, and computers.

Existing roads are used if possible, but reaching some lines may require clearing vegetation and loose rock to improve access for the crews and the trucks. Each mile of seismic line cleared to a width of 8 to 15 feet represents disturbance of about an acre of land. A network of low-standard temporary roads and trails can result from these operations. The alignment of these trails usually consists of straight lines dictated by the grid, often with little regard for steep slopes or rough terrain. Level topography with few trees and shrubs would require little or no trail construction. An area with rugged topography or larger vegetative types such as trees and large shrubs would require more trail preparations. Temporary roads and trails are usually constructed with bulldozers.

Seismic crews consist of several surveying people, people for laying and retrieving the cable and geophones, the truck drivers and drillers for the energy source, personnel in the recording truck and miscellaneous water truck drivers, cleanup people, and field crew managers. The size of the seismic crews vary from 15 to 80 people. On most seismic jobs, the people and equipment are transported in trucks or four-wheel-drive vehicles. However, the surveying, cable laying, and sometimes the drilling can be done on foot in some situations.

Under normal conditions, 3 to 5 miles of line can be surveyed each day using the explosive methods. Crews may be in the field for 1 to 4 weeks for an average conventional survey. An average 3-D survey may take several months to complete.

DRILLING OPERATIONS

Stratigraphic Test

Sometimes operators need underground rock samples to further define and confirm data from a geophysical exploration program. A stratigraphic test, commonly called a "strat" test, involves drilling a hole primarily to obtain geological information. Small-diameter holes are drilled to 100 feet or several thousand feet with small, truck-mounted drilling equipment. A space of ½ acre or less may be cleared of vegetation and leveled for the average strat test drill site. A road may be needed to get equipment to the site. As the rock is drilled, the resulting rock chips are brought to the surface by a high-pressure airflow or circulating drilling mud. The geologist analyzes the cuttings in order to correlate this geological and geophysical data to other known subsurface structure in order to prepare a subsurface geological map.

A space of about ½ acre or less is leveled and cleared of vegetation for the average strat test drill site. If air drilling is employed, drill cuttings are blown into a reserve pit next to the drill truck through what is known as a blooey line. If mud is used as a drilling fluid, mud pits may be dug. More commonly, portable mud tanks are used. Usually 1 to 3 days are required to drill the strat test holes, depending on the well depth and the hardness of the bedrock. In areas with shallow, high-pressure, water-bearing zones, casing may be required to keep water out of the hole.

Once the surface and subsurface geological and geophysical information is interpreted and a potential oil or gas trap is located, exploratory wells are drilled to test for the actual presence of oil or natural gas.

Oil and Gas Well Drilling

Classification of Wells: Wells drilled for oil and gas are classified as either exploratory or development wells. An exploratory well is drilled either in search of an as-yet-undiscovered pool of oil or gas (a wildcat well) or to extend greatly the limits of a known pool. Exploratory wells may be classified as (1) wildcat, drilled in an unproven area; (2) field extension or step-out, drilled in an unproven area to extend the proved limits of a field; or (3) deep test, drilled within a field area but to unproven deeper zones. Development wells are wells drilled in proven territory in a field to complete a pattern of production.

Exploration, or wildcat, well drilling, and the equipment involved are well beyond that of strat test drilling. At a common height of 180 feet, the rig stands as tall as a 12-story building. An average drilling rig needs a level location of about 3 acres. The drilling pad and access road must be capable of supporting thousands of tons of equipment. The access road may need to be widened and upgraded to accommodate heavy loads.

Choosing the Site: Once exploration activities have narrowed the search to specific drilling targets, the operator must select an exact spot on the surface to drill the well. The industry prefers to drill vertically, and usually chooses a drill site directly above the desired bottom hole location. When topographical, geological, or environmental constraints prevent a drill site from being located directly above the bottomhole location, the use of direction drilling can achieve the objective. Reaches of over a mile are common for 10,000-foot-deep wells, and extended reach wells have been drilled with over 2 miles of horizontal departure.

Direction drilling involves directing a wellbore from the vertical below the surface along a predetermined course to a target zone located a given distance away. It is a common practice in the industry today, with a number of uses. Directional drilling techniques can be applied if the target zone lies underneath an inaccessible location such as a heavily urbanized area, mountain, or water body, and the drill rig must be located elsewhere. The technique is most often used in offshore applications to allow many wells to be drilled from one location. It can be used to drill around or through fault planes, salt domes, or obstructions in the hole, and to provide relief to a nearby well that has blown out. More recently, the technique has been used to move surface locations as an environmental protection measure.

While directional drilling allows flexibility in the selection of the drill site, there are numerous technical, physical, and economic constraints on its use. Sophisticated equipment and specialized personnel are needed to monitor and guide the direction of the well as it is being drilled. Geological factors such as formation stability, type, and dip angle physically complicate and restrict the opportunities for using directional drilling. The cost of using this technique typically ranges from 10 percent to 50 percent higher than the cost of a vertical well.

Accessing the Site: Wildcat drilling often takes place in remote areas. Preliminary exploration work will not have contributed any new roads to an area, although there may be some cross-country trails. Temporary access roads will have to be constructed. Existing roads may need upgrading to accommodate the heavier loads associated with truck traffic. One lane is usually adequate. Installation of culverts or other engineering structures will be needed in steep terrain or when crossing stream channels. Soil texture, topography, and moisture conditions might dictate that roads be surfaced with material such as gravel, oyster shells, caliche, or ground limestone. Heavy equipment such as graders, bulldozers, front-end loaders, and dump trucks are commonly used in constructing roads. In marshy areas, a roadbed may be laid with heavy boards.

Preparing the Drill Site: To accommodate the rig and equipment, the drill site must be prepared. Site preparation may include extensive clearing, grading, cutting, filling, and leveling of the drill pad using heavy construction equipment. Soil material suitable for plant growth is often removed first and stockpiled for later use in reclamation. The operator may also dig reserve pits to hold large volumes of drilling mud and drill cuttings. In environmentally sensitive areas, such as Alaska and California, a large effort is made not to alter the surface area comprising the drill site more than is necessary. For example, reserve pits may not be dug. Instead, large steel bins are placed on the site to receive the cuttings and other materials that are normally dumped into the reserve pits. These bins can then be trucked away from the site and the material inside them disposed of properly. Also, even in areas where reserve pits are excavated, they are often lined with thick plastic sheeting to prevent any contaminated water or other materials from seeping into the ground. The drill pad typically occupies about 3 to 5 acres.

Directional drilling may require a larger-sized rig for additional facilities that increase the pad size. For inland water sites, drilling barges that sit on the bottom may be used as a foundation for the drill rig. Some dredging may be done on these sites to create a slip, and protective skirts or pilings may be installed around the barge to prevent erosion by currents and tidal flow. In deeper water, jack-up, submersible and semi-submersible, rigs and drill ships may be used to drill wildcat wells. An offshore platform is required to drill development wells in deep water.

Since a source of freshwater is required for the drilling mud and for other purposes, a water well is sometimes drilled prior to moving the rig onto the location. If other sources are available, the water may be piped or trucked to the site.

At the exact spot on the surface where the hole is to be drilled, a rectangular pit called a cellar is dug, or culvert-like pipe is driven into the ground. If the cellar is dug, it may be lined with boards, or forms may be built and concrete poured to make walls for the cellar. The cellar is needed to accommodate drilling accessories that will be installed under the rig later.

In the middle of the cellar, the top of the well is started, sometimes with a small truckmounted rig. The conductor hole is large in diameter, perhaps as large as 36 inches or more; is about 20 to 100 feet deep; and is lined with conductor casing, which is also called conductor pipe. If the topsoil is soft, the conductor pipe may be driven into the ground with a pile driver. In either case, the conductor casing keeps the ground near the surface from caving in. Also, it conducts drilling mud back to the surface from the bottom when drilling begins, thus the name conductor pipe.

Usually, another hole considerably smaller in diameter than the conductor hole is dug beside the cellar and also lined with pipe. Called the rathole, it is used as a place to store the kelly when it is temporarily out of the borehole during certain operations. Sometimes on small rigs, a third hole, called the mousehole, is dug. On large rigs, it is not necessary to dig a mousehole because of the rig floor's height above the ground. In either case, the mousehole is lined with pipe and extends upward through the rig floor and is used to hold a joint of pipe ready for makeup.

Rigging Up: With the site prepared, the contractor moves in the rig and related equipment. The process, known as rigging up, begins by centering the base of the rig, called the substructure, over the conductor pipe in the cellar. The substructure supports the derrick or mast, pipe, drawworks, and sometimes the engines. If a mast is used, it is placed into the substructure in a horizontal position and hoisted upright. A standard derrick is assembled piece by piece on the substructure. Meanwhile, other drilling equipment such as the mud pumps are moved into place and readied for drilling.

Other rigging-up operations include erecting stairways, handrails, and guardrails; installing auxiliary equipment to supply electricity, compressed air, and water; and setting up storage facilties and living quarters for the toolpusher and company man. Further, drill pipe, drill collars bits, mud supplies, and many other pieces of equipment and supplies must be brought to the site before the rig can make hole.

Mobilizing the drill rig to the location requires moving 10 to 25 large truckloads of equipment over public highways and smaller roads. In very remote locations, entire drilling crews and service personnel may be temporarily housed onsite. A typical drilling crew consists of five people. Drilling operations are continuous, 24 hours a day and 7 days a week. The crews usually work two 12-hour shifts. With the drilling crew, geologists, engineers, supervisors, and specialized service providers, there may be anywhere from 5 to over 20 people on a drilling location at any given time. An irregular stream of traffic to and from the rig occurs day and night.

Drilling the Surface Hole: Rotary drilling is used almost universally in modern-day drilling. Drilling is accomplished by rotating special bits under pressure. Starting to drill is called "spudding in" the well. To spud in, a large bit, say 17 ½ inches in diameter as an example, is attached to the first drill collar and is lowered into the conductor pipe by adding drill collars and drill pipe one joint at a time until the bit reaches the bottom. While drilling, the rig derrick and associated hoisting equipment support the drill string's weight. The combination of rotary motion and weight on the bit causes rock to be chipped away at the bottom of the hole.

The rotary motion is created by a square or hexagonal rod, called a kelly, which fits through a square or hexagonal hole in a large turntable, called a rotary table. The rotary table sits on the drilling rig floor and as the hole advances, the kelly slides down through it. With the kelly attached to the top joint of pipe, the pump is started to circulate mud, the rotary table is engaged to rotate the drill stem and bit, and weight is set down on the bit to begin making hole. When the kelly has gone as deep as it can, it is raised, and a joint of drill pipe about 30 feet long is attached in its place. The drill pipe is then lowered, the kelly is attached to the top of it, and drilling recommences. By adding more and more drill pipe, the hole can steadily penetrate deeper.

Large volumes of fluid, generically called drilling mud, circulate down the drill pipe to the drill bit and back to the surface. The mud lubricates and cools the bit and carries drill cuttings to the surface. The composition of the mud system depends on the types of formations being drilled, economics, water availability, pressure, temperature, and many other significant factors. Mud can be as simple as freshwater, or a complex emulsion of water, oil, chemicals, clays, and weighting material. Chemicals added to the mud help drill and protect the hole's integrity. Weighting material is often added to prevent formation fluids from flowing into the well as it is being drilled. Mud systems can be highly toxic or relatively benign. The drilling mud along with cuttings from the well account for the largest volume of waste generated at the wellsite.

The first part of the hole is known as the surface hole. Even though the formation that contains the hydrocarbons may lie many thousands of feet below this point, drilling ceases temporarily because steps must now be taken to protect and seal off the formations that occur close to the sufrace. For example, freshwater zones must be protected from contamination by drilling mud. To protect them, special pipe called casing is run into the hole and cemented.

Tripping Out: The first step in running casing is to pull the drill stem and bit out of the hole. Pulling the drill stem and bit out of the hole in order to run casing, change bits, or perform some other operation in the borehole is called tripping out. To trip out, the drilling crew uses the rig's hoisting system, or drawworks, to raise the drill stem out of the hole.

Attached to the traveling block is a set of drill pipe lifting devices called elevators. Elevators are gripping devices that can be latched and unlatched around the tool joints of the drill pipe. The crew latches the elevators around the drill pipe, and the driller raises the traveling block to pull the pipe upward. When the third joint of pipe clears the rotary table, the rotary helpers set the slips and use the tongs to break out the pipe. The pipe is usually removed in stands of three joints. Removing pipe in three-joint stands, rather than in single joints, speeds the tripping out process. With the stand of pipe broken out, the crew guides it into position on the rig floor to the side of the mast or derrick.

The derrickman unlatches the elevators from the top of the pipe and stands the pipe back in the derrick. Working as a close-knit team, the driller, rotary helpers, and derrickman continue tripping out until all the drill pipe, the drill collars, and the bit are out of the hole. At this point, the only thing in the hole is drilling mud, because mud was pumped into the hole while pipe was tripped out.

Running Surface Casing: Once the drill stem is out, often a special casing crew moves in to run the surface casing. Casing is large-diameter steel pipe, and is run into the hole with the use of special heavy-duty casing slips, tongs, and elevators. Casing accessories include centralizers, scratchers, a guide shoe, a float collar, and plugs.

Centralizers keep the casing in the center of the hole so that when the casing is cemented, the cement can be evenly distributed around the outside of the casing. Scratchers help remove mud cake from the side of the hole so that the cement can form a better bond. The guide shoe guides the casing past debris in the hole, and has an opening in its center out of which cement can exit the casing. The float collar serves as a receptacle for special cementing plugs, and allows drilling mud to enter the casing at a controlled rate. The plugs begin and end the cementing job, and serve to keep cement separated from the mud so that the mud cannot contaminate the cement. The casing crew, with the drilling crew available to help as needed, runs the surface casing into the hole one joint at a time. Casing is available in joints of about 40 feet. Once the hole is lined from bottom to top with casing, the casing is cemented in place.

Cementing: The cementing of oil well casing annuli is a universal practice done for a number of reasons, depending on casing type. Conductor casings can be cemented to prevent the drilling fluid from circulating outside the casing, causing the very surface erosion the casing was intended to prevent. Surface casings must be cemented to seal off and protect freshwater formations, provide an anchor for blowout preventer equipment, and give support at the surface for deeper strings of casing. Intermediate strings of casing are cemented in order to seal off abnormal pressure formations, effectively isolate incompetent formations that might cause drilling problems unless supported by casing and cement, and shut off zones of lost circulation. Production casing is cemented to prevent the migration of fluids to thief zones, to prevent sloughing of formations that could result in reduced production, and to isolate productive zones for future development.

An oilwell cementing service company usually performs the job of cementing the casing in place. The cement used to cement oilwells is not too different from the cement used as a component in ordinary concrete. Basically, oilwell cement is Portland cement with special additives to make it suitable for various conditions of pumping, pressure, and temperature.

Cementing service companies stock various types of cement and use special trucks to transport the cement in bulk to the well site. Bulk cement storage and handling at the rig location make it possible to mix the large quantities needed in a short time. The cementing crew mixes the dry cement with water, often using a recirculating mixer (RCM). This device thoroughly mixes the water and cement by recirculating part of the already-mixed components through a mixing compartment. Powerful cementing pumps move the liquid cement (slurry) through a pipe to a special valve made up on the topmost joint of casing. This valve is called a cementing head, or plug container. As the cement slurry arrives, the bottom plug is released from the cementing head and precedes the slurry down the inside of the casing. The bottom plug keeps any mud that is inside the casing from contaminating the cement slurry where the two liquids interface. Also, the plug wipes off mud that adheres to the inside wall of the casing and prevents it from contaminating the cement.

The plug travels ahead of the cement until it reaches the float collar. At the collar the plug stops, but continued pump pressure breaks a seal in the top of the plug and allows the slurry to pass through a passageway in it. The slurry flows out through the guide shoe, and starts up the annulus between the outside of the casing and the wall of the hole until the annulus is filled.

A top plug is released from the cementing head and follows the slurry down the casing. The top plug keeps the displacement fluid, usually drilling mud, from contaminating the cement slurry. When the top plug comes to rest on the bottom plug in the float collar, the pumps are shut down and the slurry is allowed to harden. Allowing time for the cement to set is known as waiting on cement (WOC) and varies in length. In some cases, it may be only a matter of a few hours; in other cases, it may be 24 hours or even more, depending on well conditions. Adequate WOC time must be given to allow the cement to set properly and bond the casing firmly to the wall of the hole. After the cement hardens and tests indicate that the job is good -- that is, that the cement has made a good bond and no voids exist between the casing and the hole -- drilling can be resumed.

Tripping In: To resume drilling, the drill stem and a new, smaller bit that fits inside the surface casing must be tripped back into the hole. The bit is made up on the bottommost drill collar. Then, working together, the driller, floormen, and derrickman make up the stands of drill collars and drill pipe and trip them back into the hole.

When the drill bit reaches bottom, circulation and rotation are begun and the bit drills through the small amount of cement left in the casing, the plugs, the guide shoe, and into the new formation below the cemented casing. As drilling progresses and hole depth increases, formations tend to get harder; as a result, several round trips (trips in and out of the hole) are necessary to replace worn bits.

Controlling Formation Pressure: During all phases of drilling, an important consideration is well control. Well control is preventing the well from blowing out by using proper procedures and equipment. A blowout is the uncontrolled flow of fluids -- oil, gas, water, or all three -- from a formation that the hole has penetrated.

Blowouts threaten lives, property, and pollution of the environment. Rig crews receive extensive training in how to recognize and react to impending blowouts, making them relatively rare events.

The key to well control is understanding pressure and its effects. Pressure exists in the borehole because it contains drilling mud and in some formations because they contain fluids. All fluids --drilling mud, water, oil, gas, and so forth -- exert pressure. The denser the fluid (the more the fluid weighs), the more pressure the fluid exerts. A heavy mud exerts more pressure than a light mud. For effective control of the well, the pressure exerted by the mud in the hole should be higher than the pressure exerted by the fluids in the formation.

Pressure exerted by mud in the hole is called hydrostatic pressure. Pressure exerted by fluids in a formation is called formation pressure. The amount of hydrostatic pressure and formation pressure depends on the depth at which these pressures are measured and the density, or weight, of each fluid. Regardless of the depth, hydrostatic pressure must be equal to or slightly greater than formation pressure, or the well kicks. The well kicks, formation fluids enter the hole, if hydrostatic pressure falls below formation pressure. Thus, one of the crew's main concerns during all phases of the drilling operation is to keep the hole full of mud whose weight is sufficiently high to overcome formation pressure.

However, unexpectedly high formation pressures can be encountered. Formation fluids can be swabbed, or pulled, into the hole by the piston-like action of the bit as pipe is tripped out of the hole. Also, the mud level in the hole can fall so that the hole is no longer full of mud. Whatever the reason, when hydrostatic pressure falls below formation pressure, crew members have a kick on their hands, and they must take quick and proper action to prevent the kick from becoming a blowout.

Helping the crew keep an eye on the rig's operation are various control instruments located on the driller's console. Some rigs have data processing systems that utilize slave computer display terminals, or CRTs (short for cathode ray tubes), on the rig floor, in the mud logging trailer, in the toolpusher's trailer, and in the company man's trailer. When limits that have been programmed into the system are exceeded, the system goes into an alarm condition.

Whether the kick warning signs come from electronic monitors, a computer printout, or the behavior of the mud returning from the hole, an alert drilling crew detects the signs and takes proper action to shut the well in. To shut a well in, large valves called blowout preventers, which are installed on top of the cemented casing, are closed to prevent further entry of formation fluids into the hole. Once the well is shut in, procedures are begun to circulate the intruded kick fluids out of the hole. Also, weighting material is added to the mud to increase its density to the proper amount to prevent further kicks, and the weighted up mud is circulated into the hole. If the mud has been weighted the proper amount, then normal operations can be resumed.

Running and Cementing Intermediate Casing: At a predetermined depth, drilling stops again in order to run another string of casing. Depending on the depth of the hydrocarbon reservoir, this string of casing may be the final one, or it may be an intermediate one. Intermediate casing is smaller than surface casing because it must be run inside the surface string and to the bottom of the intermediate hole. In general, it is run and cemented in much the same way as surface casing.

Final Depth and Well Evaluation: Using a still smaller bit that fits inside the intermediate casing, the next part of the hole is drilled. Often, the next part of the hole is the final part of the hole unless more than one intermediate string is required. After cementing the intermediate casing, drilling resumes by tripping the new bit and drill stem back in the hole. The intermediate casing shoe is drilled out, and drilling the new hole resumes.

While drilling and once reaching the total depth (TD) of the well, the operator collects information to determine if hydrocarbons have been encountered. To help the operator decide whether to abandon the well or to set a final, or production, string of casing, several techniques can be used. A thorough examination of the cuttings made indicates whether the formation contains sufficient hydrocarbons. A geologist catches cuttings at the shale shaker and analyzes them in a portable laboratory at the well site. He often works closely with a mud logger logger -- a technician who monitors and records information brought to the surface by the drilling mud as the hole penetrates formations of interest.

Well logging is another valuable method of analyzing downhole formations. Using a mobile laboratory, well loggers lower sensitive tools to the bottom of the well on wireline and then pull them back up the hole. As they pass back up the hole, the tools measure and record certain properties of the formations and the fluids (oil, gas, and water) that may reside in the formations. Logging tools can also be run as part of the drill string to measure hole conditions and formation properties as the well is being drilled. This is called “measurement while drilling” or MWD.

If logging results indicate commercial quantities, a drill stem test (DST) may be run. Tools are positioned on the drill pipe to isolate the zone to be flow tested. Downhole formation pressure and fluids enter the tool and activate a recorder. Test may be designed to allow formation fluids to flow to the surface during the test or just to allow a certain volume to enter into the wellbore. In either case, provisions must be made at the surface to separate formation fluids from the mud, and to store and dispose of formation liquids. Natural gas produced during drill stem test is vented or flared. A properly designed and run DST can give excellent indication of the types and volumes of fluid the zone is capable of producing.

In addition to well logging and drill stem testing, formation core samples can be taken from the hole and examined in a laboratory.

Setting Production Casing: After the drilling contractor has drilled the hole to final depth and the operating company has evaluated the formations, the company decides whether to set production casing or plug and abandon the well. If the well is judged to be a dry hole --that is, not capable of producing oil or gas in commercial quantities -- the well will be plugged and abandoned. Several cement plugs will be put in the well to seal it permanently. Cement plugs will be designed and placed to protect the zones of usable water from pollution and to prevent escape of oil, gas, or other fluids to the surface or other zones. Plugging and abandoning a well are considerably less expensive than completing it.

On the other hand, if evaluation reveals that commercial amounts of hydrocarbons exist, the company may decide to set casing and complete the well. The services of a casing crew and cementing company will once more be arranged for; and the production casing will be run and cemented in the well.

The drilling contractor nears the end of his job when the hole has been drilled to total depth and production casing has been set and cemented. In some cases, the rig and crew remain on the location to “complete” the well, or make it ready for production. In other cases, the drilling contractor moves his rig, and the operator brings in a smaller, less expensive completion rig and crew to finish up the job.

Well Completion: Completion equipment and methods employed are quite varied. The perforated completion is by far the most popular method of completing a well. Perforating is the process of piercing the casing wall, cement, and rock to provide openings through which formation fluids may enter the wellbore. Perforating is accomplished by placing guns holding special explosive charges opposite the zone to be produced. The charges are shaped so that an intense, directional explosion is formed. The well must have a good cement job and well-designed and well-executed perforation methods to get effective formation flow.

Explosives used in perforating guns are very stable. Accidents are rare as long as the people involved use proper procedures. Perforating guns may be run in the well on tubing or by wireline. Firing is accomplished by applying electric current, pressure, or mechanical force to a firing head located on the perforating gun.

The final string of pipe usually run in a producing well is the tubing. Tubing is a string of relatively small diameter pipe through which the hydrocarbons are produced. Tubing sizes vary from less than 2 inches in diameter up to 4½ inches for large volume producers. In a flowing well, its smaller diameter produces more efficient flow than casing. Also, since it is not cemented in the hole, tubing may be removed when it becomes plugged or damaged. Tubing, when used with a packer, keeps well fluids and formation pressures away from the casing. Well fluids and high pressures can damage casing, necessitating costly repairs.

The packer consists of a pipelike device through which well fluids can flow. Rubber sealing elements form a fluid tight seal around the inside of the casing. Gripping elements, called slips, hold the packer in place. Because the packer seals off the space between the tubing and the casing, produced fluids are forced into and up the tubing.

Another device often installed in the tubing string near the surface is a "subsurface safety valve." The valve remains opened, as long a flow is normal. When the valve senses a loss in pressure or significantly increased flow (such as would occur with a flowline break), the valve closes automatically. Subsurface safety valves can prevent uncontrolled well flow in the event of massive surface equipment failure.

Finally, a tubing head is installed at the top of the well to support the tubing. Valves, gauges, and flow control devices are installed on top of the tubing head. Together, they make up what is commonly called a Christmas tree.

When reservoir pressures are not sufficient for the well to flow on its own, operators employ artificial lift methods. The most common by far is rod pumping. A plunger pump is installed deep in the well and connected by rods to a pumping unit on the surface. The pump jack moves the rods up and down to work the downhole pump. Pump jacks are often driven with electric motors or natural gas engines. The gas lift method works by injecting high-pressure gas into the fluid column of a swell to lighten and raise the fluid by expansion of the gas. Instead of pump jacks, there will be a source of high-pressure gas in the field, usually from a gas compressor. The hydraulic pumping method uses a fluid to drive a downhole motor, which in turns drives a pump that pumps the oil to the surface. Surface equipment for hydraulic pumping includes a high-pressure pump and vessels to separate the hydraulic fluid from produced fluid. Yet another type of artificial lift is electric submersible pumping, usually only used on very high-volume wells. An electric motor attached to a pump is installed downhole. Electric current is supplied to the motor through special heavy-duty armored cable. Surface facilities may just be a small transformer/control box.

The well may be stimulated to enhance flow. Stimulation may be performed before or after the completion equipment is installed. Two common types of stimulation are formation acidization and hydraulic fracturing. Stimulation treatments can improve flow to the point where commercial production is achieved in an otherwise uneconomical well.

Formation acidizing is treating the hydrocarbon-bearing rock with large volumes of acid. The most common types of acid used are hydrochloric (HCl) and hydrofluoric (HF). Oilfield acids contain additives to prevent of delay corrosion of the well's tubulars, inhibit sludging and emulsion reactions with oil in the formation, and make the acid easier to pump. The aim in acidizing is to enlarge the pore spaces and passages by dissolving rock, thus enlarging existing flow channels and opening new ones to the wellbore.

Acid is brought to the well location in tanker trucks and pumped using one or more truck-mounted pumps. Spent acid that is flowed back from the well is often kept separate from field production. The spent acid may be put into temporary tanks until it is trucked off to disposal.

In hydraulic fracturing, fluid is pumped into the formation at high enough pressures and rates to split the rock. Proppants are pumped with the fluid to hold the crack open once pumping stops. Sand and sintered bauxite beads are two common propping agents. Fracturing fluid must not only break down the formation, but also extend and transport the proppant into the fracture. The industry has developed a multitude of complex fluid and proppant systems to achieve the best results in the many varied types of reservoirs.

Many truck-mounted pumps and temporary storage tanks are needed on location to fracture-treat wells. Larger well locations may be needed if hydraulic fracturing is part of a completion procedure.

Field Development: If the wildcat well produces oil or gas in commercial quantities, one or more additional wells are normally drilled to confirm the initial finding and further test and define the extent of the oil or gas reserves. Location of the confirmation wells is dependent upon analysis of discovery well data and any existing seismic surveys. Confirmation progresses by drilling one well after another, each dependent on the results of the previous wells.

With more information in hand, facilities can be designed to handle production from the field. Next, development wells are drilled as needed to efficiently drain the reservoir. The procedures for drilling development wells are about the same as for wildcats, except that there may be a variation in the amount and type of subsurface sampling, testing, and evaluation. More detailed seismic work may be performed to aid in the location of development wells.

A state Oil & Gas Commission usually establishes the field well spacing pattern. Typical well spacing may be one well every 640, 320, 160, 80, or 40 acres. Completely filled spacing patterns would translate to 1, 2, 4, 8, or 16 wells per square mile, respectively. In general, oil well spacing is denser than for gas wells, and shallow well spacing is denser than for deeper wells.
Access roads to development wells are usually better planned and constructed than those for wildcat wells because these wells tend to have a longer life. Typically a lease area will have one main route, with side roads to each well or multiwell pad location. Change from temporary to permanent roads does not take place until a well has been established as being capable of production. The amount of roadway required per square mile of field is 4 miles, based upon a spacing pattern of 40 acres and a separate pad for each well.

Directional drilling is sometimes used to concentrate the surface locations of two or more wells in one area. This technique minimizes the amount of surface area (roads and well pads) needed to develop a field. Multiple well pads may be used when developing a field inside the limits of a city or in environmentally sensitive areas.

Other surface equipment and support facilities are brought in or constructed during field development. For example, a battery of storage tanks or a pipeline may be required to handle produced oil or gas. Separation and treatment facilities are required to separate gas and water from oil. Storage tanks are required to hold brines produced during oil extraction, and a proper disposal capability, most typically reinjection, must be developed. Natural gas must be properly disposed of (usually flared) or treated to remove impurities if it is to used or sold.

Well Servicing and Workover Operations: Sometimes it is necessary to repair downhole mechanical problems. Workover rigs are often used to repair downhole equipment or assist in large stimulation jobs. The most common well servicing operation is related to artificial lift installation, tubing string repairs, and work on other downhole completion equipment that may be malfunctioning. More involved workover operations might include cleanout of sand, scale, or paraffin deposits that accumulate in the well, casing repair, cementing, perforating new or existing zones of production, or even some limited drilling operations.

Workover rigs are scaled-down drilling rigs. They are usually equipped to stand the pipe in the derrick, rotate pipe while it is in the hole, and circulate workover fluids down and back up the well. Workover rigs are usually self-contained on a truck. They are highly mobile and can be rigged up and rigged down quickly. A well servicing jog to replace a rod pump may last only 1 or 2 days. A major workover operation to change or "recomplete" to another productive zone may last more than a month.

Well Abandonment and Reclamation: Workover rigs are also used to plug and abandon wells once they are depleted. Plugging operations consist of removing the tubing, packer, and other completion equipment; pumping cement across producing zones; and placing cement plugs at various depths to protect freshwater zones. Finally, a cement plug is set at the surface to cap the well, and wellhead equipment is cut off. A permanent abandonment marker is often placed to identify the well's location.

The surface owner and regulatory agencies often dictate surface reclamation. Reclamation can range from just removing equipment to reclaiming the area to conditions that existed before drilling the well.

Full-scale reclamation can include the following:

- Removal of structures, equipment, and debris used or generated during operations;
- Removal or remediation of contaminated soils;
- Recontouring of disturbed areas to near original grade;
- Spreading and preparation of topsoil;
- Planting of native vegetation, usually grasses, but sometimes also tree saplings;
- Erosion protection measures such as mulching; and
- Monitoring of revegetation and erosion control efforts.

Reclamation may last a few days or a few years, depending on the degree of contamination on the site and the ability of native species to grow.

APPENDIX E

REMAINING OIL AND GAS RESOURCES BENEATH PADRE ISLAND NATIONAL SEASHORE USGS ASSESSMENT METHODOLOGY

Prepared by
C.J. Schenk, R. Charpentier, R. Crovelli, J.W. Schmoker
U.S. Geological Survey
Denver, Colorado

INTRODUCTION

The Energy Team of the USGS was retained by the National Park Service to assess the undiscovered oil and gas resource potential of Padre Island National Seashore. The oil and gas plays of the entire Gulf Coast region were most recently assessed in 1995 (Schenk and Viger, 1996). Padre Island National Seashore lies along the southeastern margin of the Texas Gulf Coast and is within the Western Gulf Province. The oil and gas plays developed in 1995 for the Western Gulf Province formed the basis for this more localized assessment of Padre Island National Seashore.

The first step in the assessment process was to define geologically based plays that were then assessed for undiscovered oil and gas resources. A play is defined as a set of known or postulated oil and (or) gas accumulations sharing similar geologic, geographic, and temporal properties, such as source rock, migration pathway, timing, trapping mechanism, and hydrocarbon type. The geologic formations that may be productive in the future on Padre Island National Seashore include the Oligocene Vicksburg, the Oligocene Frio, the Lower Miocene, and the Middle Miocene. The four plays developed for this assessment reflect this stratigraphy.

Following the geologic development of the plays, the second step involved data allocation and evaluation, which formed the basis of this geologically based field size assessment. Third, the input data from the geologist was entered into each of the quantitative models to calculate undiscovered oil and gas resources for each of the four plays. Finally, in Step 4, the allocations of undiscovered resources to Padre Island National Seashore were made using an analysis of richness factor.

STEP 1. GEOLOGIC PLAY DEFINITION

The oil and gas plays of the 1995 Assessment were developed to assess much larger areas of the Gulf Coast (Schenk and Viger, 1996) than we are interested in for this study. Here, we defined plays with smaller areal size so that the allocation of resources to Padre Island National Seashore was more geologically realistic. For example, in the 1995 Assessment, Padre Island National Seashore was included in a play called the Frio Downdip Gas Play that extended across much of coastal Texas. For this study, only that portion of this larger play south of a geologic feature called the Rio Grande Embayment was assessed, a play we herein call the Frio Rio Grande Embayment Gas Play.

The four plays developed for this study are the Vicksburg Rio Grande Embayment Play, Frio Rio Grande Embayment Gas Play, Lower Miocene Gas Play, and the Middle Miocene Rio Grande Embayment Gas Play. Each of these plays was defined geologically.

Vicksburg Rio Grande Embayment Downdip Gas

General Description

The Vicksburg Rio Grande Embayment Downdip Gas Play is bounded to the west by the Vicksburg fault zone, to the north by the San Marcos Arch, to the south by the Mexican border, and to the east by the extension of the play to depths of 25,000 feet. The play is part of a larger one defined as a downdip Vicksburg gas play (4731) for the U.S. National Oil and Gas Assessment (Schenk and Viger, 1996). Padre Island National Seashore is entirely confined within this play. The area of the play is 34,307 square kilometers, and Padre Island represents 1.5% of the play, or 524 square kilometers.

The Vicksburg is a clastic wedge that prograded across southern Texas in Early Oligocene time, and is generally bounded by the benthic foram zones *Cibicides mississippiensis* and *Textularina warreni*. The Vicksburg fault zone is a major zone of shelf edge growth faulting that developed during Vicksburg time, and had a significant impact on the distribution of reservoir and non-reservoir facies of the Vicksburg.

The Vicksburg Formation is a prolific oil and gas producer in the state of Texas, with more than 250 fields discovered to date (Coleman and Galloway, 1990). The potential for additional discoveries in the Vicksburg depends upon the area of interest or play. For example, the deep gas trends are the most likely plays for additional discoveries in the future compared to the updip fluvial and deltaic Vicksburg reservoirs (Schenk and Viger, 1996).

Reservoirs and Reservoir Quality

Most of the published information on reservoirs in the Vicksburg Formation is from the producing areas updip from the area of concern in this play. Most updip reservoirs in this play are in shelf-edge deltas, strand-plain, or barrier sandstones (Coleman and Galloway, 1990). Reservoirs of the Vicksburg Formation that are considered to be most likely for the undiscovered resources in this play and in the area of Padre Island National Seashore are slope-channel and fan sandstones, rather than deltaic, nearshore marine or shelf sandstones that are productive in updip Vicksburg fields, as the Vicksburg paleoshelf edge was located west of present-day Padre Island. Potential reservoirs may include slope-channel sandstones, levee sandstones, and fan sandstones.

Sandstones of the Vicksburg Formation have undergone a complex diagenetic history that has a significant impact on sandstone reservoir quality (Richmann and others, 1980; Taylor and Al-Shaieb, 1986; Humphrey, 1986). Vicksburg sandstones are predominantly lithic arenites, with the lithic fraction composed mainly of volcanic rock fragments. These grains are chemically and mechanically labile, and are an important aspect of diagenesis. Early diagenesis began with pervasive calcite cementation, clay rims around detrital grains, and quartz and feldspar overgrowths. At depth, dissolution of volcanic rock fragments, calcite cement, and feldspars led to the formation of secondary porosity, possible due to fluids preceding hydrocarbon migration. Secondary porosity in proximal Vicksburg sandstones ranges up to 15%. Porosity in sandstones of the undiscovered fields may be lower, as the sandstones may be finer grained in general, and may not have the good development of secondary porosity. The deeper Vicksburg reservoirs in this play may be overpressured.

Source Rocks

Source rocks for the hydrocarbons in the Vicksburg are not know for certain, but analyses of the underlying Jackson Group shales indicate that these shales may have sourced some of the oil and gas in the Vicksburg (Tanner and Fuex, 1990). For the area of Padre Island National Seashore, the predominant hydrocarbon is gas rather than oil, given the depths involved in the play, the thermal history, and the production to date.

Traps and Seals

The Vicksburg section is cut by several major growth faults, leading to complex structures throughout the Vicksburg and overlying sections. The growth faults range from the Vicksburg fault zone eastward through the Frio and Miocene growth fault zones. The structures associated with growth faults and salt movement form the structures that are the traps in this play. Structures include faulted rollover anticlines, anticlines, and complexly faulted growth structures. The seals for this play are the marine mudstones that encase the fan sandstones, or encase the slope channel sandstones, or may be from the juxtaposition of mudstones against sandstones along faults.

Exploration

Exploration in the Vicksburg has focused on the updip area of this play, and few wells have been drilled to test the downdip portion of the play that is of most interest in this study. The potential for hydrocarbons in the downdip area is considered good, as significant gas discoveries in the Vicksburg are being made today just to the north of this play in the vicinity of Galveston Bay (Petlet, 1997).

Frio Rio Grande Embayment Downdip Gas

General Description

The Frio Rio Grande Embayment Downdip Gas Play is bounded to the west by the Frio fault zone, to the north by the San Marcos Arch, to the south by the Mexican border, and to the east by depths to 25 to 30,000 feet. The Frio Formation comprises at least three depositional sequences, and are called the lower, middle and upper Frio sequences (Theis and others, 1993). For this assessment, the Anahuac depositional sequence is included with the Frio. Thus, this assessment covers the section between *Texularia warreni* and *Discorbis restricted.* The area of the Frio play is 28,960 square kilometers, and Padre Island represents 1.8% of the play, or 524 square kilometers.

The Frio Formation is one of the most prolific hydrocarbon producing stratigraphic intervals in Texas. Renewed interest in the Frio is evident in significant exploration in this play in the area of Galveston Bay, where deep gas discoveries are being made in the Frio and Vicksburg (Petlet, 1997). This play forms part of Play 4732 of Schenk and Viger (1996), and Play 1 of Galloway, Hobday, and Magara (1982).

Reservoirs and Reservoir Quality

The Frio Formation in the play area represents the distal portion of the Frio, which includes shelf sandstones, slope-channel sandstones, and fan sandstones with all associated subenvironments. The paleoshelf edge for the upper Frio is located just off the present-day shoreline (Galloway and others, 1982). The types of reservoirs hold significant potential, as this downdip area has not been explored as heavily as the updip area of the Frio.

Reservoir quality is similar to the deep Vicksburg (Loucks, Bebout, and Galloway, 1977; Bebout, Loucks, and Gregory, 1978). Frio sandstones are lithic and feldspathic arenites, with early cementation by calcite, followed by cementation by clays, quartz, feldspar, and sparry calcite. Important to the evolution of porosity was the dissolution of calcite, feldspars, and volcanic rock fragments at depth, which led to secondary porosity. This type of porosity is best developed in coarser grained facies, which would be channel sands in the deeper water deposits. Finer grained turbidites may have significantly less secondary porosity due to the finer grain size. Following secondary porosity development, cementation by kaolinite and iron-bearing carbonates was locally important. Porosity of deeper Frio sandstones may range to 18 percent (Bebout, Loucks, and Gregory, 1978). The deeper Frio and Anahuac reservoirs in this play may be overpressured.

Source Rocks

The source rocks for the Frio hydrocarbons, like those for all Tertiary rocks in the Gulf Coast, are not known for certain. Frio mudstones have reached the stage of generative maturity for hydrocarbons, but the low organic carbon contents, around 0.3 weight percent, indicate that Frio mudstones may not have been a significant source. Most studies of the Frio suggest that hydrocarbons were generated in mudstones at some depth below the Frio section and migrated up or along faults to Frio reservoirs (Galloway and other, 1982).

Traps and Seals

The Frio Formation has undergone the same types of structural deformation as the Vicksburg, mainly in the development of extensive listric fault zones. Associated with these fault zones are structures such as anticlines, faulted anticlines, roll-over structures, and complexly faulted structures along the growth faults. Seals are mainly mudstones of the Frio and Anahuac that enclose sandstones, or seals are mudstones juxtaposed with sandstones along the faults.

Exploration

The Frio play is the most likely for additional gas discoveries in the Padre Island area. If the current trend of 3-D seismic based exploration continues south along the coast, then additional Frio discoveries are likely.

Lower Miocene Rio Grande Embayment Gas Play

General Description

The Lower Miocene Rio Grande Embayment Gas Play is bounded to the north by the San Marcos Arch, to the south by the Mexican border, to the west by the Vicksburg Fault Zone, and to the east by the boundary with the Lower Miocene Slope-Fan Gas Play. The Lower Miocene interval for this study in bounded by the forams *Crisellaria R* and *Discorbis B* zones. This interval corresponds in general to the Oakville and Lagarto formations in coastal Texas. This play approximates play MC-1 in the Texas Gas Atlas (Kosters and others, 1989). The area of the Lower Miocene play is 26,717 square kilometers, and Padre Island National Seashore represents 1.96%, or 524 square kilometers of the play.

The Lower Miocene is a significant oil and gas producer in this play, with several large gas reservoirs discovered to date. The remaining fields, however, may be small.

Reservoirs and Reservoir Quality

Sandstone reservoirs in this play range from deltaic, strandplain and shelf sandstones, with depths to undiscovered reservoirs in the Padre Island area in the range of 5000 to 8000 feet.

Reservoir quality in Lower Miocene sandstones generally is good, with porosity ranging up to 30%, and permeability ranging up to 5000 md. The diagenetic history of Miocene sandstones is similar to that of the Oligocene Vicksburg and Frio sandstones (Flournoy and Ferrell, 1980). The sands began as lithic arenites and lithic arkoses, with the lithic fraction dominated by feldspar and volcanic rock fragments. Early cementation by calcite, and quartz decreased primary porosity, but compaction was not as important as in the Oligocene sandstones. At depth, dissolution of lithic grains, feldspars, and calcite cement led to the formation of secondary porosity, which gives the reservoirs the present quality. Secondary porosity can range up to 30%, and permeabilities can range to 2500 md. Late cementation by kaolinite and iron-bearing carbonates led to a decrease in secondary porosity. As in the Oligocene sandstones, coarser grained sandstones will exhibit better development of secondary porosity than finer grained sandstones.

Source Rocks

The source rocks for the Lower Miocene hydrocarbons are not known for certain, but, like the source for the Frio, is generally thought to be from organic-bearing mudstones beneath the Miocene section, and migration has occurred up and along faults to source the Lower Miocene sandstone reservoirs. Galloway and others (1986) considered the Frio and /or the Anahuac mudstones as potential source rocks for this play.

Traps and Seals

Traps in the Lower Miocene Play include growth-fault-related structures, such as anticlines, faulted anticlines, and rollovers. Other structural traps include salt structures and shale ridges. Seals in this play are provided by mudstones of the Lower Miocene, by the juxtaposition of mudstones and sandstones along faults, and by the margins of salt structures. The traps are associated with the Vicksburg-Frio growth fault zones and deep-seated salt structures. The main limitation to the effectiveness of this play is seal quality (Galloway and others, 1986), although the *Amphistegina B* transgressive mudstones form a seal for several reservoirs in this play.

Exploration

The potential for additional Lower Miocene gas reservoirs to be discovered in the Padre area is good, but not as good as the Frio. The potential exists for Lower Miocene reservoirs to be located on the same structures as Frio reservoirs.

Middle Miocene Rio Grande Embayment Gas Play

General Description

The Middle Miocene Rio Grande Embayment Gas Play is bounded to the west by the Vicksburg Fault Zone, to the north by the San Marcos Arch, to the south by the Mexican border, and to the east by the Middle Miocene Shelf-Slope Gas Play. The Middle Miocene interval for this report is bounded by the *Robulus L* and *Textularia W* zones. This interval corresponds in general to the Goliad Formation of coastal Texas. The area of the play is 39,680 square kilometers, and Padre Island National Seashore represents 1.3%, or 524 square kilometers of the play.

Reservoirs and Reservoir Quality

Sandstone reservoirs in this play include fluvial, coastal plain, deltaic, strandplain and shelf reservoirs. In the area of Padre Island, the reservoirs are mainly of strandplain and shelf origin.

Reservoir quality in Middle Miocene reservoirs generally is good, with porosity ranging up to 32%, with permeability ranging to 5000 md. The diagenetic history of Miocene sandstones is similar to that of the Oligocene Vicksburg and Frio sandstones (Flournoy and Ferrell, 1980). The sands began as lithic arenites, with the lithic fraction dominated by feldspar and volcanic rock fragments. Early cementation by calcite, and quartz decreased primary porosity, but compaction was not as important as in the Oligocene sandstones. At depth, dissolution of lithic grains, feldspars, and calcite cement led to the formation of secondary porosity, which gives the reservoirs the present quality. Late cementation by kaolinite and iron-bearing carbonates led to a decrease in secondary porosity. As in the Oligocene sandstones, coarser grained sandstones will exhibit better development of secondary porosity than finer grained sandstones.

Source Rocks

The source rocks for the Middle Miocene hydrocarbons are not known for certain, but, like the source for the Frio and Lower Miocene is generally thought to be from organic-bearing mudstones beneath the Miocene section, and migration has occurred up and along faults to source the Middle Miocene sandstone reservoirs.

Traps and Seals

Traps in the Middle Miocene play are similar to those of the Lower Miocene, and are largely related to growth faults, shale ridges, and salt structures. Traps include anticlines, faulted anticlines, complexly faulted sections above shale ridges, and salt structures. Seals include mudstones of the Middle Miocene, as the mudstones may enclose the sandstones, be juxtaposed along faults with sandstones, and also can be the margins of shale or salt structures, although seals may be a problem given the low number of accumulations discovered in this play to date.

Exploration

The potential for additional Middle Miocene reservoirs to be found in the Padre Island area is considered to be low, given the level of exploration and the problems with potential seals.

STEP 2. OIL AND GAS DATA ALLOCATION AND EVALUATION

Once the plays were defined geologically, the next step was to organize and allocate all of the pertinent oil and gas information to each play using digital techniques.

Data Retrieval, Play Allocations, and Field size

The oil and gas field data for both the onshore and offshore areas of the Western Gulf were initially retrieved from the Nehring Significant Oil and Gas Field File, a commercially available database. Oil and gas wells were retrieved from the Petroleum Information Well History Control One-Line File, another commercially available database. The oil and gas fields and wells within the play boundaries were allocated digitally to each play by producing formation, which were the Vicksburg, Frio, Lower Miocene, and Middle Miocene. This digital allocation of fields and wells was done using Arc/Info.

One of the basic tenets of assessments such as this that used a geologically based field size analysis approach is that estimates must be available for discovered field sizes. Field size is the sum of 1) oil and gas production, 2) calculated reserves, and 3) an estimate of field growth. The production and reserves data are provided in the Nehring Significant Oil and Gas Field database, but we must estimate the amount of field growth that may occur in each field over the next 30 years.

Field growth is a long-acknowledged phenomenon within oil and gas fields. Basically, the size of a field grows with time, compared with a field's first reported size, for several reasons. We must estimate, for the fields in each play, the grown size of each field before we construct and begin to examine historical data plots for each play. For the fields in the four Padre Island plays, we used a growth function that was developed for onshore Gulf Coast gas fields by Root (1996) for the 1995 National Assessment. All of the historical data plots were constructed using grown field sizes.

Historical Data Plots

Once the grown fields were assigned to each play, then a series of historical data plots were constructed that were used as guides to develop the distributions of sizes and numbers of undiscovered accumulations. The data plots included numbers of accumulations discovered vs time, numbers of fields vs field size, field size vs time, field size vs numbers of exploration wells, numbers of fields vs exploration wells, and a series of plots with such parameters as API gravity, gas/oil ratio, and reservoir depth. These plots are used in conjunction with the play geology and predictions as to future trends, technologies, and new exploration concepts to estimate a distribution of undiscovered field size and number for each play. Ancillary data, such as gas-oil ratios and natural gas liquid to gas ratios, were included so we could calculate co-products such as natural-gas liquids.

Field Size and Numbers Analysis

Determining the distributions of sizes and numbers of undiscovered gas accumulations for each play forms the core of the assessment. Given all the historical exploration and production data, and predictions as to future exploration and development and applications of new technology, estimates are made of the minimum, median, and maximum numbers of gas accumulations remaining to be discovered in each play. Likewise, estimates were made of the minimum, median, and maximum sizes of gas accumulations remaining in each play.

Following the estimates made by the assessor, a review meeting washeld where the estimates of undiscovered sizes and numbers were defended on a geologic basis. Changes suggested during this review process were incorporated into the final distributions that were sent forward to the modelers.

Data Form

The data form used in this assessment is similar to the one used for the U.S. National Assessment. Key input parameters include minimum size of field to be assessed, the risk structure for charge, reservoir, and timing, distributions of sizes and numbers of undiscovered accumulations, and input for co-product calculations. The form was completed for each play, and the same input data was provided to each model.

STEP 3. QUANTITATIVE METHODS FOR RESOURCE CALCULATIONS

The input data was entered into two models, an Adapfve Fractile model and a Monte Carlo model. Each model produced an estimate for undiscovered gas and condensate resource in each play using identical input data. The initial estimates of undiscovered resources are for the entire play area, not just for the area of Padre Island National Seashore.

Adaptive Fractile Method

The Adaptive Fractile Distribution is an adaptive probability distribution in terms of seven fractiles (F100, F95, F75, F50, F25, F5, and F0) for a random variable of interest, for example, the number of undiscovered fields. Typically, the fractile F95 denotes the value of the random variable such that the probability of at least F95 is 0.95. The seven fractiles sufficiently describe the probability distribution for modeling purposes. Suppose we are given the estimates for the following three fractiles; the median (F50), a center parameter; the minimum (F100) and maximum (F0), which are spread parameters. The Adaptive Fractile Distribution consists of a mathematical algorithm involving proportions for calculating the four intermediate fractiles (F95, F75, F25, and F5) which are shape parameters. The Adaptive Fractile Distribution can be adapted to have any shape. Two important scenarios of the Adaptive Fractile Distribution are 1) specified shape when no data are available, and 2) same shape as empirical distributions from data.

Monte Carlo Method

Calculations of undiscovered resources were made using a USGS program based on Microsoft Excel and Crystal Ball, a commercial Monte Carlo simulation program that works within Excel. On each iteration of the simulation, a sample from the field size distribution gave the number of undiscovered fields in the play. That many independent samples from the field size distribution were taken and summed. Amounts of natural gas liquids and geographic allocations were calculated by multiplication of appropriate factors. This was then redone for a total of ten thousand iterations, giving relatively smooth output distributions.

For each of the four plays two Monte Carlo simulations of ten thousand iterations each were conducted. The first simulation used lognormal or (for symmetrical distributions) normal distributions fit to the input parameters. The second simulation used adaptive fractile distributions fit to the input parameters.

STEP 4. ALLOCATION OF UNDISCOVERED RESOURCES TO PAIS

To allocate undiscovered resources to Padre Island National Seashore, we used a method called richness factor analysis (Crovelli, 1983). The essence of this approach is to determine the degree to which undiscovered resources can be reasonably assigned to a parcel of land such as Padre Island, given the percentage of land Padre Island occupies within the play, the position of Padre within the play area, and the petroleum geology of the play. For example, Padre Island occupies 1.8% of the Frio Rio Grande Embayment Play area, thus if undiscovered resources were evenly distributed, Padre would contain 1.8% of the resources of the Frio Play. However, with respect to the Frio play, Padre Island is nicely situated for additional Frio gas discoveries, greater than the 1.8% land area would suggest. This type of analysis was completed for each play, resulting in the allocation of undiscovered resources, including conventional gas and condensate, to Padre Island National Seashore.

Assessment Results

Results of the allocation of conventional gas resources and condensate by richness factor are given in Table 1. The results of each method are shown; the Adaptive Fractile method, the Monte Carlo method using adaptive fractile distributions, and the Monte Carlo method using log-normal distributions. The results illustrate the similarities when the adaptive fractile distributions are used, but also the differences where log-normal distributions are used. The Monte Carlo method with log-normal model produced slightly less undiscovered resource for each play. The results show that approximately 65-80 bcf (10-13 mmboe) of conventional gas and 1.5 to 1.7 mmb of condensate are expected to be discovered on Padre Island National Seashore.

Table 1. Padre Island National Seashore Assessment Results

	Adaptive Fractile Mean (bcfg)	Monte Carlo AF Mean (bcfg)	Monte Carlo LN Mean (bcfg)
Vicksburg	11	11	9.3
Frio	38	38	32
Lower Miocene	25	25	20
Middle Miocene	4	4	4
MEAN GAS TOTAL	78	78	65.3

	Adaptive Fractile Mean (mmbngl)	Monte Carlo AF Mean (mmbngl)	Monte Carlo LN Mean (mmbngl)
Vicksburg	.3	.3	.3
Frio	1.05	1.06	.9
Lower Miocene	.3	.3	.25
Middle Miocene	.04	.04	.04
MEAN NGL TOTAL	1.7	1.7	1.5

References Cited

Al-Ghamdi, A.M., and Watkins, J.S., 1996, Structural styles and depositional history of North and South Padre Island OCS areas, offshore South Texas, in Jones, J.O., and Freed, R.L., eds., Structural Framework of the Northern Gulf of Mexico: Gulf Coast Association of Geological Societies Special Publication, p. 1-8.

Bebout, D.G., Loucks, R.G., and Gregory, A.R., 1978, Frio sandstone reservoirs in the deep subsurface along the Texas Gulf Coast: their potential for production of geopressured geothermal energy: Texas Bureau of Economic Geology, Report of investigations No. 91, 93 p.

Coleman, J., and Galloway, W.E., 1990, Petroleum geology of the Vicksburg Formation, Texas: Transactions of the Gulf Coast Association of Geological Societies, v. 40, p. 119-130.

Crovelli, R., 1983, Probabilistic methodology for petroleum resource appraisal of wilderness lands, in Miller, B.M., ed., Petroleum potential of wilderness lands in the western United States: U.S. Geological Survey Circular 902, Chapter O, p. 01-05.

Flournoy, L.A., and Ferrell, R.E., Jr., 1980, Geopressure and diagenetic modifications of porosity in the Lirette field area, Terrebonne Parish, Louisiana: Transactions of the Gulf Coast Association of Geological Societies, v. 30, p. 341-345.

Galloway, W.E., Jirik, L.A., Morton, R.A., and DuBar, J.R., 1986, Lower Miocene (Fleming) depositional episode of the Texas coastal plain and continental shelf: structural framework, facies, and hydrocarbon resources: Texas Bureau of Economic Geology, Report of Investigations No. 150, 50p.

Humphrey, J., 1986, Depositional environments and diagenesis of the Oligocene Vicksburg Formation in Lyda and North Rincon fields, Starr County, Texas: Transactions of the Gulf Coast Association of Geological Societies, v. 36, p. 171-179.

Jiang, M.M., 1993, Miocene sequence biostratigraphy of the Northern Gulf of Mexico: Transactions of the Gulf Coast Association of Geological Societies, v.

Kosters, E.C., Bebout, D.G., Seni, S.J., Garrett, C.M., Brown, L.F., Hamlin, H.S., Dutton, S.P., Ruppel, S.P., Finley, R.J., and Tyler, N., 1989, Atlas of Major Texas Gas Reservoirs: Gas Research Institute, 161 p.

Loucks, R.G., Bebout, D.G., and Galloway, W.E., 1977, Relationship of porosity formation and preservation to sandstone consolidation history- Gulf Coast Lower Tertiary Frio Formation: Transactions of the Gulf Coast Association of Geological Societies, v. 27, p 109-120.

Morton, R.A., Jirik, L.A., and Galloway, W.E., 1988, Middle-Upper Miocene depositional sequences of the Texas coastal plain and continental shelf; geologic framework, sedimentary facies, and hydrocarbon plays: Texas Bureau of Economic Geology, Report of Investigations No. 174, 40p.

Petzet, G.A., 1997, Vicksburg, Frio successes lift Galveston Bay area prospects: Oil and Gas Journal, v. 95, no. 32, p. 75-77.

Richmann, D.L., Milliken, K.K., Loucks, R.G., and Dodge, M.M., 1980, Mineralogy, diagenesis, and porosity in Vicksburg sandstones, McCallen Ranch field, Hidalgo County, Texas: Transactions of the Gulf Coast Association of Geological Societies, v. 30, p. 473-482.

Root, D., 1996, in Gautier, D.L., Dolton, G.L., Takahashi, K.I., and Varnes, K.L., eds., 1995 National Assessment of United States Oil and Gas Resources- results, methodology, and supporting data: U.S. Geological Survey Digital Data Series DDS-30, Release 2, 1 CD-ROM.

Schenk, C.J., and Viger, R.J., 1996, Western Gulf Province, in Gautier, D.L., Dolton, G.L., Takahashi, K.I., and Varnes, K.L., eds., 1995 National Assessment of United States Oil and Gas Resources- results, methodology, and supporting data: U.S. Geological Survey Digital Data Series DDS-30, Release 2, 1 CD-ROM.

Tanner, J.A., and Fuex, A.N., 1990, Chemical and isotopic evidence of the origin of hydrocarbons and source potential of rocks from the Vicksburg and Jackson formations of Slick Ranch area, Starr County, Texas, in Schumacher, D. and Perkins, B.F., eds., Gulf Coast Oils and Gases; their characteristics, origin, distribution, and exploration and production significance: Proceedings of the Ninth Annual Research Conference, SEPM Foundation, p. 79-97.

Taylor, D.A., and Al-Shaieb, Z., 1986, Oligocene Vicksburg sandstones of the Tijerina-Canales-Blucher field: a south Texas geologic jambalaya: Transactions of the Gulf Coast Association of Geological Societies, v. 36, p. 315-339.

Thies, K.J., Bowen, B.E., Rosen, R.N., Shaffer, B.L., and Adamick, J.A., 1993, Sequence stratigraphy of the Upper and Middle Frio, Orange County, Texas: Transactions of the Gulf Coast Association of Geological Societies, v. 43, p. 413-419.

APPENDIX F

GUIDELINE FOR THE DETECTION AND QUANTIFICATION OF CONTAMINATION AT OIL AND GAS OPERATIONS

September, 1999

Water Resources Division
National Park Service
Fort Collins, Colorado

I. WHAT IS THE PURPOSE OF THIS DOCUMENT?

This document is to be used as a guideline for collecting samples at sites within National Park Service (NPS) units where there are oil or gas operations. Samples will indicate whether or not contamination exists at the site as a result of an operation.

It is important that specific contaminants are tested for and that specific methodology is used so that contamination is accurately defined and so that results taken at different times by different people at the same site can be reliably compared. This guideline presents methodology for analyzing soil, sediment, groundwater, and surface water.

Specifically, guidelines are presented for: 1) when owner/operators must collect samples, 2) what contaminants to test for, 3) how to collect samples, 4) quality assurance/quality control, 5) how to analyze samples in the laboratory, 6) required detection limits and choosing environmental benchmarks, and 7) sample plan and reporting requirements.

Note that in this guideline “Superintendent” refers to the Superintendent and/or members of his/her staff who will represent him/her on these issues. In many cases, the Superintendent's actual involvement may be only that of approving the recommendations of the staff member(s).

II. WHEN AND WHERE TO COLLECT SAMPLES

The Superintendent can require sampling at a site if it has recently experienced a release, has a history of releases, or the facility is operated in a manner that poses a risk of releasing crude oil, natural gas condensates, produced water, or any other “contaminating substance” associated with an oil or gas operation.

Sampling can occur at any time during or after an operation. (“After” refers to when an owner/operator sells the operation, transfers its leasing rights, or closes the operation and abandons the site.)

Sampling will be biased, not random, focussing on areas where contamination is obvious (visible) or suspected (such as near production or storage facilities). The exact sample locations and number of samples collected are site-specific and will be determined by the Superintendent, not by the owner/operator. Owner/operators are responsible for sample collection, sample analyses, and reporting of results, not NPS.

Sample data from a nearby (but off-site) “clean” location will be needed to determine “background” concentrations at the site for the contaminants of concern. A comparison of the contaminated site data with “background” data will allow resource managers to determine how contaminated the site is. If the site has been remediated, comparisons of sample data with “background” data can indicate if the clean-up met the Superintendent’s remediation goals for the site.

Note that incoming owner/operators at new or existing oil or gas operations may wish to test the site for contamination before they begin operations. If they choose to do so, it is strongly suggested they test for the contaminants and use the methodology given in this guideline so that if samples are required during or after the operation for any reason, all data can be reliably compared.

III. WHAT CONTAMINANTS TO TEST FOR

Contaminating substances that can be found at oil and gas sites are primarily crude oil, natural gas condensate, produced water, drilling mud, lube (motor) oil, and solvents. The individual contaminants found in these substances are listed in Table 1. Though other contaminants also are found in these substances, those in Table 1 were chosen because of their greater environmental toxicity and because they are good indicators of the presence of the contaminating substance(s) of interest.

When contamination of a site by one of these six contaminating substances is being investigated, sampling and analyses for some or all of the individual contaminants found in that contaminating substance should occur. Two lists of contaminants were compiled and are designated as “Tier I” (the smaller group, indicated by “xx” in Table 1) and “Tier II” (the more comprehensive group, indicated by both “xx” and “x”). Having two tiers to choose from allows the Superintendent flexibility in what contaminants he/she requires that the operator test for. The Tier I contaminants are included in the Tier II contaminants and therefore will always be tested for.

Tier I sampling should be conducted when basic information is needed. For instance, if contamination at a site is suspected but not known, testing for Tier I contaminants will confirm this; it will also give an idea of the severity of contamination. Tier I sampling might also be conducted where Park natural resources (like groundwater, vegetation, or surface water) are at low/no risk.

Table 1: Contaminants to test for when investigating various types of contamination at oil and gas sites. Contaminants that should be tested for during Tier I sampling are indicated by "xx", while those with either an "x" or "xx" should be tested for during Tier II sampling.

contaminant	where found: soil/sediment = S groundwater/ surfacewater = W	Contaminating substances individual contaminants are associated with: crude oil	condensate [j]	produced water	drilling mud	lube (motor) oil	solvents [k]
PAHs [a]	S, W	x	x	x	x	x	x
TPH [b]	S, W	xx	xx	x	x	xx	xx
BTEX [c]	S, W	x	xx	x	x	x	xx
metals [d]							
arsenic	S, W	x		x	x	x	
barium	S, W	x		xx	xx	x	
cadmium	S, W	x		x	x		
chromium	S, W	x		x	xx	x	
copper	S, W	x		x	x	x	
iron	S, W		x				
lead	S, W	x		x	x	xx	
magnesium	S, W	x		x	x	x	
mercury [e]	S, W	x		x	x		
nickel	S, W	xx		x		x	
selenium	S, W	x			x		
strontium	S, W	x		xx			
vanadium	S, W	xx		x	x		
zinc	S, W	x		xx	x	xx	
ammonia [f]	W	x		x			
calcium	W			x	x	x	
chloride	S			xx			
potassium	W	x		x	x		
sodium	W			x	x	x	
sulfates	W			x			
gross alpha emissions [g]	W			x			
radium-226 [g]	S			x			
pentachlorophenol	S, W				x		
surfactants	S, W				x		
pH	S, W	x	x	x	x		
conductivity	S, W		x	xx	x		
salinity	W			xx	x		
TDS	W			x	x		
grain size	S	x	x	x	xx	x	
total organic carbon	S	x	x	x	x	x	x
percent moisture [h]	S	xx	xx	xx	xx	xx	xx
static water level [i]	W	xx	xx	xx	xx	xx	xx
temperature	W	xx	xx	xx	xx	xx	xx

a = Polycyclic Aromatic Hydrocarbons. The lab analysis required in this guideline detects approximately 38 individual compounds including the priority pollutant "parent" compounds and their alkylated homologs. See Table 2 for a full list of these. Note that these 38 compounds are measured with a single analytical test (i.e. there is not a separate test for each compound). When testing water forPAHs, do for groundwater only unless ongoing surface water contamination from adjacent contaminated soil, sediment, or aquifer is suspected.

b = Total Petroleum Hydrocarbons. Certain "ranges" of hydrocarbons should be analyzed for, depending on the contaminating substance. For crude oil, a "full range" or "wide range" TPH scan should be conducted; for natural gas condensate a "lighter end" TPH scan, like for "gasoline range organics" (GRO), should be conducted; and for diesel fuel a TPH scan for "diesel rangeorganics" (DRO) should be conducted. See section VI.A for details.

c = Benzene, Toluene, Ethylbenzene, Xylene. Sediment and surface water typically not tested for these unless ongoing contamination from adjacent contaminated media (soil, sediment, or groundwater) is suspected.

d = analyze all metals for the "total recoverable" fraction

e = analyze soil (or sediment) for mercury only if mercury manometers are suspected to have been used on-site in the past (natural gas operations only)

f = report both the "total" and "unionized" fractions

g = analyze for this only if naturally occurring radioactive materials (NORM) are suspected to occur in the oil- or gas-bearing strata in this region. Note that if gross alpha in water exceeds a certain level, further testing for radioactive elements may be required. Radium-226 analyses must use gamma spectroscopy; this test takes approx. 30 days.

h = percent moisture is necessary to calculate the required dry weight and wet weight units

i = for groundwater only

j = can be from a gas production facility or a gas pipeline

k = various solvents can be used on-site (e.g. benzene, toluene, ethylbenzene, xylene, various petroleum products, etc.). Analyte tested for depends on the particular solvent used on-site.

Table 2: Polycyclic aromatic hydrocarbons (PAHs) detected by the recommended "expanded scan" analysis for PAHs (see section VI.A). These compounds include the so-called priority pollutant "parent" compounds plus their alkylated homologs. Note that the 38 compounds below are measured with a single analytical test (that is, there is not a separate analytical test for each compound).

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Benzo(e)pyrene
Benzo(a)pyrene
Biphenyl
Chrysene
Chrysene, C1-
Chrysene, C2-
Chrysene, C3-
Chrysene, C4-
Dibenzo(a,h)anthracene
Dibenzothiophene
Dibenzothiophene, C1-
Dibenzothiophene, C2-
Dibenzothiophene, C3-
Fluoranthene
Fluoranthenes/Pyrenes, C1-
Fluorene
Fluorene, C1-
Fluorene, C2-
Fluorene, C3-
Ideno(1,2,3,c,d)pyrene
Naphthalene
Naphthalene, C1-
Naphthalene, C2-
Naphthalene, C3-
Naphthalene, C4-
Perylene
Phenanthrene
Phenanthrenes/Anthracenes, C1-
Phenanthrenes/Anthracenes, C2-
Phenanthrenes/Anthracenes, C3-
Phenanthrenes/Anthracenes, C4-

Tier II sampling should be conducted when more detailed information is needed. For instance, if clean-up activities at a site have been completed, testing for Tier II contaminants will confirm if all (or nearly all) the contaminants have, in fact, been removed. Tier II sampling might also be conducted at sites where important Park natural resources are at a higher risk of being exposed to contaminants and impacted.

The Superintendent will determine whether Tier I or II is needed. Some combination of the two may also be used. He/she may also choose to omit or add contaminants to the Tier I or II lists should the situation warrant it.

Note that Table 1 does not include all possible contaminants associated with oil or gas operations. Other contaminating substances involved are: caustic solutions used in natural gas sweetening (these can contain sodium, pH, amines, and EDTA contaminants); glycols used in natural gas dehydration; and surfactants, acidizing agents, corrosion inhibitors, solvents, biocides, etc. used in oil or gas well workover and completion. The Superintendent may require that contaminants associated with these substances be tested for if they are suspected of having been released on-site.

IV. HOW TO COLLECT SAMPLES

A. Sample Locations

1. Soil

Background samples should be collected from an area as close to the site as possible where it is certain no contaminating substances from the site could have reached (from surface runoff, off-site dumping, migration from wind, etc.).

For soils that are known to be contaminated, samples should be collected from the spot and depth where contamination appears to be highest. For sites where soils are suspected of being contaminated, seek out areas near production facilities, storage tanks, valves, etc., and adjacent low points in the topography where contaminated runoff may have passed over or “puddled up” and concentrated. Collect sample at a depth where contamination would be highest: in most cases probably the top one to two inches. Note that releases in very porous (e.g. sandy) soil may percolate down and concentrate in deeper, less porous soil layers.

For sites where removal of contaminated soils has already occurred, sample should be collected in the top inch or so of the newly exposed soil to insure that all the contaminants that percolated down into the soil were, in fact, removed.

All samples will be grab samples. (As a rule, composite samples should not be collected.) Where contamination is suspected but not known, the sampling device probably should be some type of tube or auger in order to capture equal amounts of soil over the depth of the profile; depending on the properties of the soil (like how hard or rocky it is), however, other devices (like a trowel) may work better. Sample collectors may have to communicate with the laboratory to ensure that enough soil is collected for the various analyses.

For BTEX samples, see section B.1. below.

The total number of samples to be collected will be site-specific and determined by the Superintendent. Enough samples should be collected and analyzed to meet the Tier I or Tier II sampling objective (see section III).

2. Sediment

Background samples should be collected from sediment adjacent to the sediments in question, but where it is reasonably certain no contaminating substances from the site (or other sites in the area) could have reached (from surface runoff, off-site dumping, etc.).

As with soils, sediments known to be contaminated should be sampled from the spot and depth where contamination appears to be highest. For sediments suspected of being contaminated, seek out areas near production facilities, storage tanks, valves, etc., and adjacent areas where potentially contaminated sediment in runoff could have settled out. Sample the sediment that has accumulated since the spill/release began. In some cases this may be the top ¼ inch, in others it may be the top several inches.

For sites where removal of contaminated sediments has already occurred, samples should be collected in the newly exposed sediment to insure that all contaminants were, in fact, removed.

All samples will be grab samples. (As a rule, composite samples should not be collected.) Where contamination is suspected but not known, or the layer of contaminated sediment is more than a couple inches thick, the sampling device probably should be some type of tube or auger in order to capture equal amounts of sediment over the depth of the profile; depending on the properties of the sediment (like how rocky it is) and the depth of the water, however, other devices may work better. Sample collectors may have to communicate with the laboratory to ensure that enough sediment is collected for the various analyses.

The total number of samples to be collected will be site-specific and determined by the Superintendent. Enough samples should be collected and analyzed to meet the Tier I or Tier II sampling objective (see section III).

3. Groundwater

Groundwater samples should be collected if the Superintendent determines that hydrogeological conditions at the site are such that groundwater resources under or near the site are reasonably at risk. Samples can be collected either via established monitoring wells or with "push" technology (such as Geoprobe®).

It is critical that: a) sampling occurs in the right areas (for example, one location must beupgradient of the potential point of impact and at least two must bedowngradient); and b) wells are finished at the appropriate depths to intercept any contaminant plume(s). (This will require knowledge of the local hydrogeology and the contaminants involved and their environmental fate characteristics). If "push" technology is used and samples are collected on more than one occasion, care must be taken to sample the exact same locations and at the same depths in the aquifer.

"Low-flow" sample collection methods should be used as per the EPA guidance document in IV.B.3 below.

Groundwater samples should not be filtered.

For BTEX samples, see section B.3. below.
All samples will be grab samples. (As a rule, composite samples should not be collected.) Sample collectors may have to communicate with the laboratory to ensure that enough sample is collected for the various analyses.

The total number of samples to be collected will be site-specific and determined by the Superintendent. Enough samples should be collected and analyzed to meet the Tier I or Tier II sampling objective (see section III).

4. Surface Water

Background samples should be collected upstream of any possible inputs of contaminated water (e.g. surface runoff or shallow groundwater) from the site.

Where contamination is obvious, such as in a surface sheen, collect samples right at the surface, avoiding any scum, algae, or other detritus on the water surface if possible (and note infieldbook if present). Where a contaminating substance (such as a dense nonaqueous phase liquid, or DNAPL) is visible or suspected at the bottom of the water column, then collect samples at that depth. For surface water suspected of being contaminated but it is unknown whether the contaminants are “floaters” or “sinkers,” collect samples at a depth of 3-12 inches.

For BTEX samples, see section B.4. below.

All samples will be grab samples. (As a rule, composite samples should not be collected.) Sample collectors may have to communicate with the laboratory to ensure that enough sample is collected for the various analyses.

The total number of samples to be collected will be site-specific and determined by the Superintendent. Factors such as flow, depth, and the size of the water body are important here. Enough samples should be collected and analyzed to meet the Tier I or Tier II sampling objective (see section III).

B. Sample Collection Methodologies

Acceptable sampling methodology must be used so that results are as representative as possible. Sample collection can be complex and should be conducted by experienced professionals (typically a contractor). This could also help if the values or methods are challenged by one of the parties involved. Furthermore, experienced professionals are also trained in the appropriate precautions to protect the health and safety of the sample collector(s) from exposure to potentially harmful contaminants or situations.

Methodologies published by recognized organizations should be used. Acceptable methodologies are listed below for each environmental media (soil, sediment, etc.). If sample collection methodologies other than these are used, they must contain the following to be acceptable: 1) Applicability of the procedure, 2) Equipment required, 3) Detailed description of procedures to be followed in collecting the samples, 4) Common problems encountered and corrective actions to be followed, and 5) Precautions to be taken. The methodology to be used must be cited in the sample plan. A basic description of collection methodology should be included in the report to the Superintendent (section VIII).

1. Soil

Methods from source documents published by the following organizations are acceptable:
-U.S. EPA
-American Society for Testing and Materials
-U.S. Department of the Interior
-American Petroleum Institute

Note that when collecting soil samples for BTEX analysis, specialized equipment and collection methods are necessary. Use a coring device such as the EnCore™ sampler or disposable plastic syringes. For detailed guidance, see section 4.1 and method 5035 in Chapter 4 of EPA's SW-846, Update III (full reference in section VI.A. below).

2. Sediment

Methods from source documents published by the following organizations are acceptable:
-U.S. EPA
-American Society for Testing and Materials
-U.S. Department of the Interior
-American Petroleum Institute

3. Groundwater

Use:
Environmental Protection Agency. 1992. RCRA Ground-Water Monitoring: Draft Technical Guidance. EPA/530/R-93-001. Office of Solid Waste, EPA, Washington, D.C.

"Low-flow" sampling should be conducted; for guidance, see:
Puls, R.W. and M.J. Barcelona. 1996. Ground Water Issue: Low-Flow (MinimalDrawdown) Ground-Water Sampling Procedures. EPA/540/S-95/504. Office of Solid Waste and Emergency Response, EPA, Washington, D.C.

Note that when collecting water samples for BTEX analysis, specialized equipment and collection methods are necessary. For detailed guidance, see section 4.1 and method 5030B in Chapter 4 of EPA's SW-846, Update III (full reference in section VI.A. below).

4. Surface Water

Methods from source documents published by the following organizations are acceptable:
-U.S. EPA
-American Society for Testing and Materials
-U.S. Department of the Interior
-American Petroleum Institute

Also recommended is this NPS guidance:
Stednick, J.D. and D.M. Gilbert. 1998. Water quality inventory protocol: Riverine environments. National Park Service, Water Resources Division, Technical Report no. NPS/NRWRD/NRTR-98/177. Fort Collins, CO, 103 pp.

Note that when collecting water samples for BTEX analysis, specialized equipment and collection methods are necessary. For detailed guidance, see section 4.1 and method 5030B in Chapter 4 of EPA's SW-846, Update III (full reference in section VI.A. below).

C. Sample Containers, Preservation, Storage

Refer to documents listed in sections VI.A. below and IV.B. above for specific guidance, including 40 CFR Part 136, if necessary. EPA's SW-846, Update III is especially helpful.

Note that sediment samples should not be acidified for metals and that neither groundwater nor surface water samples should be filtered. Remember special conditions when sampling for BTEX (see section 4.1 and methods 5030 and 5035 in Chapter Four of SW-846, Update III) and for any metals requiring unusually low detection limits.

D. Chain of Custody

Proper chain-of-custody procedures must be used in sample handling (collection, shipping, storage, analysis). For examples, see Standard Methods for the Examination of Water and Wastewater for general guidance, and SW-846, Update III, Chapter 9, section 9.2.2.7 for detailed guidance.

V. QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control (QA/QC) plans ensure that the data generated are scientifically valid, defensible, and of known precision and accuracy. Some of the basic elements of QA/QC plans are:

- data quality objectives (DQO)
- field operating procedures (such as sample management, decontamination, equipment calibration, etc.)
- field QA/QC requirements (such as data handling, collection of control samples like blanks, spikes and duplicates, etc.)
- lab operating procedures (such as sample management, equipment calibration, etc.)
- lab QA/QC procedures (such as data handling, control samples, etc.).

A QA/QC plan should be in place before any sampling begins. Basic QA/QC procedures to be followed should be described briefly in the sample plan (section VIII). If a certain QA/QC guidance document is used, it should be cited in the sample plan. Many guidance documents are available—several through EPA—including the following, recommended here:

> Environmental Protection Agency. 1997. Test methods for evaluating solid waste, physical/chemical methods (SW-846), 3rd edition, Update III, Chapter One. EPA Office of Solid Waste and Emergency Response, EPA, Washington, D.C.

Adherence to the QA/QC plan should be documented throughout the project and demonstrated in the final report to the Superintendent.

Aspects of quality assurance that may be helpful can be found in:

Environmental Protection Agency. 1996. The volunteer monitor's guide to quality assurance project plans. EPA Office of Wetlands, Ocean and Watersheds 4503F. EPA publication number: EPA 841-B-96-003. Also available at: http://www.epa.gov/owow/monitoring/volunteer/qappcover.htm

VI. HOW TO ANALYZE SAMPLES IN THE LABORATORY

A. Analytical Methods

Metals analyses must use the methods in EPA's SW-846, Update III (or more recent). This applies to soil, sediment, groundwater, and surface water samples. Groundwater and surface water methods can also include EPA's 200 series for metals, or the 1600 series where extremely low (state-of-the-art) detection limits are desired. The full reference for the SW-846 document is:

Environmental Protection Agency. 1997. Test methods for evaluating solid waste, physical/chemical methods (SW-846), 3rd edition, Update III. EPA Office of Solid Waste and Emergency Response, EPA, Washington, D.C.

Polycyclic aromatic hydrocarbon (PAH) analyses must use a modification of method 8270 in EPA's SW-846, Update III. Developed by the National Oceanic and Atmospheric Administration (NOAA), this method is referred to as "GC/MS method 8270 in selective ion mode (SIM)", and is informally referred to as the "expanded scan" for PAHs. Consult the following for a detailed explanation of methodology:

Lauenstein, G.G., and A.Y. Cantillo (1998). Sampling and analytical methods of the National Status and Trends Program Mussel Watch Project: 1993-1996 update. NOAA Technical Memorandum NOS ORCA 130. 233 pp.

Total petroleum hydrocarbons (TPH) analyses will be for certain "ranges" of hydrocarbons, depending on the contaminating substance present. For crude oil, a "wide range" or "full range" TPH scan should be conducted to measure the heavier fractions. For natural gas condensate a "lighter end" TPH scan, such as for "gasoline range organics" (GRO), should be conducted. For diesel fuel, a TPH scan for "diesel range organics" (DRO) should be conducted to measure the mid-range fractions. Although many analytical methods are available for TPH, samples should be analyzed using only GC/FID (gas chromatograph/flame ionization detection) methodology. Method 8015B in EPA's SW-846, Update III is highly recommended.

Benzene, toluene, ethylbenzene, and xylene (BTEX) analyses should use method 8260B in EPA's SW-846, Update III.

Ammonia analyses should use EPA method 350.1 (or equivalent APHA method 4500-NH3 H, or USGS method 4523-85). Samples should not be filtered.

For all other contaminants in Table 1, use methods approved in 40 CFR Part 136 (EPA, Standard Methods for the Examination of Water and Wastewater (latest edition), ASTM, or USGS). Methods in the NPS, Water Resources Division "Water quality inventory protocol" (section IV.B.4 above) can also be used.

B. Laboratories

Samples must be sent to an experienced lab that can: 1) perform the above analytical methods; 2) achieve the required detection limits (section VII below); 3) perform the required QA/QC procedures (section V above); and 4) provide the information required in the sample plan and the final report to the Superintendent (section VIII below).

Note that in regards to the PAH analytical method (as specified in VI.A. above), only a few labs nationwide (perhaps a dozen) currently can perform this analysis. Many of these same labs can also "fingerprint" samples; that is, by analyzing hydrocarbon-contaminated samples, they can identify the type and source of the petroleum product at the site. A partial list of these labs follows (no government endorsement implied):

Arthur D. Little, Inc.
25 Acorn Park
Cambridge, MA. 02140
(617) 498-5000

Battelle Marine Science Lab
1529 West Sequim Bay Rd.
Sequim, WA. 98382
(360) 683-4151

Geochemical and Environmental Research Group
Texas A&M University
833 Graham Rd.
College Station, TX. 77845
(409) 862-2323 ext. 115

Woods Hole Group, Environmental Laboratories
375 Paramount Drive, Suite B
Raynham, MA. 02767-5154
(508) 822-9300 or 563-5030

VII. Detection Limits

Note: The term "detection limit" used herein refers to what is commonly called the "reporting limit" and occasionally called the "quantitation limit." It does not refer to the much lower "instrument detection limit" or "method detection limit."

Labs should achieve the detection limits (DLs) in Table 3 below. These DLs are below federal (and presumably state) standards and most other criteria currently in the literature. Therefore, analytical methods that achieve these DLs will be able to indicate if most standards and criteria are being met. Note, however, that the DLs for two contaminants—PAHs and mercury—are above some of the more strict standards or criteria that exist. This is because many labs cannot achieve DLs this low, and the DLs in the table were chosen so that most experienced and well-equipped labs could achieve them. Lower DLs are achievable for PAHs and mercury at some labs that have the expertise and special instrumentation (see section VI.B. above for examples).

If the natural resources at or near the site are particularly sensitive, pristine, or important to the Park, the Superintendent may wish to choose the strictest available standard or criteria as theremediation goal. He/she would then have to request some lowerDLs (lower than those in Table 3) from the lab for PAHs and mercury.

For the contaminants in Table 1 that are not listed in Table 3, commonly reported DLs are acceptable.

Table 3: Maximum acceptable detection limits ("reporting limits") for surface water, groundwater, soil, and sediment samples. Lower detection limits are also acceptable.

Contaminant	Detection limit for surface water and groundwater samples	Detection limit for soil and sediment samples (dry weight)
PAHs	10 ppt [a]	1 ppb [c]
TPH	50 ppb	0.1 ppm
benzene	1 ppb	25 ppb
toluene	5 ppb	25 ppb
ethylbenzene	5 ppb	25 ppb
xylene	5 ppb	25 ppb
ammonia	0.05 ppm	--
arsenic	5 ppb	0.5 ppm
barium	1 ppb	1 ppm
cadmium	0.5 ppb	0.2 ppm
chromium	3 ppb	1 ppm
copper	5 ppb	1 ppm
iron	0.1 ppm	10 ppm
lead	1 ppb	5 ppm
mercury	0.2 ppb [b]	0.2 ppm [d]
nickel	5 ppb	5 ppm
selenium	1 ppb	1 ppm
strontium	10 ppb	5 ppm
vanadium	10 ppb	1 ppm
zinc	10 ppb	5 ppm

water units:
ppm = parts per million = milligrams per liter = mg/L
ppb = parts per billion = micrograms per liter = ug/L
ppt = parts per trillion = nanograms per liter = ng/L
soil/sediment units:
ppm = parts per million = milligrams per kilogram = mg/kg = micrograms per gram = ug/g
ppb = parts per billion = micrograms per kilogram = ug/kg = nanograms per gram = ng/g
a - DLs as low as 1 ppt may be achievable
b - DLs as low as 0.1 ppb, or even 10 ppt, may be achievable
c - DLs as low as 0.25 ppb may be achievable
d - DLs as low as 25 ppb, or even 1 ppb, may be achievable

For an extensive list of federal standards and other published environmental criteria for most of the contaminants in Table 1, consult NPS Water Resources Divisions' "Environmental Contaminants

Encyclopedia" at the website http://www.aqd.nps.gov/toxic. Note that there may be state standards, other criteria, or in some cases, updated federal standards that are not listed in this Encyclopedia.

VIII. SAMPLE PLAN AND REPORTING REQUIREMENTS

A. Sample Plan

The owner/operator should submit a brief sample plan to the Superintendent for approval before samples are collected. The plan must include:

- sampling objectives (such as, "identify contaminants and concentrations involved," "determine spatial extent of spill," "determine if remediation is complete," etc.)
- the contaminating substances being investigated (such as crude oil, natural gas condensate, produced water, etc.)
- list of individual contaminants that will be tested for (see Table 1)
- analytical methods to be used (see section VI. A.)
- type of samples to be collected (such as soil, sediment, groundwater, or surface water)
- citation and brief description of sample collection methodology to be used (see section IV. B.)
- specific sample locations and number of samples at each (Superintendent will walk the site and choose exact locations; this information may not be available until the time when samples are actually collected)
- total number of samples (this information may not be available until the time when samples are actually collected)
- acknowledgment that detection limits (that is, "reporting limits") specified herein (section VII) will be achieved
- brief description of QA/QC procedures to be followed and citation of any guidance document used (see section V)
- acknowledgment that proper chain-of-custody procedures will be initiated and followed

B. Reporting Requirements

Upon completing sample collection and analyses, the owner/operator shall submit a report to the Superintendent. This report shall include:

- sample ID number/name
- description of sample locations (include maps, sketches, or photos)
- sample depth
- brief description of spill area (apparent extent of spill, topography, vegetation, surface water features, apparent soil conditions, etc.)
- date and time of sampling
- name of sample collector
- information pertinent to the sample collection methodology used (sampling devices used, how samples were collected, etc.)
- sample containers used, any preservation methods, and storage conditions of samples
- date and time of analyses
- name of chemist/technician performing analyses
- type of sample (soil, sediment, groundwater, or surface water)
- sample fraction measured (such as "total", "total recoverable", etc.)

- analytical results and units (mg/kg, µg/L, etc.)
- percent moisture (for soil/sediment samples)
- wet weight *and* dry weight units (for soil/sediment samples)
- analytical methods used
- detection limits (that is, “reporting limits”) achieved
- method detection limits (MDL) for the analytical methods used
- indication of analyses done in the field (such as pH, conductivity, etc.)
- field observations made while collecting samples
- lab and field QA/QC results and procedures followed
- name of analytic equipment used
- appropriate chain-of-custody forms

IX. IN CASE OF A SPILL

The 36 CFR 9B regulations require that each Plan of Operations contain a “contaminating or toxic substance spill control plan.” Spill Prevention, Control, and Countermeasure (SPCC) plans required of owner/operators by OPA '90 are also acceptable. These plans discuss required clean-up equipment and procedures. Additionally, the gross levels of contamination and damage associated with large spills may trigger regulatory involvement from other federal or state agencies that have their own mitigation protocols and requirements for how to proceed.

X. SPILL RESPONSE AND NOTIFICATION PROCEDURE FOLLOWING RELEASE OF A CONTAMINATING SUBSTANCE FROM A NONFEDERAL OIL AND GAS OPERATION IN A PARK UNIT

A. Initial Park Staff Actions Following Discovery of a Release

1. Secure the area to protect public health and safety

2. Notify operator of the release and immediate need to control the source and contain the release, and obtain information of the released substance

3. Initial site assessment to identify park resources potentially as risk from the release (surface water, wetlands, cultural resources, etc.), and quantity of released substance

4. Direct operator during initial spill containment actions to protect natural and cultural resources at risk, and to protect human health and safety

5. Notify Regional Spill Response Coordinator and relay all pertinent information

6. Obtain 5 liter sample of released substance (Note: need preservation and storage guidance for park staff) and initiate chain of custody documentation

7. Continue to oversee operator containment actions and maintain security

8. Park Superintendent advises operator that the operation is immediately “suspended” pursuant to NPS regulations at 36 CFR §9.51(c)(2)

9. Park staff prepares a detailed Case Incident Report on the spill event

B. Regional Spill Response Coordinator Notification Duties

1. Contact National Response Center to advise of release and obtain case number

2. Notify Environmental Quality Division (Dan Hamson), Geologic Resources Division (Jim Woods), Regional Minerals Coordinator, and Water Resources Division (Matt Hagermann) if release threatens water resources

3. Coordinate a conference call with above technical offices and park staff to define appropriate course of action relative to spill containment, public health and safety, site assessment, damage assessment, and operator responsiveness and capability

4. Notify pertinent state regulatory agencies and state trustees

C. Coordination of Response, Clean-up and Damage Assessment

1. All involved NPS staff track time and all other expenditures associated with the spill event

2. Regional Minerals Coordinator prepares formal suspension notice for Regional Directors signature in accordance with NPS regulations at 36 CFR §9.51(c)(2)

3. Park staff coordinates with designated On Scene Coordinator (EPA, Coast Guard, orNPS staff expert if EPA or Coast Guard does not dispatch a coordinator) and state regulatory agencies to oversee operator spill response and initial clean-up actions

4. Park staff coordinates with On Scene Coordinator (OSC) and state trustee agencies in the conduct of resource damage assessment (Note: operator may contract with approved consulting firm/laboratory to conduct assessment work)

5. All involved NPS offices evaluate site assessment results and reach consensus on additional remediation actions and reclamation goals, and communicate recommendations to park Superintendent. (Note: NPS regulations at 36 CFR §9.39(a)(1)(i) and §9.39(a)(2)(iii) require operators to remove or neutralize any contaminating substance)

6. Park staff coordinates with OSC and state trustee agencies in monitoring remediation and reclamation actions

7. Park Superintendent and NPS technical working group evaluates final remediation/reclamation success and determines if further legal action against the operator is required (Note: operators are liable for any damages to federally-owned or controlled lands, waters or resources pursuant to 36 CFR §9.51(a).

APPENDIX G

ONSHORE OIL AND GAS ORDER NO. 2

Bureau of Land Management, Department of the Interior
Section III.G., Drilling Abandonment Requirements
From Federal Register, Vol. 53, No. 223,
Friday, November 18, 1988, pages 46810 and 46811

G. Drilling Abandonment Requirements.

The following standards apply to the abandonment of newly drilled dry or non-productive wells in accordance with 43 CFR 3162.3-4 and section V of Onshore Oil and Gas Order No. 1. Approval shall be obtained prior to the commencement of abandonment. All formations bearing usable-quality water, oil, gas, or geothermal resources, and/or a prospectively valuable deposit of minerals shall be protected. Approval may be given orally by the authorized officer before abandonment operations are initiated. This oral request and approval shall be followed by a written notice of intent to abandon filed no later than the fifth business day following oral approval. Failure to obtain approval prior to commencement of abandonment operations shall result in immediate assessment of under 43 CFR 3163.1(b)(3). The hole shall be in static condition at the time any plugs are placed (this does not pertain to plugging lost circulation zones). Within 30 days of completion of abandonment, a subsequent report of abandonment shall be filed. Plugging design for an abandonment hole shall include the following:

1. Open Hole

   i. A cement plug shall be placed to at least 50 feet below the bottom (except as limited by total depth (TD) or plugged back total depth (PBTD)), to 50 feet above the top of:

      a. Any zone encountered during drilling which contains fluid or gas with a potential to migrate;

      b. Any prospectively valuable deposit of minerals.

   ii. All cement plugs, except the surface plug, shall have sufficient slurry volume to fill 100 feet of hole, plus an additional 10 percent of slurry for each 1,000 feet of depth.

   iii. No plug, except the surface plug, shall be less than 25 sacks without receiving specific approval from the authorized officer.

   iv. Extremely thick sections of a single formation may be secured by placing 100-foot plugs across the top and bottom of the formation, and in accordance with item ii hereof.

   v. In the absence of productive zones or prospectively valuable deposits of minerals which otherwise require placement of cement plugs, long sections of open hole shall be plugged at least every 3,000 feet. Such plugs shall be placed across in-gauge sections of the hole, unless otherwise approved by the authorized officer.

2. Cased Hole. A cement plug shall be placed opposite all open perforations and extend to minimum of 50 feet below (except as limited by TD or PBTD) to 50 feet above the perforated interval. All cement plugs, except the surface plug, shall have sufficient slurry volume to fill 100 feet of hole, plus an additional 10 percent of slurry for each 1,000 feet of depth. In lieu of the cement plug, a bridge plug is acceptable, provided:

    a. The bridge plug is set within 50 feet to 100 feet above the open perforations;

    b. The perforations are isolated from any open hole below; and,

    c. The bridge plug is capped with 50 feet of cement. If a bailer is used to cap this plug, 35 feet of cement shall be sufficient.

3. Casing Removed from Hole. If any casing is cut and recovered, a cement plug shall be placed to extend at least 50 feet above and below the stub. The exposed hole resulting from the casing removal shall be secured as required in items 1i and 1ii hereof.

4. An additional cement plug placed to extend a minimum of 50 feet above and below the shoe of the surface casing (or intermediate string as appropriate).

5. Annular Space. No annular space that extends to the surface shall be left open to the drilled hole below, If this condition exists, a minimum of the top 50 feet of annulus shall be plugged with cement.

6. Isolating Medium. Any cement plug which is the only isolating medium for a fresh water interval or a zone containing a prospectively valuable deposit of minerals shall be tested by tagging with the drill string. Any plugs placed where the fluid level will not remain static also shall be tested by either tagging the plug with the working pipe string, or pressuring to minimum pump (surface) pressure of 1,000 psi, with no more than a 10 percent drop during a 15-minute period (cased hole only). If the integrity of any other plug is questionable, or if the authorized officer has specific concerns for which he/she orders a plug to be tested, it shall be tested in the same manner.

7. Silica Sand or Silica Flour. Silica sand or silica flour shall be added to cement exposed to bottom hole static temperatures above 230❍F to prevent heat degradation of the cement.

8. Surface Plug. A cement plug of at least 50 feet shall be placed across all annuluses. The top of this plug shall be placed as near the eventual casing cutting point as possible.

9. Mud. Each of the intervals between plugs shall be filled with mud of sufficient density to exert hydrostatic pressure exceeding the greatest formation pressure encountered while drilling such interval. In the absence of other information at the time plugging is approved, a minimum mud weight of 9 pounds per gallon shall be specified.

10. Surface Cap. All casing shall be cut-off at the base of the cellar or 3 feet below final restored ground level (whichever is deeper). The well bore shall then be covered with a metal plate at least ¼ inch thick and welded in place, or a 4-inch pipe, 10-feet in length, 4 feet above ground and embedded in cement as specified by the authorized officer. The well location and identity shall be permanently inscribed. A weep hole shall be left if a metal plat is welded in place.

11. The cellar shall be filled with suitable material as specified by the authorized officer and the surface restored in accordance with the instructions of the authorized officer.

APPENDIX H

U.S. FISH AND WILDLIFE SERVICE
LIST OF THREATENED AND ENDANGERED SPECIES

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
c/o TAMU-CC, Campus Box 338
6300 Ocean Drive
Corpus Christi, Texas 78412

August 8, 1997

Mr. Patrick C. McCrary - Superintendent
NATIONAL PARK SERVICE
Padre Island National Seashore
9405 South Padre Island Drive
Corpus Christi, Texas 78418

Consultation No. 2-11-97-I-226

Dear Mr. McCrary:

This responds to your letter dated July 23, 1997, requesting a formal list of the threatened and endangered species that occur or might occur at Padre Island National Seashore, within Kleberg, Kenedy, and Willacy Counties, Texas. The list has been prepared to assist you in the preparation of an Oil and Gas Management Plan/Environmental Impact Statement. Be advised that animals and plants are listed on a county by county basis for reference purposes only, therefore these species may occur in other counties if the appropriate habitat is present.

The list has been expanded to include candidate species as well. Candidate species have no protection under the Endangered Species Act; however, the U.S. Fish and Wildlife Service has substantial information on candidate species to support their listing as threatened or endangered. Therefore, actions that might contribute to the listing of candidate species should be avoided. A letter designation following the species name represents the current Federal status of that species. Within the following list, the letters E, T and C represent the status of Endangered, Threatened and Candidate, respectively. Our data indicate that the following species may occur in Kleberg, Kenedy, and Willacy Counties:

Kenedy County

American peregrine falcon (Falco peregrinus anatum) - E
brown pelican (Pelecanus occidentalis) - E
hawksbill sea turtle (Eretmochelys imbricata) - E
jaguarundi (Felis yagouaroundi) - E
Kemp's ridley sea turtle (Lepidochelys kempii) - E
leatherback sea turtle (Dermochelys coriacea) - E
northern aplomado falcon (Falco femoralis septentrionalis) - E
ocelot (Felis pardalis) - E
Arctic peregrine falcon (Falco peregrinus tundrius) - T
green sea turtle (Chelonia mydas) - T
loggerhead sea turtle (Caretta caretta) - T
piping plover (Charadrius melodus) - T
cactus ferruginous pygmy owl (Glaucidium brasilianum cactorum) - C (Proposed Threatened)

Kleberg County

American peregrine falcon (Falco peregrinus anatum) - E
black lace cactus (Echinocereus reichenbachii var. albertii) - E
brown pelican (Pelecanus occidentalis) - E
hawksbill sea turtle (Eretmochelys imbricata) - E
jaguarundi (Felis yagouaroundi) - E
Kemp's ridley sea turtle (Lepidochelys kempii) - E
leatherback sea turtle (Dermochelys coriacea) - E
northern aplomado falcon (Falco femoralis septentrionalis) - E
ocelot (Felis pardalis) - E
slender rush-pea (Hoffmannseggia tenella) - E
South Texas ambrosia (Ambrosia cheiranthifolia) - E
Arctic peregrine falcon (Falco peregrinus tundrius) - T
bald eagle (Haliaeetus leucocephalus) - T
green sea turtle (Chelonia mydas) - T
loggerhead sea turtle (Caretta caretta) - T
piping plover (Charadrius melodus) - T
mountain plover (Charadrius montanus) - C

Willacy County

American peregrine falcon (Falco peregrinus anatum) - E
brown pelican (Pelecanus occidentalis) - E
hawksbill sea turtle (Eretmochelys imbricata) - E
jaguarundi (Felis yagouaroundi) - E
Kemp's ridley sea turtle (Lepidochelys kempii) - E
leatherback sea turtle (Dermochelys coriacea) - E
northern aplomado falcon (Falco femoralis septentrionalis) - E
ocelot (Felis pardalis) - E
Arctic peregrine falcon (Falco peregrinus tundrius) - T
green sea turtle (Chelonia mydas) - T
loggerhead sea turtle (Caretta caretta) - T
piping plover (Charadrius melodus) - T
cactus ferruginous pygmy owl (Glaucidium brasilianum cactorum) - C (Proposed Threatened)
mountain plover (Charadrius montanus) - C

The Service appreciates the opportunity to provide you with this information. For updates of the species list or if we can be of further assistance, please contact our office at (512) 994-9005.

Sincerely,

William Seawell

WILLIAM M. SEAWELL
Field Supervisor

Note: The Peregrine falcon was officially delisted by U.S. Fish and Wildlife Service on August 25, 1999; therefore, it is no longer classified as either threatened or endangered. (EIS Team Leader)

APPENDIX I

TEXAS PARKS AND WILDLIFE DEPARTMENT LIST OF SPECIAL STATUS SPECIES THAT MIGHT OCCUR AT PADRE ISLAND NATIONAL SEASHORE

TEXAS THREATENED AND ENDANGERED SPECIES
November 1997

ANIMALS
In 1973 the Texas legislature authorized the Texas Parks and Wildlife Department to establish a list of endangered animals in the state. Endangered species are those species which the Executive Director of the Texas Parks and Wildlife Department has named as being "threatened with statewide extinction." Threatened species are those species which the TPW Commission has determined are likely to become endangered in the future. Laws and regulations pertaining to endangered or threatened animal species are contained in Chapters 67 and 68 of the Texas Parks and Wildlife (TPW) Code and Sections 65.171 - 65.184 of Title 31 of the Texas Administrative Code (T.A.C.).

PLANTS
In 1988 the Texas legislature authorized the Department to establish a list of threatened and endangered plant species for the state. An endangered plant is one that is "in danger of extinction throughout all or a significant portion of its range." A threatened plant is one which is likely to become endangered within the foreseeable future. Laws and regulations pertaining to endangered or threatened plant species are contained in Chapter 88 of the TPW Code and Sections 69.01 - 69.14 of the T.A.C.

REGULATIONS
TPWD regulations prohibit the taking, possession, transportation, or sale of any of the animal species designated by state law as endangered or threatened without the issuance of a permit. State laws and regulations prohibit commerce in threatened and endangered plants and the collection of listed plant species from public land without a permit issued by TPWD. In addition, some species listed as threatened or endangered under state law are also listed under federal regulations. These animals are provided additional protection by the U.S. Fish and Wildlife Service.

LISTING AND RECOVERY
Listing and recovery of endangered species in Texas is coordinated by the Endangered Resources Branch. The Department's Permitting Section is responsible for the issuance of permits for the handling of listed species. The following pages list those species which have been designated as threatened or endangered in Texas. The range of the species within the state can be referenced by the map of Texas natural regions below:

1. PINEY WOODS
1a. Longleaf Pine Forest
1b. Mixed Pine-Hardwood Forest
2. OAK WOODS & PRAIRIES
2a. Oak Woodlands
2b. Eastern Cross Timbers
2c. Western Cross Timbers
3. BLACKLAND PRAIRIES
3a. Blackland Prairie
3b. Grand Prairie
9. ROLLING PLAINS
9a. Mesquite Plains
9b. Escarpment Breaks
9c. Canadian Breaks
10. HIGH PLAINS
11. TRANS PECOS
11a. Mountain Ranges
11b. Desert Grassland
11c. Desert Scrub
11d. Salt Basin
11e. Sand Hills
11f. Stockton Plateau
10
9
3
1
2
8
7
11
4
6
5
6. SOUTH TEXAS BRUSH COUNTRY
6a. Brush Country
6b. Bordas Escarpment
6c. Subtropical Zone
7. EDWARDS PLATEAU
7a. Live Oak-Mesquite Savanna
7b. Balcones Canyonlands
7c. Lampasas Cut Plain
8. LLANO UPLIFT
8a. Mesquite Savanna
8b. Oak & Oak-Hickory Woodlands
4. GULF COAST PRAIRIES & MARSHES
4a. Dunes/Barrier
4b. Estuarine Zone
4c. Upland Prairies & Woods
5. COASTAL SAND PLAINS
12. MARINE ENVIRONMENT

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS BIOLOGICAL AND CONSERVATION DATA SYSTEM
SPECIAL ANIMAL LIST
06 OCT 1997

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
*** AMPHIBIANS					
BUFO HOUSTONENSIS	HOUSTON TOAD	G1	S1	LE	E
EURYCEA LATITANS	CASCADE CAVERNS SALAMANDER	G3	S3		T
EURYCEA NANA	SAN MARCOS SALAMANDER	G1	S1	LT	T
EURYCEA NEOTENES	TEXAS SALAMANDER	G1	S1		
EURYCEA PTEROPHILA	BLANCO RIVER SPRINGS SALAMANDER	G2	S2		
EURYCEA RATHBUNI	TEXAS BLIND SALAMANDER	G1	S1	LE	E
EURYCEA ROBUSTA	BLANCO BLIND SALAMANDER	G1	S1		T
EURYCEA SOSORUM	BARTON SPRINGS SALAMANDER	G1	S1	LE	
EURYCEA SP 1	JOLLYVILLE PLATEAU SALAMANDER	G1	S1		
EURYCEA SP 2	SALADO SPRINGS SALAMANDER	G1	S1		
EURYCEA SP 5	GEORGETOWN SALAMANDER	G1	S1		
EURYCEA SP 6	PEDERNALES RIVER SPRINGS SALAMANDER	G1	S1		
EURYCEA SP 7	EDWARDS PLATEAU SPRING SALAMANDERS	G1G3Q	S1S3		
EURYCEA SP 8	COMAL SPRINGS SALAMANDER	G1Q	S1		
EURYCEA TRIDENTIFERA	COMAL BLIND SALAMANDER	G1	S1		T
EURYCEA TROGLODYTES	VALDINA FARMS SINKHOLE SALAMANDER	GH	SH		
HYPOPACHUS VARIOLOSUS	SHEEP FROG	G5	S2		T
LEPTODACTYLUS LABIALIS	WHITE-LIPPED FROG	G5	S1		T
NOTOPHTHALMUS MERIDIONALIS	BLACK-SPOTTED NEWT	G1	S1		T
PLETHODON SERRATUS	SOUTHERN REDBACK SALAMANDER	G5	S1		
RANA GRYLIO	PIG FROG	G5	S2		
RANA PIPIENS	NORTHERN LEOPARD FROG	G5	S1		
RHINOPHRYNUS DORSALIS	MEXICAN BURROWING TOAD	G5	S2		T
SIREN SP 1	SOUTH TEXAS SIREN (LARGE FORM)	G?Q	S?		T
SMILISCA BAUDINII	MEXICAN TREEFROG	G5	S3		T
*** ARACHNIDS					
ARCHEOLARCA GUADALUPENSIS	GUADALUPE CAVE PSEUDOSCORPION	G1	S1		
CICURINA BANDIDA	BANDIT CAVE SPIDER	G1	S1		
CICURINA BARONI	ROBBER BARON CAVE SPIDER	G1	S1		
CICURINA CUEVA	A CAVE SPIDER	G1	S1		
CICURINA MADLA	MADLA'S CAVE SPIDER	G1	S1		
CICURINA VENII	VENI'S CAVE SPIDER	G1	S1		
CICURINA VESPERA	VESPER CAVE SPIDER	G1	S1		
CICURINA WARTONI	WARTON'S CAVE SPIDER	G1	S1	C1	
NEOLEPTONETA MICROPS	GOVERNMENT CANYON CAVE SPIDER	G1	S1		
NEOLEPTONETA MYOPICA	TOOTH CAVE SPIDER	G1	S1	LE	
TARTAROCREAGRIS TEXANA	TOOTH CAVE PSEUDOSCORPION	G1	S1	LE	
TEXELLA COKENDOLPHERI	ROBBER BARON CAVE HARVESTMAN	G1	S1		
TEXELLA REDDELLI	BEE CREEK CAVE HARVESTMAN	G1	S1	LE	
TEXELLA REYESI	BONE CAVE HARVESTMAN	G1Q	S1	LE	
*** BIRDS					
AIMOPHILA AESTIVALIS	BACHMAN'S SPARROW	G3	S3B		T
AIMOPHILA BOTTERII ARIZONAE	ARIZONA BOTTERI'S SPARROW	G4T3?	S1		T
AIMOPHILA BOTTERII TEXANA	TEXAS BOTTERI'S SPARROW	G4T4	S3B		T
AMMODRAMUS BAIRDII	BAIRD'S SPARROW	G3G4	S2		
AMMODRAMUS HENSLOWII	HENSLOW'S SPARROW	G3G4	S2S3N,SXB		
ATHENE CUNICULARIA HYPUGAEA	WESTERN BURROWING OWL	G4TU	S2B		
BUTEO ALBICAUDATUS	WHITE-TAILED HAWK	G4G5	S4B		T
BUTEO ALBONOTATUS	ZONE-TAILED HAWK	G4	S3B		T
BUTEO NITIDUS	GRAY HAWK	G4G5	S2B		T
BUTEO REGALIS	FERRUGINOUS HAWK	G4	S2B,S4N		
BUTEOGALLUS ANTHRACINUS	COMMON BLACK-HAWK	G4G5	S2B		T
CAMPEPHILUS PRINCIPALIS	IVORY-BILLED WOODPECKER	G1	SX	LE	E
CAMPTOSTOMA IMBERBE	NORTHERN BEARDLESS-TYRANNULET	G5	S3B		T
CHARADRIUS ALEXANDRINUS	SNOWY PLOVER	G4	S3B		
CHARADRIUS ALEXANDRINUS NIVOSUS	WESTERN SNOWY PLOVER	G4T3	S2B		
CHARADRIUS ALEXANDRINUS TENUIROSTRIS	SOUTHEASTERN SNOWY PLOVER	G4T3	S2B		
CHARADRIUS MELODUS	PIPING PLOVER	G3	S2	LT	T
CHARADRIUS MONTANUS	MOUNTAIN PLOVER	G2	S2	C1	
CHLIDONIAS NIGER	BLACK TERN	G4	S3		
CHONDROHIERAX UNCINATUS	HOOK-BILLED KITE	G4	S2		
CYANOCORAX MORIO	BROWN JAY	G5	S2B		
CYRTONYX MONTEZUMAE	MONTEZUMA QUAIL	G4G5	S3B		
DENDROICA CERULEA	CERULEAN WARBLER	G4	SHB,S3N		
DENDROICA CHRYSOPARIA	GOLDEN-CHEEKED WARBLER	G2	S2B	LE	E

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATU
EGRETTA RUFESCENS	REDDISH EGRET	G4	S3B		T
ELANOIDES FORFICATUS	SWALLOW-TAILED KITE	G5	S2B		T
EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	G5T2	S1B	LE	E
FALCO FEMORALIS SEPTENTRIONALIS	NORTHERN APLOMADO FALCON	G4T2	S1	LE	E
FALCO MEXICANUS	PRAIRIE FALCON	G4G5	S3B		
FALCO PEREGRINUS	PEREGRINE FALCON	G4	S3	E/SA	E,T
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G4T3	S2B	LE	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	G4T4	S3N	E/SA	T
GEOTHLYPIS TRICHAS INSPERATA	BROWNSVILLE COMMON YELLOWTHROAT	G5T2	S1B		
GLAUCIDIUM BRASILIANUM CACTORUM	CACTUS FERRUGINOUS PYGMY-OWL	G5T3	S3B		T
GRUS AMERICANA	WHOOPING CRANE	G1	S1	LE	E
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4	S3B,S3N	LT	T
ICTERUS CUCULLATUS CUCULLATUS	MEXICAN HOODED ORIOLE	G5TU	S4B		
ICTERUS CUCULLATUS SENNETTI	SENNETT'S HOODED ORIOLE	G5TU	S3B		
ICTERUS GRADUACAUDA AUDUBONII	AUDUBON'S ORIOLE	G5T4	S3B		
LANIUS LUDOVICIANUS MIGRANS	MIGRANT LOGGERHEAD SHRIKE	G4G5T3	S2B		
LATERALLUS JAMAICENSIS	BLACK RAIL	G4?	S2B		
MYCTERIA AMERICANA	WOOD STORK	G4	SHB,S2N		T
NUMENIUS BOREALIS	ESKIMO CURLEW	G1	SH	LE	E
PACHYRAMPHUS AGLAIAE	ROSE-THROATED BECARD	G4G5	SA		T
PARULA PITIAYUMI	TROPICAL PARULA	G5	S3B		T
PELECANUS OCCIDENTALIS	BROWN PELICAN	G4	S3B	LE	E
PICOIDES BOREALIS	RED-COCKADED WOODPECKER	G3	S2B	LE	E
PLEGADIS CHIHI	WHITE-FACED IBIS	G5	S4B		T
SETOPHAGA RUTICILLA	AMERICAN REDSTART	G5	S2B		
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	G4T2Q	S1B	LE	E
STERNA FUSCATA	SOOTY TERN	G5	S2B		T
STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3T3	S1B	LT	T
TYMPANUCHUS CUPIDO ATTWATERI	ATTWATER'S GREATER PRAIRIE-CHICKEN	G4T1	S1B	LE	E
TYMPANUCHUS PALLIDICINCTUS	LESSER PRAIRIE-CHICKEN	G3	S2B		
VERMIVORA BACHMANII	BACHMAN'S WARBLER	GH	SR	LE	E
VIREO ATRICAPILLUS	BLACK-CAPPED VIREO	G2	S2B	LE	E
*** CRUSTACEANS					
ASELLUS SMITHII	TEXAS TROGLOBITIC WATER SLATER	G1	S1		
CAMBARELLUS TEXANUS	A CRAYFISH	G3?	S3?		
FALLICAMBARUS DEVASTATOR	TEXAS PRAIRIE CRAYFISH	G2?	S2?		
GAMMARUS HYALLELOIDES	DIMINUTIVE AMPHIPOD	G1	S1		
GAMMARUS PECOS	PECOS AMPHIPOD	G1	S1		
HYALELLA TEXANA	CLEAR CREEK AMPHIPOD	G1	S1		
MONODELLA TEXANA		G1	S1		
ORCONECTES MALETAE	A CRAYFISH	G2	S1?		
PALAEMONETES ANTRORUM	TEXAS CAVE SHRIMP	G1	S1		
PROCAMBARUS NECHESAE		G1G2	S1S2		
PROCAMBARUS TEXANUS	A CRAYFISH	G1	S?		
STYGOBROMUS BALCONIUS	BALCONES CAVE AMPHIPOD	G1	S1		
STYGOBROMUS BIFURCATUS	BIFURCATED CAVE AMPHIPOD	G1	S1		
STYGOBROMUS DEJECTUS	CASCADE CAVE AMPHIPOD	G1	S1		
STYGOBROMUS FLAGELLATUS	EZELL'S CAVE AMPHIPOD	G1	S1		
STYGOBROMUS HADENOECUS	DEVIL'S SINKHOLE AMPHIPOD	G1	S1		
STYGOBROMUS LONGIPES	LONG-LEGGED CAVE AMPHIPOD	G1	S1		
STYGOBROMUS PECKI	PECK'S CAVE AMPHIPOD	G1	S1	PE	
STYGOBROMUS REDDELLI	REDDELL'S CAVE AMPHIPOD	G1	S1		
STYGOBROMUS RUSSELLI	AN AMPHIPOD	G3	S3		
*** FISHES					
AWAOUS TAJASICA	RIVER GOBY	G5	S1		T
CAMPOSTOMA ORNATUM	MEXICAN STONEROLLER	G3	S1		T
CYCLEPTUS ELONGATUS	BLUE SUCKER	G3	S3		T
CYPRINELLA PROSERPINA	PROSERPINE SHINER	G3	S2		T
CYPRINODON BOVINUS	LEON SPRINGS PUPFISH	G1	S1	LE	E
CYPRINODON ELEGANS	COMANCHE SPRINGS PUPFISH	G1	S1	LE	E
CYPRINODON EXIMIUS	CONCHOS PUPFISH	G4	S1		T
CYPRINODON PECOSENSIS	PECOS PUPFISH	G1	S1	C1	T
DIONDA ARGENTOSA	MANANTIAL ROUNDNOSE MINNOW	G2	S2		
DIONDA DIABOLI	DEVILS RIVER MINNOW	G1	S1	C1	T
DIONDA SERENA	NUECES ROUNDNOSE MINNOW	G2	S2		
ERIMYZON OBLONGUS	CREEK CHUBSUCKER	G5	S2S3		T

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATU
ETHEOSTOMA CLARUM	WESTERN SAND DARTER	G3	S3		
ETHEOSTOMA FONTICOLA	FOUNTAIN DARTER	G1	S1	LE	E
ETHEOSTOMA GRAHAMI	RIO GRANDE DARTER	G3	S2		T
GAMBUSIA GAIGEI	BIG BEND GAMBUSIA	G1	S1	LE	E
GAMBUSIA GEORGEI	SAN MARCOS GAMBUSIA	GX	SX	LE	E
GAMBUSIA HETEROCHIR	CLEAR CREEK GAMBUSIA	G1	S1	LE	E
GAMBUSIA NOBILIS	PECOS GAMBUSIA	G2	S2	LE	E
GAMBUSIA SENILIS	BLOTCHED GAMBUSIA	G4	SX		T
GILA PANDORA	RIO GRANDE CHUB	G3	S1		T
GOBIONELLUS ATRIPINNIS	BLACKFIN GOBY	G3	S1		T
HYBOGNATHUS AMARUS	RIO GRANDE SILVERY MINNOW	G1G2	SX	LE	E
HYBOGNATHUS PLACITUS	PLAINS MINNOW	G5	S4		
ICTALURUS LUPUS	HEADWATER CATFISH	G3	S2		
ICTALURUS SP 1	CHIHUAHUA CATFISH	G1G2	S1S2		
MACRHYBOPSIS AESTIVALIS TETRANEMUS	ARKANSAS RIVER SPECKLED CHUB	G5T5	S5		
MICROPHIS BRACHYURUS	OPOSSUM PIPEFISH	G5	S1		T
MICROPTERUS TRECULI	GUADALUPE BASS	G3	S3		
MOXOSTOMA AUSTRINUM	WEST MEXICAN REDHORSE	G3	S1		
NOTROPIS BUCCULA	SMALLEYE SHINER	G2Q	S2		
NOTROPIS CHIHUAHUA	CHIHUAHUA SHINER	G3	S2		T
NOTROPIS GIRARDI	ARKANSAS RIVER SHINER	G2	S2	PE	
NOTROPIS HUBBSI	BLUEHEAD SHINER	G3	S1		T
NOTROPIS JEMEZANUS	RIO GRANDE SHINER	G3	S3		
NOTROPIS OXYRHYNCHUS	SHARPNOSE SHINER	G3	S3		
NOTROPIS SIMUS	BLUNTNOSE SHINER	G2	SX		T
PERCINA MACULATA	BLACKSIDE DARTER	G5	S1		T
POLYODON SPATHULA	PADDLEFISH	G4	S3		T
SATAN EURYSTOMUS	WIDEMOUTH BLINDCAT	G1	S1		T
SCAPHIRHYNCHUS PLATORYNCHUS	SHOVELNOSE STURGEON	G4	S2		T
SYNGNATHUS AFFINIS	TEXAS PIPEFISH	G1	S1		
TROGLOGLANIS PATTERSONI	TOOTHLESS BLINDCAT	G1	S1		T
*** INSECTS					
AESHNA DUGESI	ARROYO DARNER	G3	S?		
AGATHYMUS CHISOSENSIS		G2?	S2?		
AGATHYMUS GILBERTI		G2?	S?		
AGATHYMUS VALVERDIENSIS		G2?	S?		
AMBLYCHILA PICOLOMINII	A TIGER BEETLE	G3	S?		
AMBRYSUS HUNGERFORDI HUNGERFORDI	HUNGERFORD'S NAUCORID	G5T3	S1		
AMPLYPTERUS BLANCHARDI	BLANCHARDS' SPHINX MOTH	G1	S1		
ANOMALA TIBIALIS	TIBIAL SCARAB	GH	SH		
APODEMIA CHISOSENSIS	CHISOS METALMARK	G1G3	S?		
ARGIA LEONORAE	BALMORHEA DAMSELFLY	G2G3	S2		
ASAPHOMYIA TEXANUS	TEXAS ASAPHOMYIAN TABANID FLY	GH	SH		
ATRYTONOPSIS CESTUS		G1G3	S?		
AUSTROTINODES TEXENSIS	TEXAS AUSTROTINODES CADDISFLY	G2	S2		
BATRISODES TEXANUS	COFFIN CAVE MOLD BEETLE	G1	S1	LE	
BATRISODES VENYIVI	HELOTES MOLD BEETLE	G1	S1		
CALEPHELIS FREEMANI	FREEMAN'S METALMARK	GH	SH		
CALEPHELIS RAWSONI	RAWSON'S METALMARK	G3?	S?		
CHEUMATOPSYCHE FLINTI	FLINT'S NET-SPINNING CADDISFLY	G3	S3		
CHEUMATOPSYCHE MORSEI	MORSE'S NET-SPINNING CADDISFLY	G1	S1		
CHIMARRA HOLZENTHALI	HOLZENTHAL'S PHILOPOTAMID CADDISFLY	G1	S1		
CICINDELA CAZIERI	CAZIER'S TIGER BEETLE	G1	S1		
CICINDELA CHLOROCEPHALA SMYTHI	SMYTH'S TIGER BEETLE	GHTH	SH		
CICINDELA HORNII	A TIGER BEETLE	G3	S?		
CICINDELA NEVADICA OLMOSA	LOS OLMOS TIGER BEETLE	G5T3	S1S2		
CICINDELA NIGROCOERULEA SUBTROPICA	SUBTROPICAL BLUE-BLACK TIGER BEETLE	G5T2	SH		
CICINDELA OBSOLETA NEOJUVENILIS	NEOJUVENILE TIGER BEETLE	G5T1	SH		
CICINDELA POLITULA BARBARANNAE	BARBARA ANN'S TIGER BEETLE	G5T1	S1		
CICINDELA POLITULA PETROPHILA	GUADALUPE MOUNTAINS TIGER BEETLE	G5T2	S1		
CYLINDROPSIS SP 1	TOOTH CAVE BLIND ROVE BEETLE	G1	S1		
DERONECTES NEOMEXICANA	BONITA DIVING BEETLE	G1	S1		
EUPROSERPINUS WIESTI	WIEST'S SPHINX MOTH	G3G4	S1		
EXIMACRIS SUPERBUM	SUPERB GRASSHOPPER	GH	SH		
FIXSENIA POLINGI	POLING'S HAIRSTREAK	G1	S1		
GOMPHUS MODESTUS	GULF COAST CLUBTAIL	G3	S?		

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS
HAIDEOPORUS TEXANUS	EDWARDS AQUIFER DIVING BEETLE	G1	S1	
HALIPLUS NITENS	DISJUNCT CRAWLING WATER BEETLE	GH	SH	
HETERELMIS COMALENSIS	COMAL SPRINGS RIFFLE BEETLE	G1	S1	PE
HYDROPTILA OUACHITA	A PURSE CASEMAKER CADDISFLY	G1	S1	
LIBELLULA COMPOSITA	BLEACHED SKIMMER	G3	S?	
LIMNEBIUS TEXANUS	TEXAS MINUTE MOSS BEETLE	GH	SH	
LORDITHON NIGER	BLACK LORDITHON ROVE BEETLE	G1	SH	
MEGACEPHALA AFFINIS ANGUSTATA	A TIGER BEETLE	G5T3	S?	
MINISTRYMON CLYTIE	CLYTIE HAIRSTREAK	G3?	S?	
NEUROCORDULIA MOLESTA	SMOKY SHADOWFLY	G3	S?	
NICROPHORUS AMERICANUS	AMERICAN BURYING BEETLE	G1	SR	LE
PHYLOCENTROPUS HARRISI		G1	S1	
PIRUNA HAFERNIKI		G1?	S1?	
PROTOPTILA ARCA	SAN MARCOS SADDLE-CASE CADDISFLY	G1	S1	
PROTOPTILA BALMORHEA	BALMORHEA SADDLE-CASE CADDISFLY	G2	S1	
RHADINE EXILIS	A GROUND BEETLE	G1	S1	
RHADINE INFERNALIS	A GROUND BEETLE	G1	S1	
RHADINE PERSEPHONE	TOOTH CAVE GROUND BEETLE	G1	S1	LE
SCHINIA INDIANA	PHLOX MOTH	GU	SH	
SOMATOCHLORA MARGARITA	BIG THICKET EMERALD DRAGONFLY	G2	S2	
STALLINGSIA MACULOSUS	MACULATED MANFREDA SKIPPER	G2	S2	
STYGOPARNUS COMALENSIS	COMAL SPRINGS DRYOPID BEETLE	G1	S1	PE
TAENIOPTERYX STARKI	LEON RIVER WINTER STONEFLY	G1	S1	
TEXAMAUROPS REDDELLI	KRETSCHMARR CAVE MOLD BEETLE	G1	S1	LE
ZIZULA CYNA	CYNA BLUE	G3	S?	
*** MAMMALS				
BALAENOPTERA MUSCULUS	BLUE WHALE	G2	S1	LE
BALAENOPTERA PHYSALUS	FINBACK WHALE	G3	S1	LE
BLARINA HYLOPHAGA HYLOPHAGA	ELLIOT'S SHORT-TAILED SHREW	G5T1Q	S1	
BLARINA HYLOPHAGA PLUMBEA	ARANSAS SHORT-TAILED SHREW	G5T1Q	S1	
CANIS LUPUS	GRAY WOLF	G4	SX	LE
CANIS RUFUS	RED WOLF	G1	SX	LE
CHOERONYCTERIS MEXICANA	MEXICAN LONG-TONGUED BAT	G3G4	S1	
CORYNORHINUS RAFINESQUII	RAFINESQUE'S BIG-EARED BAT	G3G4	S3	
CORYNORHINUS TOWNSENDII PALLESCENS	PALE TOWNSEND'S BIG EARED BAT	G4T4	S3?	
CYNOMYS LUDOVICIANUS ARIZONENSIS	ARIZONA BLACK-TAILED PRAIRIE DOG	G5T3	S3	
DIPODOMYS ELATOR	TEXAS KANGAROO RAT	G2	S2	
EUBALAENA GLACIALIS	BLACK RIGHT WHALE	G1	S1	LE
EUDERMA MACULATUM	SPOTTED BAT	G4	S2	
EUMOPS PEROTIS CALIFORNICUS	GREATER WESTERN MASTIFF BAT	G5T?	S3	
FELIS PARDALIS	OCELOT	G3	S1	LE
FELIS WIEDII	MARGAY	G3	SX	
FELIS YAGUARONDI	JAGUARUNDI	G4	S1	LE
FERESA ATTENUATA	PYGMY KILLER WHALE	G4	S1	
GEOMYS ARENARIUS	DESERT POCKET GOPHER	G3	S2	
GEOMYS KNOXJONESI	JONES' POCKET GOPHER	G3	S2	
GEOMYS PERSONATUS DAVISI	DAVIS POCKET GOPHER	G4T2	S2	
GEOMYS PERSONATUS FUSCUS	TEXAS POCKET GOPHER	G4T2	S2	
GEOMYS PERSONATUS MARITIMUS	MARITIME POCKET GOPHER	G4T2	S2	
GEOMYS PERSONATUS STRECKERI	CARRIZO SPRINGS POCKET GOPHER	G4T1	S1	
GEOMYS TEXENSIS BAKERI	FRIO POCKET GOPHER	G3T2	S2	
GEOMYS TEXENSIS TEXENSIS	LLANO POCKET GOPHER	G3T2	S2	
GLOBICEPHALA MACRORHYNCHUS	SHORT-FINNED PILOT WHALE	G5	S1	
KOGIA BREVICEPS	PYGMY SPERM WHALE	G5	S1	
KOGIA SIMUS	DWARF SPERM WHALE	G4	S1	
LASIURUS EGA	SOUTHERN YELLOW BAT	G5	S1	
LEPTONYCTERIS NIVALIS	GREATER LONG-NOSED BAT	G3	S1	LE
MESOPLODON DENSIROSTRIS	TROPICAL BEAKED WHALE	G4	S1	
MESOPLODON EUROPAEUS	GERVAIS' BEAKED WHALE	G3	S1	
MICROTUS OCHROGASTER TAYLORI	PRAIRIE VOLE	G5T?	S1	
MUSTELA NIGRIPES	BLACK-FOOTED FERRET	G1	SH	LE
MYOTIS AUSTRORIPARIUS	SOUTHEASTERN MYOTIS BAT	G4	S3	
MYOTIS CILIOLABRUM	WESTERN SMALL-FOOTED BAT	G5	S3	
MYOTIS THYSANODES	FRINGED BAT	G5	S3	
MYOTIS VELIFER	CAVE BAT	G5	S4	
MYOTIS VOLANS	LONG-LEGGED BAT	G5	S4	

CIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATU
YOTIS YUMANENSIS	YUMA MYOTIS BAT	G5	S4		
ASUA NARICA	WHITE-NOSED COATI	G5	S2?		T
NDATRA ZIBETHICUS RIPENSIS	PECOS RIVER MUSKRAT	G5T?	S2S3		
RCINUS ORCA	KILLER WHALE	G4G5	S1		T
RYZOMYS COUESI	COUES' RICE RAT	G5	S2		T
VIS CANADENSIS MEXICANA	DESERT BIGHORN SHEEP	G5T3	S2		
ANTHERA ONCA	JAGUAR	G3	SH	LE	T
EROMYSCUS TRUEI COMANCHE	PALO DURO MOUSE	G5T2	S2		T
HYSETER MACROCEPHALUS	SPERM WHALE	G2	S1	LE	E
SEUDORCA CRASSIDENS	FALSE KILLER WHALE	G5	S1		T
CALOPUS AQUATICUS TEXANUS	PRESIDIO MOLE	G5T1Q	S1		
IGMODON OCHROGNATHUS	YELLOW-NOSED COTTON RAT	G5	S3		
PILOGALE PUTORIUS INTERRUPTA	PLAINS SPOTTED SKUNK	G5T3T4	S3		
TENELLA CLYMENE	SHORT-SNOUTED SPINNER DOLPHIN	G4	S1		
TENELLA FRONTALIS	ATLANTIC SPOTTED DOLPHIN	G5	S1		T
TENELLA LONGIROSTRIS	LONG-SNOUTED SPINNER DOLPHIN	G5	S1		
TENO BREDANENSIS	ROUGH-TOOTHED DOLPHIN	G4	S1		T
YLVILAGUS FLORIDANUS ROBUSTUS	DAVIS MOUNTAINS COTTONTAIL	G5T3	S3		
AMIAS CANIPES	GRAY-FOOTED CHIPMUNK	G3	S2S3		
HOMOMYS BOTTAE GUADALUPENSIS	GUADALUPE SOUTHERN POCKET GOPHER	G5T2	S2		
HOMOMYS BOTTAE LIMPIAE	LIMPIA SOUTHERN POCKET GOPHER	G5T2	S2		
HOMOMYS BOTTAE TEXENSIS	LIMPIA CREEK POCKET GOPHER	G5T2	S2		
RICHECHUS MANATUS	WEST INDIAN MANATEE	G2?	S1	LE	E
RSUS AMERICANUS	BLACK BEAR	G5	S3	T/SA	T
RSUS AMERICANUS LUTEOLUS	LOUISIANA BLACK BEAR	G5T3?	SR	LT	T
RSUS ARCTOS	GRIZZLY BEAR	G4	SX	LT	
ULPES VELOX	SWIFT FOX	G3	S3?	C1	
IPHIUS CAVIROSTRIS	GOOSE-BEAKED WHALE	G4	S1		T
** MOLLUSKS					
RCIDENS CONFRAGOSUS	ROCK-POCKETBOOK	G3	S?		
RKANSIA WHEELERI	OUACHITA ROCK-POCKETBOOK MUSSEL	G1	S1	LE	E
SHMUNELLA PASONIS	FRANKLIN MOUNTAIN WOOD SNAIL	G1	S1		
SSIMINEA PECOS	PECOS ASSIMINEA SNAIL	G2	S1	C1	
COCHLIOPA TEXANA	PHANTOM CAVE SNAIL	G1	S1		
ISCONAIAS SALINASENSIS	SALINA MUCKET	G1Q	S1		
UCHEMOTREMA CHEATUMI	PALMETTO PILL SNAIL	G1	S1		
FONTELICELLA DAVISI	DAVIS SPRING SNAIL	G1	S1		
FONTELICELLA METCALFI	PRESIDIO COUNTY SPRING SNAIL	G1	S1		
FUSCONAIA ASKEWI	TEXAS PIGTOE	G3	S1S2		
FUSCONAIA LANANENSIS	TRIANGLE PIGTOE	G2	S1		
HUMBOLDTIANA CHEATUMI	DAVIS MOUNTAINS THREEBAND	G2	S2		
HUMBOLDTIANA CHISOSENSIS	CHISOS MOUNTAINS THREEBAND	G1	S1		
HUMBOLDTIANA FERRISSIANA	MITRE PEAK THREEBAND	G2	S2		
HUMBOLDTIANA HOEGIANA PRAESIDII	SAN CARLOS THREEBAND	G3T3	S3		
HUMBOLDTIANA PALMERI	MOUNT LIVERMORE THREEBAND	G2	S2		
HUMBOLDTIANA TEXANA	STOCKTON PLATEAU THREEBAND	G2	S2		
HUMBOLDTIANA ULTIMA	NORTHERN THREEBAND	G2	S2		
LAMPSILIS BRACTEATA	TEXAS FATMUCKET	G2	S?		
LAMPSILIS SATURA	SANDBANK POCKETBOOK	G3	S1		
OBOVARIA JACKSONIANA	SOUTHERN HICKORYNUT	G1G2	S?		
PHREATODROBIA IMITATA	MIMIC CAVESNAIL	G1	S1		
PLEUROBEMA RIDDELLI	LOUISIANA PIGTOE	G1	S1		
POLYGYRA HIPPOCREPIS	HORSESHOE LIPTOOTH	G1	S1		
POPENAIAS POPEI	TEXAS HORNSHELL	G2	S2		
POTAMILUS AMPHICHAENUS	TEXAS HEELSPLITTER	G1	S1		
QUADRULA AUREA	GOLDEN ORB	G2G3	S?		
QUADRULA COUCHIANA	RIO GRANDE MONKEYFACE	GH	SH		
QUADRULA HOUSTONENSIS	SMOOTH PIMPLEBACK	G2	S?		
QUADRULA PETRINA	TEXAS PIMPLEBACK	G2G3	S?		
QUADRULA PUSTULOSA MORTONI	WESTERN PIMPLEBACK	G5T2T3	S?		
QUINCUNCINA MITCHELLI	FALSE SPIKE MUSSEL	G1	SH		
SONORELLA METCALFI	FRANKLIN MOUNTAIN TALUS SNAIL	G1	S1		
TRUNCILLA COGNATA	MEXICAN FAWNSFOOT MUSSEL	G1	S1		
TRUNCILLA MACRODON	TEXAS FAWNSFOOT	G1G2	S?		
TRYONIA ADAMANTINA	DIAMOND Y SPRING SNAIL	G1	S1	C1	
TRYONIA BRUNEI	BRUNE'S TRYONIA	G1	S1		

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	ST ST
TRYONIA CHEATUMI	PHANTOM CAVE SPRING TRYONIA	G1	S1		
TRYONIA STOCKTONENSIS	GONZALES SPRING SNAIL	G1	S1	C1	
*** REPTILES					
CARETTA CARETTA	LOGGERHEAD SEA TURTLE	G3	S2	LT	T
CEMOPHORA COCCINEA COPEI	NORTHERN SCARLET SNAKE	G5T5	S3		T
CEMOPHORA COCCINEA LINERI	TEXAS SCARLET SNAKE	G5T2	S2		T
CHELONIA MYDAS	GREEN SEA TURTLE	G3	S1	LT	T
COLEONYX RETICULATUS	RETICULATED GECKO	G3	S3		T
CONIOPHANES IMPERIALIS	BLACK-STRIPED SNAKE	G3	S2		T
CROTALUS HORRIDUS	TIMBER (CANEBRAKE) RATTLESNAKE	G5	S4		T
CROTAPHYTUS RETICULATUS	RETICULATE COLLARED LIZARD	G3	S2		T
DERMOCHELYS CORIACEA	LEATHERBACK SEA TURTLE	G3	S1	LE	E
DRYMARCHON CORAIS	INDIGO SNAKE	G5	S3		T
DRYMOBIUS MARGARITIFERUS	SPECKLED RACER	G5	S1		T
ERETMOCHELYS IMBRICATA	ATLANTIC HAWKSBILL SEA TURTLE	G3	S1	LE	E
GOPHERUS BERLANDIERI	TEXAS TORTOISE	G4	S3		T
GRAPTEMYS CAGLEI	CAGLE'S MAP TURTLE	G3	S3	C1	
GRAPTEMYS OUACHITENSIS SABINENSIS	SABINE MAP TURTLE	G5T3	S3		
HOLBROOKIA LACERATA	SPOT-TAILED EARLESS LIZARD	G3G4	S3?		
HOLBROOKIA PROPINQUA	KEELED EARLESS LIZARD	G3?	S3?		
KINOSTERNON HIRTIPES MURRAYI	CHIHUAHUAN MUD TURTLE	G3T3	S1		T
LEPIDOCHELYS KEMPII	KEMP'S RIDLEY SEA TURTLE	G1	S1	LE	E
LEPTODEIRA SEPTENTRIONALIS SEPTENTRIONALIS	NORTHERN CAT-EYED SNAKE	G5T5	S2		T
LIOCHLOROPHIS VERNALIS	SMOOTH GREEN SNAKE	G5	S1		T
MACROCLEMYS TEMMINCKII	ALLIGATOR SNAPPING TURTLE	G3G4	S3		T
MALACLEMYS TERRAPIN LITTORALIS	TEXAS DIAMONDBACK TERRAPIN	G5T3	S3		
NERODIA CLARKII	GULF SALTMARSH SNAKE	G4Q	S4		
NERODIA HARTERI	BRAZOS WATER SNAKE	G2	S2		T
NERODIA PAUCIMACULATA	CONCHO WATER SNAKE	G2	S2	LT	T
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD	G5	S4		T
PHRYNOSOMA HERNANDESI	MOUNTAIN SHORT-HORNED LIZARD	G5	S3		T
PITUOPHIS MELANOLEUCUS RUTHVENI	LOUISIANA PINE SNAKE	G5T3	S2		T
SCELOPORUS ARENICOLUS	DUNES SAGEBRUSH LIZARD	G5T2	S2		
TANTILLA ATRICEPS	MEXICAN BLACKHEAD SNAKE	G3	S1		
TANTILLA RUBRA	BIG BEND BLACKHEAD SNAKE	G4	S2		T
THAMNOPHIS SIRTALIS ANNECTENS	TEXAS GARTER SNAKE	G5T3	S3		
THAMNOPHIS SIRTALIS DORSALIS	NEW MEXICO GARTER SNAKE	G5T3	S1		
TRACHEMYS GAIGEAE	BIG BEND SLIDER	G3	S2		
TRIMORPHODON BISCUTATUS	TEXAS LYRE SNAKE	G5	S3		T

360 Records Processed

BASIC CODE KEY

FEDERAL STATUS (USESA)

LE - Listed Endangered
LT - Listed Threatened
LELT - Listed Endangered in part of range, Threatened in a different part
PE - Proposed to be listed Endangered
PT - Proposed to be listed Threatened
PDL - Proposed to be Delisted
E(S/A) or T(S/A) - Listed Endangered or Threatened on basis of Similarity of Appearance.
DL - Delisted Endangered/Threatened
C1 - Candidate, Category 1. USFWS has substantial information on biological vulnerability and threats to support proposing t as endangered or threatened. Data are being gathered on habitat needs and/or critical habitat designations.
C1* - C1, but lacking known occurrences
C1** - C1, but lacking known occurrences, except in captivity/cultivation
XE - Essential Experimental Population.
XN - Non-essential Experimental Population.

STATE STATUS

E - Listed as Endangered in the State of Texas
T - Listed as Threatened in the State of Texas
blank - Not currently listed

GLOBAL RANK (GRANK)

G1 - Critically imperiled globally, extremely rare, 5 or fewer occurrences. [Critically endangered throughout range.]
G2 - Imperiled globally, very rare, 6 to 20 occurrences. [Endangered throughout range.]
G3 - Very rare and local throughout range or found locally in restricted range, 21 to 100 occurrences. [Threatened throughou range.]
G4 - Apparently secure globally.
G5 - Demonstrably secure globally.
GH - Of historical occurrence through its range.
G#T# - "G"= species rank; "T"= rank of variety or subspecies taxa.
GU - Possibly in peril range-wide, but status uncertain.
G#G# - Ranked within a range as status uncertain.
GX - Believed to be extinct throughout range.
Q - Qualifier denoting questionable taxonomic assignment.
? - Not ranked to date; or, Qualifier denoting uncertain rank.
C - Captive population exists.

STATE RANK (SRANK)

S1 - Critically imperiled in state, extremely rare, very vulnerable to extirpation, 5 or fewer occurrences.
S2 - Imperiled in state, very rare, vulnerable to extirpation, 6 to 20 occurrences.
S3 - Rare or uncommon in state, 21 to 100 occurrences.
S4 - Apparently secure in state.
S5 - Demonstrably secure in state.
SA - Accidental in state.
SE - An exotic species established in state.
SH - Of historical occurrence in state. May be rediscovered.
SP - Potential occurrence in state.
SR - Reported, but without persuasive documentation.
SRF - Reported in error, but error persists in literature.
SU - Possibly in peril in state, but status uncertain.
SX - Apparently extirpated from State.
SZ - Migratory/transient in state to irregular/dispersed locations.
B - Basic rank refers to the breeding population in the state.
N - Basic rank refers to the non-breeding population in the state.
? - Not ranked to date; or, Qualifier denoting uncertain rank.
C - Captive population exists.

COMMON NAME	SCIENTIFIC NAME	STATE STATUS	FEDERAL STATUS	ECOREGIONS OF OCCURRENCE
***MAMMALS				
	Bats			
GREATER LONG-NOSED BAT	LEPTONYCTERIS NIVALIS	E	LE	11
SOUTHERN YELLOW BAT	LASIURUS EGA	T		6
SPOTTED BAT	EUDERMA MACULATUM	T		11
RAFINESQUE'S BIG-EARED BAT	CORYNORHINUS RAFINESQUII	T		1
	Rodents			
TEXAS KANGAROO RAT	DIPODOMYS ELATOR	T		9
COUES' RICE RAT	ORYZOMYS COUESI	T		6
PALO DURO MOUSE	PEROMYSCUS TRUEI COMANCHE	T		10
	Marine Mammals			
GERVAIS' BEAKED WHALE	MESOPLODON EUROPAEUS	T		12
GOOSE-BEAKED WHALE	ZIPHIUS CAVIROSTRIS	T		12
PYGMY SPERM WHALE	KOGIA BREVICEPS	T		12
DWARF SPERM WHALE	KOGIA SIMUS	T		12
SPERM WHALE	PHYSETER MACROCEPHALUS	E	LE	12
ATLANTIC SPOTTED DOLPHIN	STENELLA FRONTALIS	T		12
ROUGH-TOOTHED DOLPHIN	STENO BREDANENSIS	T		12
KILLER WHALE	ORCINUS ORCA	T		12
FALSE KILLER WHALE	PSEUDORCA CRASSIDENS	T		12
SHORT-FINNED PILOT WHALE	GLOBICEPHALA MACRORHYNCHUS	T		12
PYGMY KILLER WHALE	FERESA ATTENUATA	T		12
FINBACK WHALE	BALAENOPTERA PHYSALUS	E	LE	12
BLUE WHALE	BALAENOPTERA MUSCULUS	E	LE	12
BLACK RIGHT WHALE	EUBALAENA GLACIALIS	E	LE	12
WEST INDIAN MANATEE	TRICHECHUS MANATUS	E	LE	(4,12)
	Carnivores			
RED WOLF	CANIS RUFUS	E	LE	(1-4,7)**
GRAY WOLF	CANIS LUPUS	E	LE	(6-11)
BLACK BEAR	URSUS AMERICANUS	T	T/SA	(1,2,4,6-8),1
LOUISIANA BLACK BEAR	URSUS AMERICANUS LUTEOLUS	T	LT	(1)
GRIZZLY BEAR	URSUS ARCTOS		LT	(10,11)
WHITE-NOSED COATI	NASUA NARICA	T		4,6,7,11
BLACK-FOOTED FERRET	MUSTELA NIGRIPES	E	LE	(9-11)**
OCELOT	FELIS PARDALIS	E	LE	(4),6
MARGAY	FELIS WIEDII	T		(6)
JAGUARUNDI	FELIS YAGUARONDI	E	LE	(4),6
JAGUAR	PANTHERA ONCA	T	LE	(6,11)
***BIRDS				
	Waterbirds			
BROWN PELICAN	PELECANUS OCCIDENTALIS	E	LE	4
REDDISH EGRET	EGRETTA RUFESCENS	T		4
WHITE-FACED IBIS	PLEGADIS CHIHI	T		2-11
WOOD STORK	MYCTERIA AMERICANA	T		1,2,4,6
WHOOPING CRANE	GRUS AMERICANA	E	LE	4
	Raptors			
SWALLOW-TAILED KITE	ELANOIDES FORFICATUS	T		1,4
BALD EAGLE	HALIAEETUS LEUCOCEPHALUS	T	LT	1-4,7-11
COMMON BLACK-HAWK	BUTEOGALLUS ANTHRACINUS	T		6,11
GRAY HAWK	BUTEO NITIDUS	T		6
WHITE-TAILED HAWK	BUTEO ALBICAUDATUS	T		4-6
ZONE-TAILED HAWK	BUTEO ALBONOTATUS	T		6,7
NORTHERN APLOMADO FALCON	FALCO FEMORALIS SEPTENTRIONALIS	E	LE	6
PEREGRINE FALCON	FALCO PEREGRINUS	E,T	E/SA	4,7-11
AMERICAN PEREGRINE FALCON	FALCO PEREGRINUS ANATUM	E	LE	7-11
ARCTIC PEREGRINE FALCON	FALCO PEREGRINUS TUNDRIUS	T	E/SA	4
CACTUS FERRUGINOUS PYGMY-OWL	GLAUCIDIUM BRASILIANUM CACTORUM	T		5,6
MEXICAN SPOTTED OWL	STRIX OCCIDENTALIS LUCIDA	T	LT	11
	Upland Birds			
ATTWATER'S GREATER PRAIRIE-CHICKEN	TYMPANUCHUS CUPIDO ATTWATERI	E	LE	4
	Shorebirds			
PIPING PLOVER	CHARADRIUS MELODUS	T	LT	4
ESKIMO CURLEW	NUMENIUS BOREALIS	E	LE	4
INTERIOR LEAST TERN	STERNA ANTILLARUM ATHALASSOS	E	LE	6,9
SOOTY TERN	STERNA FUSCATA	T		4
	Woodpeckers			
RED-COCKADED WOODPECKER	PICOIDES BOREALIS	E	LE	1
IVORY-BILLED WOODPECKER	CAMPEPHILUS PRINCIPALIS	E	LE	(1)
	Songbirds			
NORTHERN BEARDLESS-TYRANNULET	CAMPTOSTOMA IMBERBE	T		6
SOUTHWESTERN WILLOW FLYCATCHER	EMPIDONAX TRAILLII EXTIMUS	E	LE	11
ROSE-THROATED BECARD	PACHYRAMPHUS AGLAIAE	T		6
BLACK-CAPPED VIREO	VIREO ATRICAPILLUS	E	LE	7,11
BACHMAN'S WARBLER	VERMIVORA BACHMANII	E	LE	(1)
TROPICAL PARULA	PARULA PITIAYUMI	T		6
GOLDEN-CHEEKED WARBLER	DENDROICA CHRYSOPARIA	E	LE	7
BACHMAN'S SPARROW	AIMOPHILA AESTIVALIS	T		1
BOTTERI'S SPARROW	AIMOPHILA BOTTERII	T		4

COMMON NAME	SCIENTIFIC NAME	STATE STATUS	FEDERAL STATUS	ECOREGIONS OF OCCURRENCE
***REPTILES				
Turtles				
LOGGERHEAD SEA TURTLE	CARETTA CARETTA	T	LT	12
GREEN SEA TURTLE	CHELONIA MYDAS	T	LT	12
ATLANTIC HAWKSBILL SEA TURTLE	ERETMOCHELYS IMBRICATA	E	LE	12
KEMP'S RIDLEY SEA TURTLE	LEPIDOCHELYS KEMPII	E	LE	12
ALLIGATOR SNAPPING TURTLE	MACROCLEMYS TEMMINCKII	T		1-4
LEATHERBACK SEA TURTLE	DERMOCHELYS CORIACEA	E	LE	12
CHIHUAHUAN MUD TURTLE	KINOSTERNON HIRTIPES	T		11
TEXAS TORTOISE	GOPHERUS BERLANDIERI	T		4-6
Lizards				
RETICULATED GECKO	COLEONYX RETICULATUS	T		11
RETICULATE COLLARED LIZARD	CROTAPHYTUS RETICULATUS	T		6
TEXAS HORNED LIZARD	PHRYNOSOMA CORNUTUM	T		2-11
MOUNTAIN SHORT-HORNED LIZARD	PHRYNOSOMA HERNANDESI	T		11
Snakes				
SCARLET SNAKE	CEMOPHORA COCCINEA	T		1,4-6
BLACK-STRIPED SNAKE	CONIOPHANES IMPERIALIS	T		6
INDIGO SNAKE	DRYMARCHON CORAIS	T		4-7
SPECKLED RACER	DRYMOBIUS MARGARITIFERUS	T		6
NORTHERN CAT-EYED SNAKE	LEPTODEIRA SEPTENTRIONALIS	T		4
BRAZOS WATER SNAKE	NERODIA HARTERI	T		2,9
CONCHO WATER SNAKE	NERODIA PAUCIMACULATA	T	LT	8,9
SMOOTH GREEN SNAKE	LIOCHLOROPHIS VERNALIS	T		4
LOUISIANA PINE SNAKE	PITUOPHIS MELANOLEUCUS RUTHVENI	T		1
BIG BEND BLACKHEAD SNAKE	TANTILLA RUBRA	T		7,11
TEXAS LYRE SNAKE	TRIMORPHODON BISCUTATUS	T		11
TIMBER (CANEBRAKE) RATTLESNAKE	CROTALUS HORRIDUS	T		1-4
***AMPHIBIANS				
Salamanders				
CASCADE CAVERNS SALAMANDER	EURYCEA LATITANS	T		7
SAN MARCOS SALAMANDER	EURYCEA NANA	T	LT	7
COMAL BLIND SALAMANDER	EURYCEA TRIDENTIFERA	T		7
BARTON SPRINGS SALAMANDER	EURYCEA SOSORUM		LE	7
TEXAS BLIND SALAMANDER	EURYCEA RATHBUNI	E	LE	7
BLANCO BLIND SALAMANDER	EURYCEA ROBUSTA	T		7
BLACK-SPOTTED NEWT	NOTOPHTHALMUS MERIDIONALIS	T		4-6
SOUTH TEXAS SIREN (LARGE FORM)	SIREN SP 1	T		4-6
Frogs and Toads				
HOUSTON TOAD	BUFO HOUSTONENSIS	E	LE	2,4
MEXICAN TREEFROG	SMILISCA BAUDINII	T		6
WHITE-LIPPED FROG	LEPTODACTYLUS LABIALIS	T		6
SHEEP FROG	HYPOPACHUS VARIOLOSUS	T		5,6
MEXICAN BURROWING TOAD	RHINOPHRYNUS DORSALIS	T		6
***FISHES				
Large River Fish				
SHOVELNOSE STURGEON	SCAPHIRHYNCHUS PLATORYNCHUS	T		1
PADDLEFISH	POLYODON SPATHULA	T		1
Minnows				
MEXICAN STONEROLLER	CAMPOSTOMA ORNATUM	T		11
DEVILS RIVER MINNOW	DIONDA DIABOLI	T	C1	7
RIO GRANDE CHUB	GILA PANDORA	T		11
RIO GRANDE SILVERY MINNOW	HYBOGNATHUS AMARUS	E	LE	(11)
CHIHUAHUA SHINER	NOTROPIS CHIHUAHUA	T		11
ARKANSAS RIVER SHINER	NOTROPIS GIRARDI		PE	9
BLUEHEAD SHINER	NOTROPIS HUBBSI	T		1
BLUNTNOSE SHINER	NOTROPIS SIMUS	T		(11)*
PROSERPINE SHINER	CYPRINELLA PROSERPINA	T		7,11
Suckers				
BLUE SUCKER	CYCLEPTUS ELONGATUS	T		1-4,6,7
CREEK CHUBSUCKER	ERIMYZON OBLONGUS	T		1
Catfish				
WIDEMOUTH BLINDCAT	SATAN EURYSTOMUS	T		7
TOOTHLESS BLINDCAT	TROGLOGLANIS PATTERSONI	T		7
Killifishes				
LEON SPRINGS PUPFISH	CYPRINODON BOVINUS	E	LE	11
COMANCHE SPRINGS PUPFISH	CYPRINODON ELEGANS	E	LE	11
CONCHOS PUPFISH	CYPRINODON EXIMIUS	T		11
PECOS PUPFISH	CYPRINODON PECOSENSIS	T	C1	11
Livebearers				
BIG BEND GAMBUSIA	GAMBUSIA GAIGEI	E	LE	11
SAN MARCOS GAMBUSIA	GAMBUSIA GEORGEI	E	LE	(7)*
CLEAR CREEK GAMBUSIA	GAMBUSIA HETEROCHIR	E	LE	8
PECOS GAMBUSIA	GAMBUSIA NOBILIS	E	LE	11
BLOTCHED GAMBUSIA	GAMBUSIA SENILIS	T		(7,11)**

COMMON NAME	SCIENTIFIC NAME	STATE STATUS	FEDERAL STATUS	ECOREGIONS OF OCCURRENCE
	Perches			
FOUNTAIN DARTER	ETHEOSTOMA FONTICOLA	E	LE	7
RIO GRANDE DARTER	ETHEOSTOMA GRAHAMI	T		7,11
BLACKSIDE DARTER	PERCINA MACULATA	T		1
	Coastal Fishes			
OPOSSUM PIPEFISH	MICROPHIS BRACHYURUS	T		12
RIVER GOBY	AWAOUS TAJASICA	T		4,6,12
BLACKFIN GOBY	GOBIONELLUS ATRIPINNIS	T		6,12
***INVERTEBRATES				
	Crustaceans			
PECK'S CAVE AMPHIPOD	STYGOBROMUS PECKI		PE	7
	Insects			
AMERICAN BURYING BEETLE	NICROPHORUS AMERICANUS		LE	1
COMAL SPRINGS RIFFLE BEETLE	HETERELMIS COMALENSIS		PE	7
TOOTH CAVE GROUND BEETLE	RHADINE PERSEPHONE		LE	7
KRETSCHMARR CAVE MOLD BEETLE	TEXAMAUROPS REDDELLI		LE	7
COFFIN CAVE MOLD BEETLE	BATRISODES TEXANUS		LE	7
COMAL SPRINGS DRYOPID BEETLE	STYGOPARNUS COMALENSIS		PE	7
	Spiders			
TOOTH CAVE SPIDER	NEOLEPTONETA MYOPICA		LE	7
BEE CREEK CAVE HARVESTMAN	TEXELLA REDDELLI		LE	7
BONE CAVE HARVESTMAN	TEXELLA REYESI		LE	7
TOOTH CAVE PSEUDOSCORPION	TARTAROCREAGRIS TEXANA		LE	7
	Mollusks			
OUACHITA ROCK-POCKETBOOK MUSSEL	ARKANSIA WHEELERI	E	LE	2
***PLANTS				
	Cacti			
TOBUSCH FISHHOOK CACTUS	ANCISTROCACTUS TOBUSCHII	E	LE	7
BUNCHED CORY CACTUS	CORYPHANTHA RAMILLOSA	T	LT	11
LLOYD'S HEDGEHOG CACTUS	ECHINOCEREUS LLOYDII	E	PDL	11
BLACK LACE CACTUS	ECHINOCEREUS REICHENBACHII VAR ALBERTII	E	LE	4,6
DAVIS' GREEN PITAYA	ECHINOCEREUS VIRIDIFLORUS VAR DAVISII	E	LE	11
CHISOS MOUNTAINS HEDGEHOG CACTUS	ECHINOCEREUS CHISOENSIS VAR CHISOENSIS	T	LT	11
LLOYD'S MARIPOSA CACTUS	NEOLLOYDIA MARIPOSENSIS	T	LT	11
NELLIE CORY CACTUS	CORYPHANTHA MINIMA	E	LE	11
SNEED PINCUSHION CACTUS	CORYPHANTHA SNEEDII VAR SNEEDII	E	LE	11
STAR CACTUS	ASTROPHYTUM ASTERIAS	E	LE	6
	Trees, Shrubs, and Sub-shrubs			
WALKER'S MANIOC	MANIHOT WALKERAE	E	LE	6
HINCKLEY'S OAK	QUERCUS HINCKLEYI	T	LT	11
JOHNSTON'S FRANKENIA	FRANKENIA JOHNSTONII	E	LE	6
TEXAS AYENIA	AYENIA LIMITARIS	E	LE	6
TEXAS SNOWBELLS	STYRAX TEXANUS	E	LE	7
	Wildflowers			
SOUTH TEXAS AMBROSIA	AMBROSIA CHEIRANTHIFOLIA	E	LE	4,6
TEXAS PRAIRIE DAWN	HYMENOXYS TEXANA	E	LE	4
ASHY DOGWEED	THYMOPHYLLA TEPHROLEUCA	E	LE	6
TERLINGUA CREEK CAT'S-EYE	CRYPTANTHA CRASSIPES	E	LE	11
WHITE BLADDERPOD	LESQUERELLA PALLIDA	E	LE	1
SLENDER RUSH-PEA	HOFFMANNSEGGIA TENELLA	E	LE	4,6
MCKITTRICK PENNYROYAL	HEDEOMA APICULATUM	T	DL	11
TEXAS POPPY-MALLOW	CALLIRHOE SCABRIUSCULA	E	LE	9
LARGE-FRUITED SAND-VERBENA	ABRONIA MACROCARPA	E	LE	2
TEXAS TRAILING PHLOX	PHLOX NIVALIS SSP TEXENSIS	E	LE	1
CHAFFSEED	SCHWALBEA AMERICANA		LE	?
	Orchids			
NAVASOTA LADIES'-TRESSES	SPIRANTHES PARKSII	E	LE	1,2
	Grasses and Grass-like Plants			
TEXAS WILD-RICE	ZIZANIA TEXANA	E	LE	7
LITTLE AGUJA PONDWEED	POTAMOGETON CLYSTOCARPUS	E	LE	11

KEY: State Status - E=Endangered, T=Threatened
Federal Status - LE=Listed Endangered, LT=Listed Threatened, PE=Proposed Endangered, PT=Proposed Threatened, DL=Delisted, PDL=Proposed Delisted, E/SA,T/SA=Endangered/Threatened by Similarity of Appearance, C1=Candidate Species (category 1 - awaiting listing)
Ecoregion - ( )=Species extirpated from ecoregion within Texas
**=Species extinct*
***=Species extinct in the wild (except some experimental populations)*
If a species is listed, all its subspecies have same listing status, by default

In 1983, the Texas Legislature created the Special Nongame and Endangered Species Conservation Fund. This fund may be used for nongame wildlife and endangered species research and conservation, habitat acquisition and development, and dissemination of information pertaining to these species. Money for the fund is obtained through private donations and sale of nongame wildlife art prints, decals and stamps. For more information on the fund or endangered species call 1-800-792-1112 or 512-912-7011.

PWD-LF-W3000-017 (11/97) (previous revisions obsolete)

APPENDIX J

NATIONAL MARINE FISHERIES SERVICE LETTER PROVIDING A LIST OF THREATENED AND ENDANGERED MARINE MAMMALS THAT MIGHT OCCUR AT PADRE ISLAND NATIONAL SEASHORE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33702

JUL 1 1998 F/SER3:CCC:jbm

Mr. David E. McGinnis, Superintendent
Padre Island National Seashore
9405 South Padre Island Drive
Corpus Christi, Texas 78418

Dear Mr. McGinnis:

This responds to your letter, dated May 26, 1998, requesting a list of threatened and endangered species within National Marine Fisheries Service (NMFS) jurisdiction occurring within the boundaries of the Padre Island National Seashore. Specifically, you are concerned with the species that may be affected by the Seashore's Oil and Gas Management Plan. The only listed species under our jurisdiction likely to occur within the Seashore boundaries are sea turtles, including green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*) turtles.

For information on the distribution, abundance, diet, and habitat use of the turtles within the Padre Island National Seashore, we recommend that you confer with Donna Shaver, within your own offices on Padre Island. Donna's outstanding work with nesting and stranded turtles, as well as her in-water sampling, has resulted in a wealth of area-specific natural and life history information of sea turtles within the Seashore. The NMFS relies extensively on these data whenever we develop management measures for fisheries, dredging projects, and other Federal activities in Texas.

Please contact Colleen Coogan (727 570-5312) if you have any questions or need further information regarding Endangered Species Act coordination.

Sincerely,

Andrew J. Kemmerer
Regional Administrator

cc: F/PR3
F/SEC5, Galveston

THIS PAGE INTENTIONALLY LEFT BLANK

REFERENCES

Albers, P.H. 1979. Effects of Corexit 9527 on the hatchability of mallard eggs. Bull. Env. Contam. and Tox. 23:661-668.

Albers, P.H. and M.L. Gay. 1982. Effects of a chemical dispersant and crude oil on breeding ducks. Bull. Env. Contam. and Tox. 9:138-139.

Albers, P.H., 1990. Oil spills and the environment: A review of chemical fate and biological effects of petroleum. In: White, J. Ed., The Effects of Oil on Wildlife. Sheridan Press, Hanover PA. pp. 1-11.

Amdurer, M. and L.S. Land. 1982. "Geochemistry, Hydrology, and Mineralogy of the Sand Bulge Area, Laguna Madre Flats, South Texas". Journal Sedimentary Petrology. 52(3):703-716.

Baccus, J.T. and J.K. Horton. 1979. "An Ecological and Sedimentary Study of Padre Island National Seashore". Contract CX7029-7-0059, National Park Service, Santa Fe, New Mexico.

Berkebile, C.A. and R. Hay. 1994. "Phase I Groundwater Resource Investigation at the Padre Island National Seashore - Final Report". Contract 1443PX749093149, National Park Service, Corpus Christi, Texas.

Blum, M. and J.R. Jones. 1985. "Variation in Vegetation Density and Foredune Complexity at North Padre Island, Texas". Tx. Jr of Sci. 37(1).

Boylan, David M. 1986. "The Hydrogeologic Resources of North Padre Island; Coastal South Texas." Published MS Thesis. Baylor University, Waco, Texas.

Brown, F.L., Jr., J.H. McGowen, T.J. Evans, C.G. Groat, and W.L. Fisher. 1977. Environmental geologic atlas of the Texas Coastal Zone - Kingsville area. The University of Texas at Austin, Bureau of Economic Geology, 131 pgs.

Butler, R.G., A. Harfenist, F.A. Leighton, and D.B. Peakall. 1988. Impact of sublethal oil and emulsion exposure on the reproductive success of Leach's storm-pestrels: short- and long-term effects. J. of Appl. Ecol. 25:125-143.

Caldwell, M. C., Hall, N. R. and D. K. Caldwell. 1971. Ability of an Atlantic bottlenosed dolphin to discriminate between, and potentially identify to individual, the whistles of another species, the spotted dolphin. Cetology 6, 1-6.

Campbell, T.N. 1983. Coahuiltecans and Their Neighbors. Handbook of North American Indians 10:343-358. Edited by Alfonso Ortiz. Smithsonian Institution. Washington D.C.

Chamberlain, D.W. 1991. Effects of nonexplosive seismic energy releases on fish. American Fisheries Society Symposium 11:22-25

Chambers, J.R. 1992. Coastal degradation and fish population losses. in Proceedings of the National Symposium on Fish Habitat Conservation, March 7-9, 1991, Baltimore, MD. 38pp.

Chaney, A.H. 1988. "An Analysis of the Nekton and Plankton Around a Shoalgrass Bed in the Laguna Madre of Texas". Contract PX7490-7-0009, National Park Service, Corpus Christi, Texas.

Chaney, A.H., G.W. Blacklock, and S.G. Bartels. 1993. "Bird Use of the Padre Island National Seashore Gulf Beach from Sept. 1992 - Aug. 1993". Contract 1443PX749092188, Padre Island National Seashore, Corpus Christi, Texas.

Chaney, A.H., G.W. Blacklock, and S.G. Bartels. 1993. "Laguna Madre Bird Project From Yarborough Pass to Mansfield Channel During July 1992 Through April 1993". Contract 1443PX7000092582, Padre Island National Seashore, Corpus Christi, Texas.

Chaney, A.H., G.W. Blacklock, and S.G. Bartels. 1995. "Laguna Madre Bird Survey, Yarborough Pass to Northern Boundary, Padre Island National Seashore, August 1994 to August 1995". Contract 1443PX749094190, Padre Island National Seashore, Corpus Christi, Texas.

Cobb, R. 1987. Mitigation Evaluation Study for the South Texas Coast, 1975-1986. Report to USFWS (No. 14-16-0002-86-919), CCSU Center for Coastal Studies, Corpus Christi, TX.

Cowardin, L.M., et al. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Services Publication FWS/OBS-79/31.

Dahl, B.E., B.A. Fall, A. Lohse, and S.G. Appan. 1975. "Construction and Stabilization of Coastal Foredunes with Vegetation: Padre Island, Texas." Contract DACQ 72-69-C0012, Department of the Army, Fort Belvoir, Virginia.

Davis, R., G. Scott, B. Würsig, G. Fargion, W. Evans, L. Hansen, R. Benson, K. Mullin, T. Leming, N. May, B. Mate, J. Norris, T. Jefferson, D. Peake, S. K. Lynn, T. Sparks, and C. Schroeder. 1995. Distribution and Abundance of Marine Mammals in the North-Central and Western Gulf of Mexico: Draft Final Report.

Ditton, R.B. and J.H. Gramann. 1987. A Survey of Down-Island Visitors and Their Use Patterns at Padre Island National Seashore. National Park Service, Cooperative Park Studies Unit, Texas A & M University, Department of Recreation and Parks, Texas Agricultural Experiment Station, College Station, Texas, Technical Report No. 6. 175 p.

Drawe, D.L. and K.R. Kattner. 1978. "Effective Burning and Mowing on Vegetation of Padre Island". SW Naturalist. 23(2): 273-278.

Drawe, D. Lynn. 1992. "An Analysis of Plant Communities and Plant Species Composition along Four Transects across Padre Island National Seashore". Padre Island National Seashore, Corpus Christi, Texas.

Drawe, D.L. and I.M. Ortega. 1996. Impacts of geophysical seismic survey vehicles on Padre Island National Seashore vegetation. 1996. Texas Journal of Science. 48(2):107-118.

Dunton, K. 1994. Seasonal growth and biomass of the subtropical seagrass Halodule wrightii Aschers. In relation to continuous measurements of underwater irradiance. Marine Biology 120:479-489.

Duronslet, M.J., C.W. Caillouet, S. Manzella, K.W. Indelicato, C.T. Fontain, D.B. Revera, T. Williams, and D. Boss. 1986. The effects of an underwater explosion on the sea turtles *Lepidochelys kempi* and *Caretta caretta* with observations of effects on other marine organisms (trip report) Galveston, TX: U.S. Dept. of Commerce, National Marine Fisheries Service, Southeast Fisheries Center.

Eleuterius, L. N. 1987. Seagrass ecology along the coasts of Alabama, Louisiana, and Mississippi. pages 11-24, In M. J. Durako, R. C. Phillips, and R. R. Lewis (eds.), Proceedings of the Symposium on Subtropical-Tropical Seagrasses of the Southeastern United States. Florida Marine Research Publication No. 42, Florida Department of Natural Resources, St. Petersburg, Florida.

Elliott, L. and C. Zonick. 1996. Investigations into the Direct and Indirect Effects of Channel/Dredge Spoil Complexes on Habitat used by Piping Plovers and other Shorebirds along the Texas Laguna Madre. Interim Report to USFWS, Albuquerque, NM (Section 6). 21 pp.

Everett, J. Keith. 1979. *Historic Structures Report, Novillo Line Camp, Padre Island National Seashore*. Santa Fe, New Mexico: National Park Service.

Farmer, M. 1991. Reddish Egrets of the Lower Laguna Madre, Texas. National Audubon Society report to USFWS, Albuquerque, NM. 54 pp.

Fritts, T.H., and M.A. McGehee. 1982. Effects of petroleum on the development and survival of marine turtle embryos. Prepared for the Minerals Management Service, Gulf of Mexico OCS Region under contract No. 14-16-0009-80-946.

Geraci, J.R., D.J. St. Aubin, and R.J. Reisman. 1983. Bottlenose dolphins, Tursiops truncatus, can detect oil, Can J. Fish. Aquat. Sci. 40(9):1515-1522.

Geraci, J.R. 1990. Physiologic and toxic effects of oil on cetaceans. In: J.R. Geraci and D.J. St Aubin, eds. Sea mammals and oil: confronting the risks. Academic Press, Inc. pp. 167-197.

Goetze, J.R., A. Nelson, and V. French. 1997. "Dynamics of Small Mammal Populations of the Big Ball Hill Region, and Adjacent Areas, of Padre Island National Seashore". Unpublished Report, Texas A&M University, Kingsville, Texas.

Gramann, J.H. and E.J. Ruddell. 1989. Characteristics, Management Preferences and Conflict Perceptions of Bird Island Basin Visitors, Padre Island National Seashore. National Park Service, Cooperative Park Studies Unit, Texas A & M University, College Station, Texas, Technical Report No. 14. 159 p.

Hannan, H.H., T. Savage, F. Werkenthin, C Wiedenfeld, and J. Ralph. 1978. A Water Quality and Limnological Study of the Sewage System-Pond Complex at the Ranger Station, North Padre Island, Texas". Contract 7029-8-0469, National Park Service, Santa Fe, New Mexico.

Harris, V. M. 1965. "History of Cattle Raising on Padre Island". Pp. 1-13 in*South Texas Agriculture*, Volume 1, No. 2. Robstown, Texas: The Perry Foundation.

Herzing, D. 1990. Underwater and close up with spotted dolphins. Whalewatcher 24(3): 16-19.

Horizon Environmental Services. 1989. "Padre Island National Seashore Vegetative History". Contract RQ7490-8-0006, National Park Service, Corpus Christi, Texas.

Hunter, Rob. 1997. "A Limited Site Characterization on Abandoned Oil and Gas Exploration and Production Sites." Contracts 1443PX700095680 and 1443PX700095678, Padre Island National Seashore, Corpus Christi, Texas.

Lutz, P.L., and A.A. Alfaro-Shulman. 1992. The effects of chronic plastic ingestion on green sea turtles, final report. U.S. Dept. of Commerce. NOA SB2 WC HO6134.

McCoy, P. and R. Ilg. 1994. "Final Plan of Operations for Drilling and Operating an Exploration Well, Padre Island National Seashore". Carter & Burgess, Inc., Austin, Texas.

Miller, J.E., S.W. Baker, and D.L. Echols. June 1995. Marine Debris Point-Source Investigations, 1984-1994, Padre Island National Seashore, 46 pgs.

Moulton, D.W., T.E. Dahl, and D.M. Dall. 1997. "Texas Coastal Wetlands; Status and Trends, Mid-1950's to Early 1990's". U.S. Department of the Interior, Fish and Wildlife Service, Albuquerque, New Mexico. 32 pages.

National Research Council. 1990. The decline of sea turtles: causes and prevention. Committee on Sea Turtle Conservations. Washington D.C. National Academy Press. 183pp.

Newcomb, J.R. 1983. Karankawa. Handbook of North American Indians 10:359-367.

Nicolau, B. A. and J. S. Adams. 1993. Estuarine faunal use in a mitigation project, Nueces River delta, Texas: years two and three. Report to USFWS (No. 14-16-0002-88-915), CCSU Center for Coastal Studies, Corpus Christi, TX.

Nicolau, B. A. 1993. Estuarine Faunal use in a mitigation project, Nueces River Delta, Texas: year four. Report to USFWS (No. 14-16-0002-88-915), TAMU, Center for Coastal Studies, Corpus Christi, TX.

Onuf, C. 1994. Seagrasses, Dredging and Light in Laguna Madre, Texas, USA. Estuarine, Coastal and Shelf Science. (1994) 39:75-91.

Onuf, C. P. 1996. Seagrass responses to long-term light reduction by brown tide in upper Laguna Madre, Texas: distribution and biomass patterns. Marine Ecology Progress Series 138:219-231.

Oxley, F.M. 1992. "A Fungal Survey of Three Ponds on North Padre Island". Published MS Thesis, Southwest Texas State University, San Marcos, Texas.

Padre Island National Seashore:
1998-1999. Various discussions with park staff.
1996. *Resources Management Plan*

Perrin, W.F., D.K. Caldwell and M.C. Caldwell. 1994. Atlantic Spotted Dolphin-Stenella frontalis (G. Cuvier, 1829). Pp. 173-190 in: Handbook of Marine Mammals, S.H. Ridgway and R. Harrison, (eds.), Academic Press, San Diego.

Perez, Rogelio G. 1971. "Relationships between phytoplankton and chlorophyll standing crops in two permanent freshwater ponds in a marine supratidal environment." Unpublished MS Thesis, Texas A&I University, Kingsville, Texas.

Phillips, R. C. 1960. Observations on the ecology and distribution of the Florida seagrasses. Prof. Papers Series No. 2, Florida State Board Conserv., Tampa, Fl., 65 pp.

Rechenthin, C.A. and H. Passey. 1967. "The Vegetation of Padre Island National Seashore". Soil Conservation Service, Temple, Texas.

Ricklis, Robert A. 1996 The Karankawa Indians of Texas: An Ecological Study of Cultural Tradition and Change. University of Texas Press.

Rocha, Dennis D. and J. W. Tunnell, Jr. 1995. "Composition and Distribution of the Gulf Beach Benthic Invertebrate Community at Padre Island National Seashore." Contract PX 7490-09-3147, National Park Service, Corpus Christi, Texas.

Rusnak, G.A. 1960. Sediments of Laguna Madre, Texas. Shepard, F.P., Phleger, F.B., and van Andel, T.H. Recent Sediments, Northwest Gulf of Mexico. Tulsa, Oklahoma: American Association of Petroleum Geologists. 394p.

Sauer, C.O. 1950. "Grassland climax, fire, and man". J. Range Manage., 3:16-21.

Schilz, Thomas F. 1994. Tonkawa. In Native America in the Twentieth Century, An Encyclopedia. Edited by Mary B. Davis. Garland Publishing. New York.

Scott, A. J., R. A. Hoover, and J. H. McGowen. 1969. Effects of Hurricane Beulah, 1967, on Texas Coastal lagoons and barriers, in Castanares, A. A., and Phleger, F. B., eds., Laguna Costeras, un symposio: Mexico, D.F., Universidad Nacional Autonoma de Mexico, UNAM-UNESCO, Memorandum Simposio International Laguna Costeras, P. 221-236.

Scurlock, Dan. 1974 Archeological Assessment, Padre Island National Seashore. Prepared by Dan Scurlock, Warren M. Lynn, and R. Thomas Ray.

Serota, Thomas D. 1971. "Relationships between phytoplankton and chlorophyll standing crops in two permanent freshwater ponds in a marine supratidal environment." Unpublished MS Thesis, Texas A&I University, Kingsville, Texas.

Shaver, D.J. 1984. "The Surf Zone Fish Fauna of the Padre Island National Seashore". Published MS Thesis, Texas A&I University, Kingsville, Texas.

Shaver, D.J. 1997. "Padre Island National Seashore, Kemp's Ridley Sea Turtle Project, 1996 Report". Department of the Interior, U.S. Geological Survey, Corpus Christi, Texas.

Sheire, James W. 1971. Padre Island National Seashore Historic Resource Study. Office of History and Historic Architecture, National Park Service, Eastern Service Center, Washington D.C.

Sissom, Stanley L. 1990. "A Baseline Study of Three Ponds Within the Padre Island National Park." Contract RQ 7490-9-0009, National Park Service, Corpus Christi, Texas.

U.S.D.A. *1965*. Soil Survey of Nueces County, Texas. Soil Conservation Service, U.S. Department of Agriculture. 144p.

U.S.D.I. 1995. Volume II: Technical Report. OCS Study # MMS 95-. Prepared by the Texas Institute of Oceanography and the National Marine Fisheries Service. U.S. Dept. of the Interior, Minerals Mgmt. Service, Gulf of Mexico OCS Region, New Orleans, La.

U.S.D.I. National Park Service. 1994. *Cultural Resource Management Guideline*, Release No. 4. Chapter 7, Management of Cultural Landscapes. Washington, D.C. National Park Service.

U.S.D.I. National Park Service. 1996. Resources Management Plan, Padre Island National Seashore.

Vermeer, K., and R. Vermeer. 1975. Oil threat to birds on the Canadianwest coast. The Canadian Field Naturalist. 89:278-298.

Weise, B.R. and W.A. White. 1980. Padre Island National Seashore: A guide to the geology, natural environments, and history of a Texas barrier island. Bureau of Economic Geology Guidebook 17, University of Texas, Austin, TX. 94 pp.

Weller, M.W. 1964. Distribution and migration of the redhead. J Wildlife Management 28:64-103.

Withers, Kim. 1993. "Study to Determine the Abundance and Distribution of Benthic Invertebrates and Shorebirds on a North Padre Island Blue-Green Algal Flat." Unpublished paper, National Park Service, Corpus Christi, Texas.

Withers, Kim. 1994. "The Relationship of Macrobenthic Prey Availability to Shorebird Use of Blue-Green Algal Flats in the Upper Laguna Madre." Published Ph.D. Thesis. Texas A&M University, College Station, Texas.

Withers, K. 1998. Biological Productivity of Southerly Wind-tidal Flats Within Padre Island National Seashore. Texas A&M University-Corpus Christi Center for Coastal Studies Tech. Rept. TAMU-CC-9810-CCS; PINS Contract 1443PX7305097163. Corpus Christi, Texas. 46 pages.

Yzaguirre, G.A. 1974. "Distribution and Variation of Rodents in Different Vegetation-terrain Types on Padre Island". Published MS Thesis, Texas A&I University, Kingsville, Texas.

Zieman, J.C. 1975. *Need ref – seagrasses and dredged material – p. 3-34.*

Zieman, J.C. 1976. The ecological effects of physical damage from motor boats on turtle grass beds in southern Florida. Aquatic Botany 2:127-139.

GLOSSARY

Abandonment: The termination of oil and gas production operations, removal of facilities, plugging of the well bore, and reclamation of surface disturbances.

Access: Any way, means, or method of entering or traversing on, across, or through federally owned or controlled lands or waters (36 CFR §.30(a)), including but not limited to: vehicle, watercraft, fixed-wing aircraft, helicopter, offroad vehicle, mobile heavy equipment, snowmobile, pack animal, and foot.

Affected Environment: Surface or subsurface resources (including social and economic elements) within or adjacent to a geographic area that could potentially be affected by oil and gas activities. The environment of the area to be affected or created by the alternatives under consideration. (40 CFR 1502.15)

Alternative: A combination of management prescriptions applied in specific amounts and locations to achieve a desired management emphasis as expressed in goals and objectives. One of several policies, plans, or projects proposed for decision-making. An alternative need, not substitute, for another in all respects.

Alternative, No-Action: An alternative that maintains established trends or management direction.

American Petroleum Institute: Founded in 1920, this national oil trade organization is the leading standardizing organization on oil field drilling and producing equipment. It maintains departments of transportation, refining, and marketing in Washington, D.C., and a department of production in Dallas.

Aquifer: (1) A layer of material that contains water. (2) The part of a water-drive reservoir that contains the aquifer.

Barrel: A measure of volume for petroleum products. One barrel is the equivalent of 42 U.S. gallons or 0.15899 cubic meters. One cubic meters equals 6.2897 barrels.

Billion Cubic Feet (BCF): Measurement of Gas at Standard pressure and temperature, measured in billion cubic feet of gas.

Biological Diversity: The relative abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area.

Blowout: An uncontrolled explosion of gas, oil, or other fluids from a drilling well. A blowout or "gusher" occurs when formation pressure exceeds the pressure applied to it by the column of drilling fluid and when blowout prevention equipment is absent or fails.

Blowout Preventer (BOP): One of several valves installed at the wellhead to prevent the escape of pressure either in the annular space between the casing and drill pipe or in open hole (i.e., hole with no drill pipe) during drilling or completion operations.

Brine: Water containing relatively large concentrations of dissolved salts, particularly sodium chloride. Brine has higher salt concentrations than ordinary ocean water.

Buffer Zone: An area between two different land uses that is intended to resist, absorb, or otherwise preclude developments or intrusions between the two use areas.

Cement Casing: To fill the annulus between the casing and hole with cement to support the casing and prevent fluid migration between permeable zones.

Christmas Tree: The control valves, pressure gauges, and chokes assembled at the top of a well to control the flow of oil and gas after the well has been completed.

Completion: The activities and methods to prepare a well for production. Includes installation of equipment for production from an oil or gas well.

Conditions of Approval (COAs): Provisions or requirements under which a Plan of Operations is approved.

Contaminating Substance: Those substances, including but not limited to, salt water or any other injurious or toxic chemical; waste oil or waste emulsified oil; basic sediment; mud with injurious or toxic substances produced or used in the drilling, development, production, transportation, or on-site storage, refining, and processing of oil and gas.

Council on Environmental Quality (CEQ): An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews federal programs for their effort on the environment, conducts environmental studies, and advises the President on environmental matters.

Cultural Landscape: A cultural landscape is a geographic area, including both cultural and natural resources and the wildlife and domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. There are four general types of cultural landscapes, not mutually exclusive: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes.

Current Legal and Policy Requirements: The pertinent federal and state laws, regulations, policies, and direction provided in approved land use management plans, which govern oil and gas operations conducted within units of the National Park System. These include NPS regulations at 36 CFR Part 9B.

Drilling Fluid ("Mud"): Circulating fluid, one function of which is to force cuttings out of the wellbore and to the surface. While a mixture of clay, water, and other chemical additives is the most common drilling fluid, wells can also be drilled using air, gas, or water as the drilling fluid.

Development Concept Plan (DCP): The Development Concept Plan bridges the gap between the General Management Plan and the comprehensive or preliminary design, providing guidance for the development and use of a particular geographic area within a park.

Directional Drilling: Intentional deviation of a wellbore from the vertical (90 degrees). Although wellbores are normally drilled vertically, it is sometimes necessary or advantageous to drill at an angle from the vertical.

Dry Hole: Any well incapable of producing oil or gas in commercial quantities. A dry hole may produce water, gas, or even oil, but not enough to justify production.

Effects: see Impacts

Endangered Species: Federally listed: any species of animal or plant in danger of extinction throughout all or a significant portion of its range; state (group I): species whose prospect of survival or recruitment in the state are in jeopardy in the foreseeable future; state (group II): species whose prospect of survival or recruitment within the state may become jeopardized in the near future.

Environmental Assessment (EA): A concise public document prepared to provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement or a Finding of No Significant Impact. An EA includes a brief discussion of the need for a proposal, the alternatives considered, the environmental impacts of the proposed action and alternatives, and a list of agencies and individuals consulted.

Environmental Impact Statement (EIS): A document prepared to analyze the impacts on the environment of a proposed project or action and released to the public for comment and review. An EIS must meet the requirements of NEPA, CEQ, and the directives of the agency responsible for the proposed project or action.

Federally Owned and Controlled Lands: Land that the United States possesses fee title through purchase, donation, public domain, or condemnation. It also includes land in which the United States holds any interest, such as a lease, easement, rights-of-way, or cooperative agreement.

Federally Owned and Controlled Waters: All surface waters in the boundaries of a National Park System unit without regard to whether the title to the submerged lands lies within the United States or another party.

Gas: Any fluid, either combustible or noncombustible, which is produced in a natural state from the earth, and which maintains a gaseous or rarefied state at ordinary temperature and pressures (36 CFR §9.31(m)).

General Management Plan (GMP): The GMP is the major planning document for all National Park System units. The GMP sets forth the basic philosophy for managing a unit, and provides strategies for resolving issues and achieving identified management objectives over a 5 to 10-year period. The GMP includes an environmental impact assessment and other required compliance documentation.

In a GMP, the National Park Service should prescribe general strategies for managing nonfederal oil and gas exploration and development if such activity is an issue in a unit. Pertinent information that might be included in a GMP includes:

- where and when nonfederal oil and gas operations may occur under statutory or regulatory authorities;
- impacts of exploration and development on unit resources and values;
- location of nonfederal oil and gas rights in relation to areas planned for park-related development, preservation, or interpretation; and
- existing or potential impacts from nonfederal oil and gas activity conducted on lands adjacent to the unit.

The GMP also establishes "management zones" in a unit according to criteria and procedures contained in DO-2 (NPS Director's Order, Planning Process). Management zoning is prescriptive, based on surface resources and visitor-related values.

Hydrocarbons: Organic compounds of hydrogen and carbon, whose densities, boiling points, and freezing points increase as their molecular weights increase. The smallest molecules of hydrocarbons are gaseous; the largest are solids. Petroleum is a mixture of many different hydrocarbons.

Impacts: ***Direct Impacts*** are caused by the action and occur at the same time and place. ***Indirect Impacts*** are caused by the action and are later in time or farther removed in distance, but are still anticipated. ***Cumulative Impacts*** are the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Impermeable: Preventing the passage of fluid. A formation may be porous yet impermeable if there is an absence of connecting passages between the voids within it.

Lease: A legal document executed between a landowner, as lessor, and a company or individual, as lessee, that grants the right to exploit the premises for minerals or other products.

Long-term: Describes impacts that would occur over a 20-year period.

Management Policies: National Park Service Management Policies is the basic Servicewide policy document of the National Park Service and will be revised at appropriate intervals to consolidate servicewide policy decisions. The management of the National Park System and NPS programs is guided by the U.S. Constitution, public laws, proclamations, executive orders, rules and regulations, and directives of the Secretary of the Interior and the Assistant Secretary for Fish and Wildlife and Parks. Other laws, regulations, and policies related to the administration of federal programs, although not cited, may also apply.

Mitigation: Includes:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.
2. Minimizing impacts by limiting the degree of magnitude of the action and its implementation.
3. Rectifying the impact of repairing, rehabilitating, or restoring the affected environment.
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
5. Compensating for the impact by replacing or providing substitute resources or environments.

National Environmental Policy Act of 1969 (NEPA): Public Law 91-190. Establishes environmental policy for the nation. Among other items, NEPA requires federal agencies to consider environmental values in decision-making processes.

National Register of Historic Places (NRHP): A listing of architectural, historical, archeological, and cultural sites of local, state, or national significance, established by the Historic Preservation Act of 1966 and maintained by the National Park Service.

Natural Gas: A highly compressible, highly expandable mixture of hydrocarbons having a low specific gravity and occurring naturally in a gaseous form. Besides hydrocarbon gases, natural gas may contain appreciable quantities of nitrogen, helium, carbon dioxide, and contaminants.

No Surface Disturbance: In general, applies to an area where an activity is allowed, so long as it does not disturb the surface.

No Surface Occupancy (NSO): A constraint that prohibits occupancy or disturbance on all or part of the land surface to protect special values or uses. Operators may exploit the oil and gas resources under the surface restricted by this constraint through use of directional drilling from sites outside the NSO area.

Oil: Any viscous, combustible liquid hydrocarbon or solid hydrocarbon substance easily liquefiable on warming, which occurs naturally in the earth, including drip gasoline or other natural condensates recovered from gas without resort to manufacturing processes.

Operations: Defined as "all functions, work and activities within a unit in connection with exploration for and development of oil and gas resources." (36 CFR §9.31(c)). Operations include, but are not limited to:

- reconnaissance to gather natural and cultural resources information;
- line-of-sight surveying and staking;
- geophysical exploration;
- exploratory drilling;
- production, gathering, storage, processing, and transport of petroleum products;
- inspection, monitoring, and maintenance of equipment;
- well "work-over" activity;
- construction, maintenance, and use of pipelines;
- well plugging and abandonment;
- reclamation of the surface; and
- construction or use of roads, or other means of access or transportation, on, across, or through federally owned or controlled lands or waters.

If an operator desires to conduct nonfederal oil and gas operations in a National Park System unit, and operations require access on, across, or through federally owned or controlled lands or waters, the 36 CFR Part 9B regulations require that the operator:

- possess a right to the nonfederal oil and gas in the unit (36 CFR §9.36(a) (2)),
- file a plan of operations with the NPS and receive approval from the Regional Director prior to commencing operations (36 CFR §9.32(a)), and
- submit a performance bond or security deposit to the NPS (36 CFR §9.48(a)).

Operator: Person(s) who may have rights to explore and develop nonfederally owned oil and gas in NPS units, including:

- Owners: individuals, corporations, local and state governments, Indian tribes (when the tribe owns the oil and gas in fee)., etc.;
- Lessees: individuals or corporations that lease oil and gas from the owner; and
- Contractors: individuals or corporations under contract with the owner, lessee, or operator.

Organic Act: Congress formally established the National Park Service by the Act of August 25, 1916, which is commonly called the National Park Service Organic Act. The Organic Act mandates the Service"...to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (16 U.S.C. § 1 *et seq.).* This unambiguous statement of purpose for the National Park System directs that preservation and public enjoyment of the natural, scenic, and cultural resources in a manner that leaves them unimpaired is the fundamental purpose of all national parks, monuments, and other reservations.

The Organic Act authorized the Secretary of the Interior to promulgate rules and regulations necessary for the management of the national parks, monuments, and other reservations under the Secretary's jurisdiction (16 U.S.C. §3). This authority, among others, provides the basis for the regulations in 36 CFR Chapter 1, including the NPS regulations in 36 CFR Part 9, governing mining claims and nonfederally owned oil and gas.

Plan of Operations: Application submitted by an operator describing how proposed oil and gas operations would be conducted in a unit of the National Park System pursuant to the NPS's Nonfederal Oil and Gas Rights Regulations, 36 CFR 9B, and containing information requirements pertinent to the type of operations being proposed (36 CFR §9.36(a) through (d)).

Reclamation: The process of returning mined land to a condition that will be approximately equivalent to the pre-mining condition terms of sustained support of functional physical processes, biological productivity, biological organisms, and land uses.

Regional Director: There are seven geographic regions under which the units of the National Park System are organized. Padre Island National Seashore is located within the Intermountain Region of the National Park Service. The Regional Director is the chief decision-maker.

Revegetation: The reestablishment and development of self-sustaining plant cover. On disturbed sites, this normally requires human assistance, such as seed bed preparation, reseeding, and mulching.

Scoping Process: An early and open public participation process for determining the scope of issues to be addressed in an Environmental Impact Statement, and for identifying significant issues related to a proposed action.

Sensitive Resource Areas: Locations of particularly rare and/or vulnerable resources identified by the EIS team. These areas are used to develop different alternatives for the oil and gas management plan.

Shut-in well: An oil and gas well in which the inlet and outlet valves have been shut off so that it is capable of production but is temporarily not producing.

Significant: "Significant" as used in NEPA (40 CFR 1508.27), requires considerations of both context and intensity:

- **Context.** This means that the significance of an action must be analyzed in several contexts, such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

- **Intensity**. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

    1. Impacts that may be both beneficial and adverse. A significant effect may exit even if the federal agency believes that on balance the effect will be beneficial.
    2. The degree to which the proposed action affects public health or safety.
    3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, and wild and scenic rivers, or ecologically critical areas.
    4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.
    5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
    6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
    7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
    8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for the listing in the National Register of Historic Places, or may cause loss or destruction of significant scientific, cultural, or historic resources.
    9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
    10. Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

Split Estate: Refers to the situation where the mineral estate is owned or controlled by a party (usually, but not always, the federal government) other than the owner of the land surface in the same area.

Statement for Management (SFM): A National Park Service planning document used to guide short- and long-term management of a unit; to determine the nature and extent of planning required to meet the unit's management objectives; and, in the absence of more specific planning documents, to provide a general framework for directing park operations and communicating park objectives to the public.

Superintendent: The Superintendent (or his/her designee) of the unit of the National Park System containing lands subject to the rights covered by the Nonfederal Oil and Gas Rights Regulations, 36 CFR 9B.

Threatened Species: Any species likely to become endangered within the foreseeable future throughout all or a significant part of its range.

Timing Limitation (Seasonal Restriction): Constraint that prohibits surface use during specified time periods to protect identified resource values. The constraint does not apply to the operation and maintenance of production facilities unless analysis demonstrates that such constraints are needed and that less stringent, project-specific constraints would be insufficient.

Vertical Drilling: Drilling of a well vertically (90 degrees) to reach a target zone straight underneath the surface location.

INDEX

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally-owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people for live in island territories under U.S. Administration.