National Park Service
U.S. Department of the Interior

Padre Island National Seashore
Texas

PADRE ISLAND
NATIONAL SEASHORE

Personal Watercraft Use

Environmental Assessment

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Environmental Assessment

February 1, 2006

SUMMARY

Padre Island National Seashore is on North Padre Island, southeast of the city of Corpus Christi, Texas. The park consists of 130,434 acres of barrier island land and water, and is the longest remaining undeveloped barrier island in the world. The seashore is approximately 70 miles long and varies from 0.5 to 3 miles wide. The seashore borders the Gulf of Mexico on the east and is separated from the Texas mainland by the Laguna Madre to the west. The barrier island was formed, and is continually being reshaped, by the actions of wind, gulf currents, and waves. The seashore's landscape ranges from broad, white, fine-sand beaches on the Gulf side, to ridges of sand dunes, grassy interior upland flats, ephemeral ponds, and freshwater wetlands in the central portion of the island. The western portion is defined by the Laguna Madre area, including back-island dunes and wind tidal flats that merge with the waters of the Laguna Madre. Within the Laguna Madre, 2 natural islands and 25 spoil islands lie within the national seashore.

The purpose of and the need for taking action is to evaluate a range of alternatives and strategies for the management of personal watercraft (PWC) use at Padre Island National Seashore in order to ensure the protection of park resources and values, while offering recreational opportunities as provided for in the national seashore's enabling legislation, purpose, mission, and goals. On completion of the National Environmental Policy Act (NEPA) process, the National Park Service may either take action to adopt special regulations to reinstate and manage PWC use at the national seashore, or it may continue to prohibit PWC use at this park unit, as provided for in the National Park Service's March 2000 rule and Padre Island National Seashore's April 5, 2002, "Notice of Determination."

BACKGROUND

More than one million personal watercraft are estimated to be in operation today in the United States. Sometimes referred to as "jet skis" or "wet bikes," these vessels use conventional, two-stroke engines powering a water jet pump as its primary source of propulsion. They are used for enjoyment, particularly for touring and maneuvers such as wave jumping, and they are capable of speeds in the 60-mph range.

After studies in Everglades National Park showed that PWC use resulted in damage to vegetation, adversely impacted shorebirds, and disturbed the life cycles of other wildlife, the National Park Service prohibited PWC use by a special regulation at the park in 1994. In recognition of its duties under its Organic Act and NPS *Management Policies 2001* (2000c), as well as increased awareness and public controversy about PWC use, the National Park Service subsequently reevaluated its methods of PWC regulation. Historically, the Park Service had grouped personal watercraft with all vessels; thus, PWC use was allowed when the Superintendent's Compendium allowed the use of other vessels. Later the National Park Service closed seven units to PWC use through the implementation of horsepower restrictions, general management plan revisions, and park-specific regulations, such as those promulgated by Everglades National Park.

In May 1998 the Bluewater Network filed a petition urging the National Park Service to initiate a rulemaking process to prohibit PWC use throughout the national park system. In response to the petition, the National Park Service issued an interim management policy requiring superintendents of parks where PWC use can occur but had not yet occurred to close the unit to such use until the rule was finalized. The National Park Service envisioned the servicewide regulation as an opportunity to evaluate impacts from PWC use before authorizing the use. On March 21, 2000, the Park Service

issued a regulation prohibiting PWC use in most units and required 21 units to determine the appropriateness of continued PWC use.

In response to the PWC final regulation, Bluewater Network sued the National Park Service, challenging the agency's decision to allow continued PWC use in 21 units while prohibiting PWC use in other units. In response to the suit, the Park Service and the environmental group negotiated a settlement. Each park desiring to continue long-term PWC use was to promulgate a park-specific special regulation in 2002. In addition, the settlement stipulated that the Park Service must base its decision to issue a park-specific special regulation to continue PWC use through an environmental analysis conducted in accordance with National Environmental Policy Act. The NEPA analysis at a minimum, according to the settlement, must evaluate PWC impacts on water quality, air quality, soundscapes, wildlife, wildlife habitat, shoreline vegetation, visitor conflicts, and visitor safety.

Padre Island National Seashore evaluated the effects of PWC use within park boundaries and solicited public input. Based on that evaluation, the park issued a "Notice of Determination" on April 5, 2002, which states that Padre Island decided not to seek a special regulation to authorize PWC use, therefore allowing the prohibition of PWC use to go into effect on April 22, 2002 (Appendix A).

Following the closure of PWC use at Padre Island National Seashore in April 2002, concerns were raised about such a closing without allowing for sufficient public comment or evaluation of environmental issues. As a result, the National Park Service decided to include Padre Island in the NEPA process to determine if a special regulation to continue PWC use is warranted.

On April 16, 2002, the National Park Service announced that Padre Island National Seashore would prohibit use of PWCs beginning April 22, 2002. At that time, Padre Island also began the process of developing an Environmental Assessment to analyze PWC use at the park. An internal scoping meeting was held at Padre Island December 10-11, 2002, to fulfill the internal scoping requirements of the National Environmental Policy Act and Director's Order 12. An analysis of environmental impacts was conducted in 2005 using data from 2004. Data used in the analysis have not appreciably changed between 2004 and 2006. Therefore, assumptions for 2004 used throughout the document apply to 2006 as well.

ALTERNATIVES CONSIDERED

This environmental assessment evaluates three alternatives concerning PWC use at Padre Island National Seashore.

- No-Action Alternative — Continue to prohibit all PWC use.
- Alternative A — Reinstate PWC use as previously managed before April 22, 2002 (limited use in Bird Island Basin Channel and on Gulf coast south of the 5-mile marker).
- Alternative B — Reinstate PWC use only in the Bird Island Basin boat channel.

Based on the environmental analysis prepared for PWC use at Padre Island, the no-action alternative is the park's preferred alternative and is also considered the environmentally preferred alternative because it would best fulfill park responsibilities as trustee of this sensitive habitat; ensure safe, healthful, productive, and aesthetically and culturally pleasing surroundings; and attain a wide range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.

ENVIRONMENTAL CONSEQUENCES

Impacts of the three PWC management alternatives were assessed in accordance with *Director's Order #12: Conservation Planning, Environmental Impact Analysis and Decision-making (DO #12)* (NPS 2001b). The *Director's Order #12 Handbook* requires that impacts to park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision-makers to understand the implications of those impacts in the short and long term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists.

To determine impacts, methodologies were identified to measure the change in park resources that would occur with the implementation of the PWC management alternatives. Thresholds were established for each impact topic to help understand the severity and magnitude of changes in resource conditions, both adverse and beneficial.

Each PWC management alternative was compared to a baseline to determine the context, duration, and intensity of resource impacts. The baseline, for purposes of this impact analysis for Padre Island National Seashore, is the continued prohibition of PWC use in the national seashore (the no-action alternative).

Table A summarizes the results of the impact analysis for the impact topics that are assessed in the "Environmental Consequences" chapter. The analysis considers a period that continues through 2014.

TABLE A: SUMMARY OF THE IMPACT ANALYSIS

Impact Topic	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed (Prior to April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
Water Quality	PWC use impacts: No water quality impacts from PWC use. Cumulative impacts: Negligible impacts in both the Bird Island Basin area of Laguna Madre and Gulf of Mexico waters within the national seashore through 2014. Minor to moderate, short-term, adverse impacts from a major oil spill or release.	PWC use impacts: Negligible impacts through 2014. Cumulative impacts: Negligible impacts from personal watercraft and other outboard motorboats. Minor to moderate, short-term, adverse impacts from a major oil spill or release.	PWC use impacts: No impact in Gulf of Mexico waters. Negligible impacts in Bird Island Basin. Cumulative impacts: Negligible impacts in Bird Island Basin, and from motorboat use in the gulf. Minor to moderate, short-term, adverse impacts from a major oil spill or release.
Air Quality			
• Impact to Human Health from Airborne Pollutants Related to PWC Use	PWC use impacts: No impacts on human health from PWC-related emissions. Cumulative impacts: Adverse, long-term, negligible impacts through 2014 for HC, PM_{10} and NO_x and minor, long-term, impacts for CO. Slightly higher NO_x emissions in 2014 from more boating and the conversion to new technology engines, but future decreased emissions of CO and HC, as well as reduced impact to regional ozone levels in 2014. Negligible risk from PAHs in through 2014.	PWC use impacts: Adverse, negligible impacts in 2004 from PWC-related airborne pollutants (CO, PM_{10}, HC, NO_x, and PAHs). Adverse, negligible impacts in 2014 with increased CO and NO_x emissions and decreased HC and PM_{10} emissions. Cumulative impacts: Negligible impacts from all boating for PM_{10}, NO_x, and HC and minor for CO through 2014.	PWC use impacts: Negligible impacts through 2014 from PWC use only in the Bird Island Basin boat channel area. Negligible risk from PAHs through 2014. Cumulative impacts: Minor impacts from all motorized watercraft through 2014 for CO and negligible impacts for PM_{10}, HC, and NO_x.
• Air Quality Related Values from PWC Pollutants	PWC use impacts: No impact from PWC use through 2014. Cumulative impacts: Overall minor impact to air quality related values from all motorized watercraft emissions through 2014.	PWC use impacts: Negligible impact levels to visibility through 2014, and minor adverse impacts from ozone exposure through 2014, with an overall minor impact to air quality related values. Cumulative impacts: An overall	PWC use impacts: Negligible impact to visibility through 2014, and a minor adverse impact from ozone exposure through 2014, with an overall minor impact to air quality related values. Cumulative impacts: Negligible

Impact Topic	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed (Prior to April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
		minor impact to air quality related values through 2014.	impacts to visibility and a minor impact from ozone exposure through 2014.
Soundscapes	PWC use impacts: No impacts on park soundscapes. Cumulative impacts: Adverse, negligible to minor impacts over the short and long terms, particularly near the Bird Island Basin boat launch and the gulf beaches, but no contribution from PWC use within Padre Island.	PWC use impacts: Adverse, short- and long-term, negligible to moderate impacts depending on location. Over the long term reduced PWC noise levels with newer engine technologies. Cumulative impacts: Adverse, short- and long-term, negligible to moderate impacts in some locations because sounds from all activities heard occasionally throughout the day. Natural sounds predominant at most locations.	PWC use impacts: Adverse, short- and long-term, negligible to minor impacts in Bird Island Basin. Over the long term reduced PWC noise levels with newer engine technologies. Cumulative impacts: Adverse, short- and long-term, negligible to minor impacts in Bird Island Basin because sounds from all activities, including personal watercraft, heard occasionally throughout the day. Natural sounds predominant at most locations.
Shoreline and Submerged Aquatic Vegetation (only in Laguna Madre)	PWC use impacts: No PWC-related impacts. Cumulative impacts: Adverse, localized, negligible to minor, short- and long-term impacts from all uses, except in areas of propeller scarring, with potential adverse, localized, long-term, minor impacts; no PWC contribution to impacts. No perceptible changes to shoreline or submerged aquatic vegetation community size, integrity, or continuity through 2014.	PWC use impacts: Adverse, localized, short- and long-term, negligible impacts; no perceptible changes to submerged aquatic vegetation community size, integrity, or continuity, through 2014. Cumulative impacts: Adverse, localized, short and long term, negligible to minor impacts except in areas of propeller scarring, with potential adverse, localized, long-term, minor impacts. No perceptible changes to submerged aquatic vegetation community size, integrity, or continuity through 2014.	PWC use impacts: Adverse, localized, negligible impacts over the short and long term; no perceptible changes to submerged aquatic vegetation community size, integrity, or continuity through 2014. Cumulative impacts: Adverse, localized, short- and long-term, negligible to minor impacts except in areas of propeller scarring, with potential adverse, localized, long-term, minor impacts. No perceptible changes to submerged aquatic vegetation community size, integrity, or continuity through 2014.
Wildlife and Wildlife Habitats	PWC use impacts: No impacts to wildlife and habitat. Cumulative impacts: Adverse, short-term, negligible impacts to fish, and negligible to minor impacts to waterfowl, nesting birds, and other wildlife on both the gulf and bay sides of the park. Potential for adverse, long-term, moderate impacts from an offshore oil spill or release.	PWC use impacts: Adverse, localized, short-term, negligible to minor impacts on wildlife and habitat at both Bird Island Basin and along the gulf shore. Cumulative impacts: Adverse, short-term, minor impacts. Potential for adverse, long-term, moderate impacts from an offshore oil spill or release.	PWC use impacts: Adverse, short-term, negligible to minor, impacts only in Bird Island Basin. Cumulative impacts: Adverse, short-term, negligible to minor impacts with the potential for adverse, long-term, moderate impacts from an offshore oil spill or release.
Threatened, Endangered, and Special Concern Species	PWC use impacts: No impacts on federal or state listed species. Cumulative impacts: All other activities could affect, but are not likely to adversely affect, federal or state listed animals because many of these species are present only seasonally, do not nest in the park, or are subject to protective measures. No contribution from PWC use.	PWC use impacts: PWC use could affect, but would not be likely to adversely affect, federal or state listed species, since little PWC use would be expected. Cumulative impacts: Other activities would not likely adversely affect these species, since many of the identified species are present only seasonally, do not nest in the park, or can readily avoid PWC users and other disturbances.	PWC use impacts: PWC use could affect, but would not be likely to adversely affect, any federal or state listed or sensitive species in the Bird Island Basin area. Cumulative impacts: Other activities would not likely adversely affect these species because many of the identified species are present only seasonally, do not nest in the park, or can readily avoid PWC users and other disturbances.

Impact Topic	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed (Prior to April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
Cultural Resources	PWC use impacts: No impact on the Mansfield Cut Underwater Archeological District. Cumulative impacts: Adverse, long-term, minor to moderate impacts, plus potential impacts from oil operations in nearshore waters and from storm events and hurricanes.	PWC use impacts: Potential for adverse, minor impacts on the Mansfield Cut Underwater Archeological District from illegal collection, vandalism, and damage. Cumulative impacts: Potential for adverse, long-term, and minor to moderate impacts, plus potential impacts of oil operations in nearshore waters and from storm events and hurricanes.	PWC use impacts: No effect on the Mansfield Cut Underwater Archeological District because no PWC use permitted. Cumulative impacts: Adverse, long-term, minor to moderate impacts, plus potential impacts from oil operations in nearshore waters and from storm events and hurricanes.
Visitor Use and Experience	PWC use impacts: No impact on the experiences of most park visitors. Adverse, long term, minor impacts on PWC users who would no longer be able to ride in the national seashore. Cumulative impacts: Adverse, negligible impacts for the majority of visitors.	PWC use impacts: Adverse, short- and long-term, negligible to moderate impacts on overall visitor experiences. Beneficial impact on PWC users (very small percentage of the total park visitors). Cumulative impacts: Adverse, short and long term, and negligible to moderate impacts.	PWC use impacts: Adverse, short- and long-term, negligible to minor impacts on overall visitor experiences. Beneficial impact on PWC users (very small percentage of the total park visitors). Cumulative impacts: Adverse, short- and long-term, negligible to minor impacts.
Visitor Conflicts and Safety	PWC use impacts: No visitor use conflicts or impacts on safety. Cumulative impacts: No PWC-related contributions to visitor safety. Adverse, negligible impacts from other sources.	PWC use impacts: Adverse, short- and long-term, minor to moderate impacts on visitor conflicts and safety on high-use days, particularly in Bird Island Basin. Cumulative impacts: Adverse, short- and long-term, minor to moderate impacts for all user groups.	PWC use impacts: Adverse, short- and long-term, minor to moderate impacts in Bird Island Basin. Cumulative impacts: Adverse, short- and long-term, minor to moderate impacts.
Socioeconomic Effects	Negligible regional economic impact compared to the size of the regional economy. No benefits or costs under the no-action alternative compared to the baseline. Negligible benefits and costs under alternatives A and B. The benefits to the PWC community would likely outweigh the costs to other recreationists and those who place a nonuse value on the natural environment at Padre Island National Seashore.		
Padre Island Seashore Management and Operations			
• Conflicts with State and Local Ordinances and Policies	No conflict with state PWC regulations, and no local PWC regulations.	No conflicts with state or local regulations.	No conflicts with state or local regulations.
• Impact to Park Operations from Increased Enforcement Needs	Adverse, short-term, negligible impacts.	Adverse, short-term, negligible to minor impacts.	Adverse, short-term, negligible to minor impacts from initially enforcing and educating visitors about the new regulation.

No park resources or values would be impaired by implementing any of the alternatives being considered.

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ABBREVIATIONS

CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
EPA	Environmental Protection Agency
FR	*Federal Register*
NEPA	National Environmental Policy Act
NPS	National Park Service
NTSB	National Transportation Safety Board
PWC	personal watercraft
PWIA	Personal Watercraft Industry Association
SAV	submerged aquatic vegetation
TCEQ	Texas Commission on Environmental Quality
TNRCC	Texas Natural Resource Conservation Commission
TPWD	Texas Parks and Wildlife Department
USC	*United States Code*

PURPOSE OF AND NEED FOR ACTION

Padre Island National Seashore is on North Padre Island, southeast of the city of Corpus Christi, Texas. The park, which consists of 130,434 acres of barrier island land and water, is the longest remaining undeveloped barrier island in the world. The seashore is approximately 70 miles long and varies from 0.5 to 3 miles wide. The seashore borders the Gulf of Mexico on the east and is separated from the Texas mainland by the Laguna Madre to the west. The barrier island was formed, and is continually being reshaped, by the actions of wind, gulf currents, and waves. The seashore's landscape ranges from broad, white, fine-sand beaches on the Gulf side, to ridges of sand dunes, grassy interior upland flats, ephemeral ponds and freshwater wetlands in the central portion of the island. The western portion is defined by the Laguna Madre area, including back-island dunes and wind tidal flats that merge with the waters of the Laguna Madre. Within the Laguna Madre, 2 natural islands and 25 spoil islands lie within the national seashore.

Congress created Padre Island National Seashore on September 28, 1962 to "save and preserve, for the purposes of public recreation, benefit, and inspiration, a portion of the diminishing seashore" of the United States that remains undeveloped (Public Law 87-712; 16 USC 459d *et. seq*.). By making Padre Island part of the national park system, Congress emphasized the importance of protecting and interpreting the natural and cultural resources of the park.

More than one million personal watercraft (PWC)* are estimated to be in operation today in the United States. Sometimes referred to as "jet skis" or "wet bikes," these vessels use conventional, two-stroke engines powering a water jet pump as its primary source of propulsion. They are used for enjoyment, particularly for touring and maneuvers such as wave jumping, and they are capable of speeds in the 60-mph range.

The National Park Service maintains that PWC use emerged and gained popularity in park units before it could initiate and complete a "full evaluation of the possible impacts and ramifications." While PWC use remains a relatively new recreational activity, it has occurred in 32 of 87 park units that allow motorized boating.

The National Park Service first began to study PWC use in Everglades National Park. The studies showed that PWC use over emergent vegetation, shallow grass flats, and mud flats commonly used by feeding shorebirds damaged the vegetation, adversely impacted the shorebirds, and disturbed the life cycles of other wildlife. Consequently, managers at Everglades determined that PWC use remained inconsistent with the resources, values, and purposes for which the park was established. In 1994 the National Park Service prohibited PWC use in Everglades by a special regulation (59 FR 58781).

Other public entities have taken steps to limit, and even to ban, PWC use in certain waterways as national researchers study more about the effects of personal watercraft. At least 34 states have either

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* Personal watercraft, as defined in 36 CFR 1.4(a) (2000), refers to a vessel, usually less than 16 feet in length, which uses an inboard, internal combustion engine powering a water jet pump as its primary source of propulsion. The vessel is intended to be operated by a person or persons sitting, standing, or kneeling on the vessel, rather than within the confines of the hull. The length is measured from end to end over the deck excluding sheer, meaning a straight line measurement of the overall length from the foremost part of the vessel to the aftermost part of the vessel, measured parallel to the centerline. Bow sprits, bumpkins, rudders, outboard motor brackets, and similar fittings or attachments, are not included in the measurement. Length is stated in feet and inches.

implemented or considered regulating PWC use and operation (63 FR 49314). Similarly, various federal agencies, including the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration (NOAA), have managed PWC use differently than other classes of motorized watercraft.

Specifically, the National Oceanic and Atmospheric Administration regulates PWC use in most national marine sanctuaries. The regulation resulted in a court case where the Court of Appeals for the District of Columbia declared such PWC-specific management valid. In *Personal Watercraft Industry Association* v. *Department of Commerce,* 48 F.3d 540 (D. C. Cir. 1995), the court ruled that an agency can discriminate and manage one type of vessel (specifically personal watercraft) differently than other vessels if the agency explains its reasons for the differentiation.

In February 1997 the Tahoe Regional Planning Agency (TRPA), the governing body charged with ensuring no derogation of Lake Tahoe's water quality, voted unanimously to ban all two-stroke, internal combustion engines, including personal watercraft, because of their effects on water quality. Lake Tahoe's ban began in 2000.

In July 1998 the Washington State Supreme Court in *Weden* v. *San Juan County* (135 Wash. 2d 678 [1998]) found that the county had the authority to ban the use of personal watercraft as a proper use of its police power in order to protect the public health, safety, or general welfare. Further, personal watercraft are different from other vessels, and Washington counties have the authority to treat them differently.

In recognition of its duties under the NPS Organic Act of 1916 and the NPS *Management Policies, 2001* (NPS 2000c), as well as because of increased awareness and public controversy, the National Park Service reevaluated its methods of PWC regulation. Historically, the National Park Service had grouped personal watercraft with all vessels; thus, people could use such craft when the unit's Superintendent's Compendium allowed the use of other vessels. Later the Park Service closed seven units to PWC use through horsepower restrictions, general management plan revisions, and park-specific regulations such as those promulgated by Everglades National Park.

In May 1998 the Bluewater Network, a coalition of more than 70 organizations representing more than 4 million Americans, filed a petition urging the National Park Service to initiate a rulemaking process to prohibit PWC use throughout the national park system. In response to the petition, the Park Service issued an interim management policy requiring superintendents of parks where PWC use can occur but where it had never occurred to close the unit to such use until the rule was finalized. In addition, the National Park Service proposed a specific PWC regulation premised on the notion that personal watercraft differ from conventional watercraft in terms of design, use, safety record, controversy, visitor impacts, resource impacts, horsepower to vessel length ratio, and thrust capacity (63 FR 178 [Sept. 15, 1998]: 49,312–17).

The National Park Service envisioned the servicewide regulation as an opportunity to evaluate impacts from PWC use before authorizing the use. The preamble to the servicewide regulation calls the regulation a "conservative approach to managing PWC use" considering the resource concerns, visitor conflicts, visitor enjoyment, and visitor safety. During a 60-day comment period the National Park Service received nearly 20,000 comments.

As a result of public comments and further review, the National Park Service promulgated an amended regulation that prohibited PWC use in most units and required the remaining units to determine the appropriateness of continued PWC use (36 CFR 3.24(a), 2000; 65 FR 55 [Mar. 21, 2000]: 15,077–90). Specifically, the regulation allowed the National Park Service to designate PWC use areas and to con-

tinue their use by promulgating a special regulation in 11 units, including Padre Island National Seashore, and by amending the Superintendent's Compendium in 10 units (36 CFR 3.24(b), 2000). The National Park Service based the distinction between designation methods on the units' degree of motorized watercraft use.

In response to the PWC final regulation, Bluewater Network sued the National Park Service under the Administrative Procedures Act and the NPS Organic Act. The organization challenged the National Park Service's decision to allow continued PWC use in 21 units while prohibiting such use in other units. In addition, the organization disputed the National Park Service's decision to allow 10 units to continue PWC use after 2002 by making entries in the Superintendent's Compendium, which would not require the opportunity for public input through a notice and comments on the rulemaking process. Further, the environmental group claimed that because PWC use causes water and air pollution, generates increased noise levels, and poses public safety threats, the National Park Service acted arbitrarily and capriciously when making the challenged decisions.

In response to the suit, the National Park Service and the environmental group negotiated a settlement. The resulting settlement agreement, signed by the judge on April 12, 2001, changed portions of the National Park Service's PWC rule. While 21 units could continue PWC use in the short term, each of those parks desiring to continue long-term PWC use were to promulgate a park-specific special regulation in 2002. In addition, the settlement stipulated that the National Park Service must base its decision to issue a park-specific special regulation to continue PWC use through an environmental analysis conducted in accordance with the National Environmental Policy Act. The NEPA analysis at a minimum, according to the settlement, must evaluate PWC impacts on water quality, air quality, soundscapes, wildlife, wildlife habitat, shoreline vegetation, visitor conflicts, and visitor safety.

In 2001 the National Park Service adopted its new management policy for personal watercraft. The policy prohibits PWC use in national park system units unless their use remains appropriate for the specific park unit (*Management Policies 2001,* sec. 8.2.3.3 [NPS 2000c]). The policy statement authorizes the use based on the park's enabling legislation, resources, values, other park uses, and overall management strategies.

Personal watercraft were allowed to operate during a grace period ending April 22, 2002. In order to allow PWC use to continue after that date, parks had to seek special regulations necessary to authorize PWC use. For those areas that did not pursue special regulations, all PWC use was prohibited at the end of the grace period (with some extensions granted through September 15, 2002). Padre Island National Seashore evaluated the effects of PWC use within park boundaries and solicited public input on that use. Based on this evaluation, the park issued a notice of determination dated April 5, 2002, which states that Padre Island decided not to seek a special regulation to authorize PWC use (appendix A). Therefore, the prohibition of PWC use went into effect on April 22, 2002 (referred to in the remainder of this document as the April 22, 2002, ban).

On March 28, 2002, the Personal Watercraft Industry Association (PWIA) filed suit against the National Park Service for its final PWC regulation, challenging its discrimination between personal watercraft and other vessels and the NPS decision to close units without conducting an environmental analysis. PWIA requested that the court enjoin the National Park Service from implementing the ban on PWC use effective April 22, 2002. In addition, following the closure of PWC use at Padre Island National Seashore in April 2002, concerns were raised about closing the park to PWC use without allowing for sufficient public comment or the evaluation of environmental issues. As a result, the National Park Service decided to include Padre Island in the NEPA process to determine if a special regulation to continue PWC use is warranted.

PURPOSE OF AND NEED FOR ACTION

The purpose of and the need for taking action is to evaluate a range of alternatives and strategies for the management of PWC use at Padre Island National Seashore in order to ensure the protection of park resources and values, while offering recreational opportunities as provided for in the national seashore's enabling legislation, purpose, mission, and goals. Upon completion of the NEPA process, the National Park Service may either take action to adopt special regulations to reinstate and manage PWC use at Padre Island National Seashore, or it may permanently close this park unit to PWC use, as provided for in the NPS March 2000 rule and the park's April 5, 2002, "Notice of Determination."

The alternatives being considered include the following:

- No-Action Alternative — Continue to eliminate PWC use entirely
- Alternative A — Reinstate PWC use as previously managed before April 22, 2002 (limited use in Bird Island Basin Channel and on Gulf coast south of mile marker 5)
- Alternative B — Reinstate PWC use in the Bird Island Basin Channel only

SCOPE OF THE ANALYSIS

Motorboats and other watercraft have been used at Padre Island since before it was designated a national park; PWC use emerged only after their introduction in the 1980s. While some effects of PWC use are similar to those of other motorcraft, and are therefore difficult to distinguish, the focus of this action is in support of decisions and rulemaking specific to PWC use. However, while the settlement agreement and need for action have defined the scope of this environmental assessment, the National Environmental Policy Act requires an analysis of cumulative effects on resources of all past, present, and reasonably foreseeable actions when added to the effects of the proposal (40 CFR 1508.7, 2000). The scope of this analysis, therefore, is to define management alternatives specific to PWC use, in consideration of other uses, actions, and activities cumulatively affecting park resources and values.

PURPOSE AND SIGNIFICANCE OF PADRE ISLAND NATIONAL SEASHORE

Congress establishes national park system units to fulfill specified purposes, based on a park's unique and significant resources. A park's purpose, as established by Congress, is the fundamental building block for its decisions to conserve resources while providing for "enjoyment of future generations."

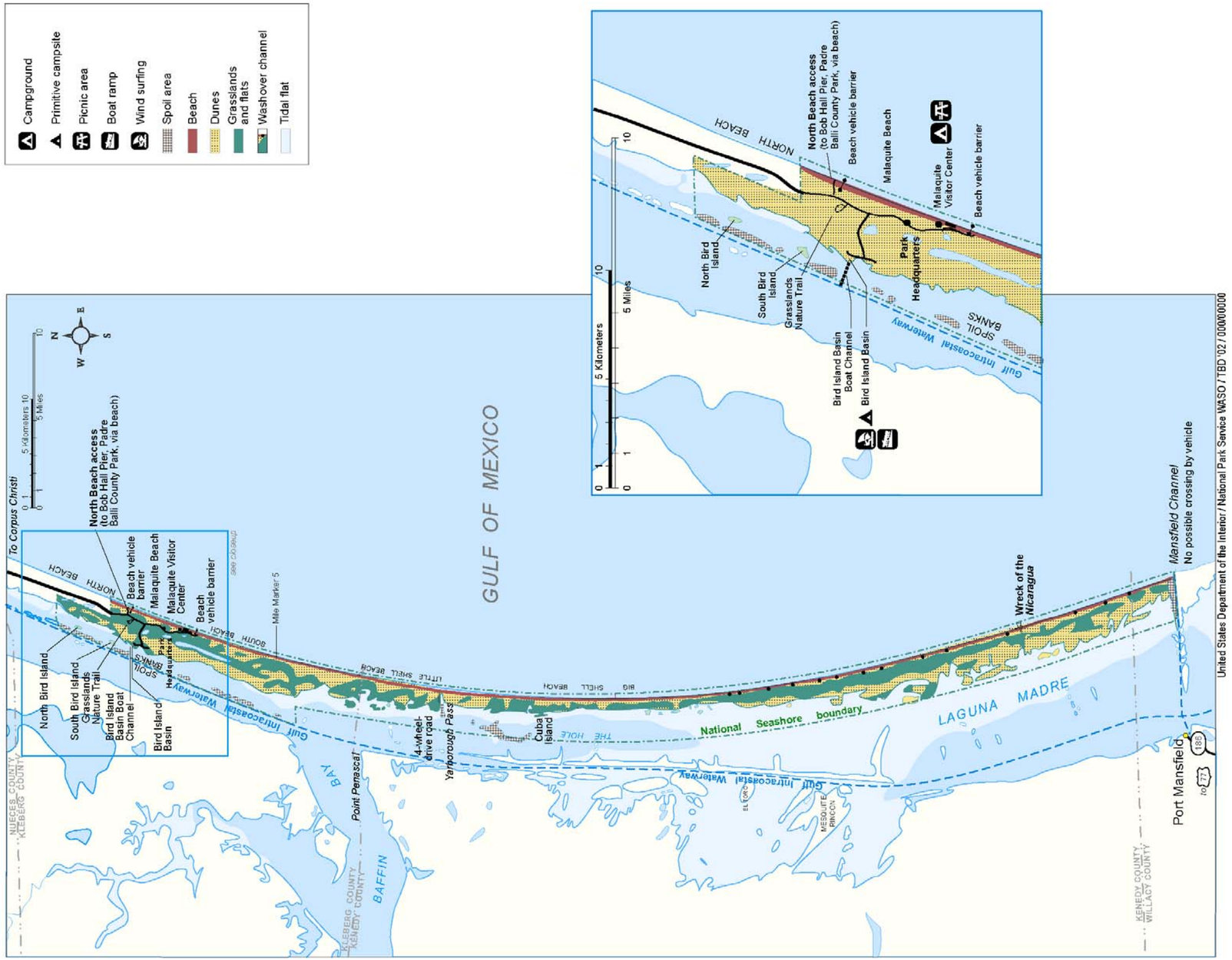
Padre Island National Seashore is the longest remaining undeveloped barrier island in the world. It provides important habitat for marine and terrestrial plants and animals, including numerous rare, threatened, and endangered species. It is the only area on the Texas coast where nests from all five species of sea turtles that occur in the Gulf of Mexico have been documented. It is situated on the central flyway for migratory birds, and is a globally important bird area for migratory, over-wintering, and resident birds.

Padre Island National Seashore supports a variety of boating activities throughout the year, including powerboating, windsurfing, boat fishing, sightseeing by boat, sailboating, canoeing, and kayaking. Other recreational activities include swimming, sunbathing, shelling, birding, hiking, scuba diving, snorkeling, wildlife viewing, and driving on the beach. Padre Island offers outstanding recreational fishing opportunities in the Laguna Madre and the Gulf of Mexico. In addition, Bird Island Basin in the Laguna Madre is internationally recognized as one of the world's premier windsurfing areas.

Padre Island National Seashore

Texas

Location



PURPOSE OF PADRE ISLAND NATIONAL SEASHORE

According to the park's *Strategic Plan* (NPS 1998b) and its enabling legislation, the purpose of Padre Island National Seashore is to preserve, protect, and interpret a portion of one of the last undeveloped seashores for public recreation, benefit, and inspiration.

SIGNIFICANCE OF PADRE ISLAND NATIONAL SEASHORE

The following park resources and values define the significance of Padre Island National Seashore:

- It is the longest undeveloped barrier island in the world, protecting rare coastal prairie, a complex, dynamic dune system, and the Laguna Madre, a hyper-saline lagoon environment.
- The location of the island, ocean dynamics, biotic diversity and integrity, lack of development, and easy access make Padre Island National Seashore an ideal place to study natural communities and species associated with barrier islands.
- It provides important habitat for marine and terrestrial plants and animals, including numerous rare, threatened, and endangered species.
- It is the only area on the Texas coast where nests from all five species of sea turtles that occur in the Gulf of Mexico have been documented (more Kemp's ridley sea turtle nests have been found at Padre Island National Seashore than anywhere else in the U.S.; the Gulf of Mexico, Laguna Madre, and Mansfield Channel provide important habitat for these five sea turtle species).
- It is situated along the central flyway (Padre Island National Seashore is a globally important area for migratory, over-wintering, and resident birds; over 350 bird species inhabit the island).
- Padre Island National Seashore, with the longest stretch of undeveloped barrier island beach in the world (accessible by vehicle), provides rare opportunities for beach recreation in an environment of isolation and solitude.
- It offers outstanding recreational fishing opportunities in the Laguna Madre and the Gulf of Mexico.
- Bird Island Basin in the Laguna Madre is internationally recognized as one of the premier windsurfing areas in the world.
- The integrity of the park as a cultural landscape exemplifies a continuum of human habitation and use dating from over 2,500 years ago (some of the richest and best-documented archival resources regarding Spanish exploration of North America document the history of the area).
- The Novillo line camp and associated historic resources include the last remaining structures relating to barrier island open-range cattle ranching in the U.S.

BACKGROUND

NPS ORGANIC ACT AND MANAGEMENT POLICIES

By enacting the NPS Organic Act of 1916, Congress directed the National Park Service to manage units under its jurisdiction "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 USC 1). Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that the National Park Service must conduct its actions in a manner that will ensure no "derogation of the values and

purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress" (16 USC 1a-1).

Despite these mandates, the NPS Organic Act and its amendments afford the National Park Service latitude when making resource decisions that balance visitor recreation and resource preservation. By these acts Congress "empowered [the National Park Service] with the authority to determine what uses of park resources are proper and what proportion of the parks resources are available for each use" (*Bicycle Trails Council of Marin* v. *Babbitt,* 82 F.3d 1445, 1453 [9th Cir. 1996]).

However, courts have consistently interpreted the NPS Organic Act of 1916 and its amendments to elevate resource conservation above visitor recreation. *Michigan United Conservation Clubs* v. *Lujan,* 949 F.2d 202, 206 (6th Cir. 1991) states, "Congress placed specific emphasis on conservation." The *National Rifle Ass'n of America* v. *Potter,* 628 F.Supp. 903, 909 (D.D.C. 1986) states, "In the Organic Act Congress speaks of but a single purpose, namely, conservation." The NPS *Management Policies 2001* also recognize that resource conservation takes precedence over visitor recreation. The policy dictates "when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant" (*Management Policies 2001,* sec. 1.4.3; NPS 2000c).

Because conservation remains predominant, the National Park Service seeks to avoid or to minimize adverse impacts on park resources and values. Yet, the Park Service has discretion to allow negative impacts when necessary (*Management Policies 2001,* sec. 1.4.3; NPS 2000c). While some actions and activities cause impacts, the Park Service cannot allow an adverse impact that constitutes a resource impairment (*Management Policies 2001,* sec. 1.4.3). The Organic Act of 1916 prohibits actions that permanently impair park resources unless a law directly and specifically allows for the acts (16 USC 1a-1). An action constitutes an impairment when its impacts "harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values" (*Management Policies 2001,* sec. 1.4.4). To determine impairment, the Park Service must evaluate "the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts" (*Management Policies 2004,* sec. 1.4.4).

Because park units vary based on their enabling legislation, natural resources, cultural resources, and missions, the recreational activities appropriate for each unit and for areas within each unit vary as well. An action appropriate in one unit could impair resources in another unit. Thus, this environmental assessment analyzes the context, duration, and intensity of impacts related to PWC use at Padre Island National Seashore, as well as the potential for resource impairment, as required by *Director's Order #12: Conservation Planning, Environmental Impact Analysis and Decision-making* (DO #12) (NPS 2001b).

SUMMARY OF AVAILABLE RESEARCH ON THE EFFECTS OF PERSONAL WATERCRAFT

Over the past two decades PWC use in the United States increased. However, there are conflicting data about whether PWC use is continuing to increase. While the National Transportation Safety Board (NTSB) estimates that retailers sell approximately 200,000 personal watercraft each year and people currently use another one million (NTSB 1998), the PWC industry argues that PWC sales decreased by 50% from 1995 to 2000 (American Watercraft Association [AWA] 2001). National PWC ownership increased every year between 1991 and 1998; the annual change in ownership peaked in 1994 at 32% and dropped to below zero in 1999, 2000, and 2001, indicating a decrease in PWC ownership in recent years (see Table 1).

TABLE 1: NATIONAL PWC REGISTRATION TREND

Year	No. of Boats Owned	Boat Ownership Trend (Percentage Change)	No. of Personal Watercraft Owned	PWC Ownership Trend (Percentage Change)
1991	16,262,000	--	305,915	--
1992	16,262,000	0%	372,283	21.7%
1993	16,212,000	0%	454,545	22.1%
1994	16,239,000	0%	600,000	32.0%
1995	15,375,000	-5%	760,000	26.7%
1996	15,830,000	3%	900,000	18.4%
1997	16,230,000	3%	1,000,000	11.1%
1998	16,657,000	3%	1,100,000	10.0%
1999	16,773,000	1%	1,096,000	-0.4%
2000	16,965,000	1%	1,078,400	-1.6%
2001			1,053,560	-2.4%

SOURCES: M. Schmidt, USCG, e-mail comm., for boat numbers, Sept. 4, 2001; National Marine Manufacturers Association (NMMA) for PWC numbers, 2002.

Multiple studies have demonstrated that four-stroke engines are substantially cleaner than carbureted, two-stroke engines, generating approximately 90% fewer emissions (Warrington 1999; TRPA 1999). A typical conventional (i.e., carbureted) two-stroke PWC engine discharges as much as 30% of its fuel unburned directly into the water (NPS 1999b; California Air Resources Board [CARB] 1999). At common fuel consumption rates, an average two-hour ride on a personal watercraft may discharge 3 gallons of fuel into the water (NPS 1999b). According to data from the California Air Resources Board, two-stroke PWC engines may consume 5 to 10 gallons of fuel per hour, of which up to 3.3 gallons per hour may be discharged unburned (CARB 1998). (As described in appendix A, an estimated discharge rate of 3 gallons per hour is used in the water quality impact calculations.)

The Personal Watercraft Industry Association notes that direct-injection engines have been available in personal watercraft for four years, and that three PWC manufacturers introduced four-stroke engines for the 2002 model year (PWIA 2002b). The U.S. Environmental Protection Agency (EPA) assumes that the existing two-stroke engine models would not be completely replaced by newer PWC technology until 2050 (EPA 1997). The Personal Watercraft Industry Association believes that through the 2002 model year, the output on a limited number of higher rated models was between 155 and 165 horsepower (hp) (PWIA 2002c).

The average operating life of a personal watercraft is 5 to 10 years, depending on the source. The formula for determining the operating life of personal watercraft was published in the *Federal Register* on October 4, 1996 (EPA 1996a). Based on this formula, the National Park Service expects that by 2013 most boat owners will already be in compliance with the 2006 EPA marine engine standards. The Personal Watercraft Industry Association believes that the typical operating life of a personal watercraft rental is 3 years and approximately 5 to 7 years for a privately owned vessel (PWIA 2002b)

Environmental groups, PWC users and manufacturers, and land managers express differing opinions about the environmental consequences of PWC use, and about the need to manage or to limit this recreational activity. Various research studies on the effects of PWC use are summarized below for water pollution, air pollution, noise, wildlife, vegetation and shoreline erosion, and health and safety.

Water Pollution

The majority of personal watercraft in use today are powered by conventional two-stroke, carbureted engines that discharge as much as 30% of their fuel directly into the water (NPS 1999b; CARB 1999).

Hydrocarbons, including benzene, toluene, ethyl benzene, and xylene (BTEX), and polycyclic aromatic hydrocarbons (PAHs), are released, as well as methyl tertiary-butyl ether (MTBE) in states that use this additive. The amount of pollution correctly attributed to PWC use compared to other motorboats and the degree to which PWC use affects water quality remains debatable. As noted in a report by the Oregon Department of Environmental Quality (ODEQ), every waterbody has different conditions (e.g., water temperature, air temperatures, water mixing, motorboating use, and winds) that affect the pollutants' impacts (ODEQ 1999).

PAHs, including benzo(a)pyrene, naphthalene, and 1-methyl naphthalene, are generally released during the combustion of fuel, although some PAHs are also found in unburned gasoline. PAHs, as well as other hydrocarbon emissions into the water, could potentially be reduced as new four-stroke engines replace older carbureted two-stroke engines (Kado et al. 2000). The conversion of carbureted two-stroke engines would be an important step toward substantially reducing petroleum related pollutants.

Discharges of MTBE and PAHs particularly concern scientists because of their potential to adversely affect the health of people and aquatic organisms. Scientists need to conduct additional studies on PAHs (Allen et al. 1998) and on MTBE (NPS 1999b), as well as long-term studies on the effect of repeated exposure to low levels of these pollutants (Asplund 2001).

A recent study conducted by the California Air Resources Board consisted of a laboratory test designed to comparatively evaluate exhaust emissions from marine and PWC engines, in particular two- and four-stroke engines (CARB 2001). The results of this study showed a difference in emissions (in some cases 10 times higher total hydrocarbons in two-stroke engines) between these two types of engines. An exception was air emissions of nitrogen oxides (NO_x), which was higher in four-stroke than in two-stroke engines. Concentrations of pollutants (MTBE, BTEX) in the tested water were consistently higher for two-stroke engines.

In 1996 the Environmental Protection Agency promulgated a rule to control exhaust emissions from new marine engines, including outboard and PWC engines. Emission controls provide for increasingly stricter standards beginning in model year 1999 (EPA 1996a, 1997). In 1996 the agency estimated an overall 52% reduction in hydrocarbon emissions in water from marine engines from present levels by 2010, and a 75% reduction by 2030, based on replacement of polluting machines with cleaner models. The 1997 EPA rule delayed implementation by one year (EPA 1996a, 1997).

At Lake Tahoe concern about the negative impact on lake water quality and aquatic life caused by the use of two-stroke marine engines led to at least 10 different studies relevant to motorized watercraft in the Tahoe Basin in 1997 and 1998. The results of these studies (Allen et al. 1998) confirmed that (1) petroleum products are in the lakes as a result of motorized watercraft operation, and (2) watercraft powered by carbureted, two-stroke engines discharge pollutants at an order of magnitude greater than do watercraft powered by newer technology engines (TRPA 1999).

On June 25, 1997, the Tahoe Regional Planning Agency adopted an ordinance prohibiting the “discharge of unburned fuel and oil from the operation of watercraft propelled by carbureted two-stroke engines” beginning June 1, 1999. Following the release of an environmental assessment in January 1999, this prohibition was made permanent.

A recent study by the Tahoe Regional Planning Agency (2003) compared the concentrations of PAH compounds released into the water and found that the two-stroke carbureted outboard engine emitted lower PAH levels into the water than did the two-stroke direct-injected engine. The four-stroke carbureted outboard engine emitted the lowest PAH levels, as well as other gasoline-related

contaminants into the water (TRPA 2003; CARB 2001). However, the two-stroke carbureted outboard engine emitted higher levels of benzene than the two-stroke direct-injected engine model (CARB 2001). PWC engines follow the same patterns of emission rates as outboard engines (CARB 2001). The TRPA 2003 study confirms other findings regarding emissions into the water and does not substantially change NPS conclusions regarding water quality impacts.

Air Pollution

Two-stroke engines that have been conventionally used in personal watercraft emit pollutants such as NO_x and volatile organic compounds (VOCs) that may adversely affect air quality. In areas with high PWC use some air quality degradation likely occurs (EPA 1996a, 2000). Kado et al. (2000) found that two-stroke engines had considerably higher emissions of airborne particulates and PAHs than four-stroke engines tested. It is assumed that the 1996 EPA rule concerning marine engines will substantially reduce PWC air emissions in the future (EPA 1996a).

Personal watercraft emit various compounds that pollute the air. In the commonly used two-stroke engines, the lubricating oil is used once and is expelled as part of the exhaust. The combustion process results in emissions of air pollutants such as VOCs, NO_x, particulate matter (PM), and carbon monoxide (CO).

Low-emissions engines, including both four-stroke engines and direct-injection two-stroke engines, generate reduced amounts of most air pollutants, including CO, PM, hydrocarbons, and VOC. However, the low-emission engines produce more NO_x than do carbureted two-stroke engines (EPA 1996a), and the two-stroke direct-injected engine has been shown to generate more airborne-particulate PAH emissions (a class of VOCs) than the two-stroke carbureted engines (Kado et al. 2000). Further research is needed to identify what impact this would have on PAH concentration in water. The Environmental Protection Agency estimates that the conversion to four-stroke engines and two-stroke direct injection will both result in an increased level of NO_x produced by PWC engines. In order to meet stringent hydrocarbon emission reduction contained in the EPA final rule, the agency estimates that manufacturers will need to recalibrate their engines to run at leaner air-fuel ratios, resulting in higher combustion temperatures, more complete combustion, and some increase in nitrogen oxide formation. In addition, conversion to two-stroke direct injection and four-stroke technology have little internal exhaust gas recirculation which could reduce emission rates of NO_x (EPA 1996a). In August 2002 the Environmental Protection Agency proposed additional rules that would further reduce boating emissions. The proposal includes evaporative emission standards for all boats and would reduce emissions from fuel tanks, etc., by 80% (67 FR 157 [August 14, 2002] 53049–115).

Noise

PWC-generated noise varies from vessel to vessel. No literature was found that definitively described scientific measurements of PWC noise. Some literature stated that all recently manufactured watercraft emit fewer than 80 decibels (dB) at 50 feet from the vessel, while other sources attributed levels as high as 102 dB without specifying distance. None of this literature fully described the method used to collect noise data.

The National Park Service contracted for noise measurements of personal watercraft and other motorized vessels in 2001 at Glen Canyon National Recreation Area (Harris, Miller, Miller & Hanson, Inc. 2002). The results show that maximum PWC noise levels at 25 meters (82 feet) ranged between 68 to 76 decibels on the A-weighted scale (dBA). Noise levels for other motorboat types measured

during that study ranged from 65 to 86 dBA at 25 meters feet (82 feet). Noise limits established by the National Park Service require vessels to operate at less than 82 dB at 82 feet from the vessel.

Personal watercraft may be more disturbing than other motorized vessels because of rapid changes in acceleration and direction of noise. Noise impacts from PWC use are caused by a number of factors. Noise from human sources, including personal watercraft, can intrude on natural soundscapes, masking the natural sounds that are an intrinsic part of the environment. This can be especially true in quiet places, such as in secluded lakes, coves, river corridors, and backwater areas. Also, PWC use in areas where there are nonmotorized users (such as canoeists, sailors, people fishing or picnicking, and kayakers) can disrupt the "passive" experience of park resources and values.

Komanoff and Shaw (2000) note that the biggest difference between noise from personal watercraft and that from motorboats is that the former continually leave the water, which magnifies noise in two ways. Without the muffling effect of water, the engine noise is typically 15 dBA louder, and the smacking of the craft against the water surface results in a loud "whoop" or series of them. With the rapid maneuvering and frequent speed changes, the impeller has no constant "throughput" and no consistent load on the engine. Consequently, the engine speed rises and falls, resulting in a variable pitch. This constantly changing sound is often perceived as more disturbing than the constant sound from motorboats.

PWC users tend to operate close to shore, to operate in confined areas, and to travel in groups, making noise more noticeable to other recreationists. Motorboats traveling back and forth in one area at open throttle or spinning around in small inlets also generate complaints about noise levels; however, most motorboats tend to operate away from shore and to navigate in a straight line, thus being less noticeable to other recreationists (Vlasich 1998).

Research conducted by the Izaak Walton League (IWL) indicates that one PWC unit can emit between 85 and 105 dB of sound, and that wildlife or humans located 100 feet away may hear sounds of 75 dB. This study also stated that rapid changes in acceleration and direction may create a greater disturbance and emit sounds of up to 90 dB (IWL 1999). Other studies conducted by the New Jersey State Police indicate that a PWC unit with a 100-hp engine emits up to 76 dBA, while a single, 175-hp outboard engine emits up to 81 dBA. Sea-Doo® research indicates that in three out of five distances measured during a sound level test, PWC engines were quieter than an outboard motorboat. Sea-Doo® also found that it would take approximately four PWC units 50 feet from the shore to produce 77 dBA, and it would take 16 PWC vessels operating at 15 feet from the shore to emit 83 dBA of sound, which is equal to one open exhaust boat at 1,600 feet from the shore. In response to public complaints, the PWC industry has employed new technologies to reduce sound by about 50% to 70% on models since 1999 (Sea-Doo® 2000; Hayes 2002). Additionally, by 2006 the EPA requirements will reduce PWC noise, in association with improvements to engine technology (EPA 1996b). EPA research also indicated that one PWC unit operating 50 feet from an onshore observer emits a sound level of 71 dBA, and studies conducted using the Society of Automotive Engineers (SAE [2001]) found that two PWC units operating 50 feet from the shore emit similar sound levels of about 74 dBA (PWIA 2000).

Most studies on the effects of noise on soundscapes and human receptors have focused on highway and airport noise. Komanoff and Shaw (2000) used the analytical approaches of these studies to perform a noise-cost analysis of personal watercraft. They concluded that the cost to beachgoers from PWC noise was more than $900 million per year. The cost per PWC was estimated to be about $700 per vessel each year or $47 for each 3-hour "PWC day." They concluded that the cost per beachgoer was the highest at secluded lake sites, where beachgoers had a higher expectation of experiencing natural quiet and usually invested a larger amount of time and personal energy in reaching the area.

However, because many more visitors are affected at popular beaches, noise costs per PWC unit were highest at crowded sites (*Drowning in Noise: Noise Costs of Jet Skis in America* [Komanoff and Shaw 2000]).

Wildlife Impacts

Although relatively few studies have specifically examined PWC effects on wildlife, several researchers have documented wildlife disturbances from personal watercraft and motorboats. A study recently completed in Florida examined the distance at which waterbirds are disturbed by both personal watercraft and outboard-powered boats (Rodgers and Schwikert 2002). Flush distances varied from 65 to 160 feet for personal watercraft, and flush distances for most species were greater for motorboats than for personal watercraft 80% of the time. The authors note that PWC use may be more threatening to waterbirds since users can navigate in shallow secluded waterways where birds typically eat and rest. Burger (2000) examined the behavior of common terns in relation to PWC use and other boats and noted that PWC users traveled faster and came closer to banks, resulting in more flight responses in terns and contributing to lower reproductive success.

Shoreline Vegetation

The effects of PWC use on aquatic communities have not been fully studied, and scientists disagree about whether PWC use adversely impacts aquatic vegetation. Most of the concern arises from the shallow draft of personal watercraft, which allows access to shallow areas that conventional motor-boats cannot reach. Like other vessels, personal watercraft may destroy grasses that occur in shallow water ecosystems. Anderson (2000) studied the effect of PWC wave-wash on shallow salt marsh vegetation and found that although the waves from personal watercraft are not different from those generated by other boats, personal watercraft can enter marsh channels and create sediment suspension problems in these areas.

Erosion Effects

Some studies have examined the erosion effects of PWC waves, and other studies suggest that personal watercraft may disturb sediments on river or lake bottoms and cause turbidity. Conflicting research exists concerning whether PWC-caused waves result in erosion and sedimentation. PWC-generated waves vary in size depending on the environment, including weight of the driver, number of passengers, and speed. As noted above, Anderson (2000) studied the effect of PWC wave-wash on shallow salt marsh vegetation and found that although the waves from personal watercraft are not different from those generated by other boats, personal watercraft can enter marsh channels and create sediment suspension problems in these areas.

Health and Safety Concerns

Industry representatives report that PWC accidents decreased in some states in the late 1990s. The National Transportation Safety Board reported that in 1996 personal watercraft represented 7.5% of state-registered recreational boats but accounted for 36% of recreational boating accidents (NTSB 1998). In the same year PWC operators accounted for more than 41% of people injured in boating accidents. PWC operators accounted for approximately 85% of the persons injured in accidents studied in 1997 (NTSB 1998).

Since PWC operators can be as young as 12 in several states, accidents can involve children. The American Academy of Pediatrics (2000) recommends that no one younger than 16 operate personal watercraft.

Increased PWC use in recent years has resulted in more concern about the health and safety of operators, swimmers, snorkelers, divers, and other boaters. A 1998 NTSB study revealed that while recreational boating fatalities have been declining in recent years, PWC-related fatalities have increased (NTSB 1998). Nationwide PWC accident statistics provided by the U.S. Coast Guard support the increase in PWC-related fatalities (see Table 2). However, since a peak of 84 PWC-related fatalities in 1997, accidents, injuries, and fatalities involving personal watercraft have decreased (M. Schmidt, U.S. Coast Guard [USCG], pers. comm., Sept. 4, 2001). The U.S. Coast Guard's Office of Boating Safety studied exposure data to assess boating risks. This method allows for a comparison between boat types based on comparable time in the water. PWC use ranked second in boat type for fatalities per million hours of exposure in 1998, with a 0.24 death rate per million exposure hours.

TABLE 2: NATIONWIDE PWC ESTIMATES AND ACCIDENT STATISTICS

Year	Recreational Boats Owned*	PWC Owned*	No. of PWC in Accidents	No. of PWC Injuries	No. of PWC Fatalities	No. of All Boats Involved in Accidents	Percentage of PWC Involved in Accidents
1987	14,515,000	N/A	376	156	5	9,020	4.2%
1988	15,093,000	N/A	650	254	20	8,981	7.2%
1989	15,658,000	N/A	844	402	20	8,020	10.5%
1990	15,987,000	N/A	1,162	532	28	8,591	13.5%
1991	16,262,000	305,915	1,513	708	26	8,821	17.2%
1992	16,262,000	372,283	1,650	730	34	8,206	20.1%
1993	16,212,000	454,545	2,236	915	35	8,689	25.7%
1994	16,239,000	600,000	3,002	1,338	56	9,722	30.9%
1995	15,375,000	760,000	3,986	1,617	68	11,534	34.6%
1996	15,830,000	900,000	4,099	1,837	57	11,306	36.3%
1997	16,230,000	1,000,000	4,070	1,812	84	11,399	35.7%
1998	16,657,000	1,100,000	3,607	1,743	78	11,368	31.7%
1999	16,773,000	1,096,000	3,374	1,614	66	11,190	30.2%
2000	16,965,000	1,078,400	3,282	1,580	68	11,079	29.6%
Total			**33,851**	**15,238**	**645**		

SOURCE: M. Schmidt, USCG, e-mail comm., Sept. 4, 2001.
*Estimates provided by the NMMA (M. Schmidt, USCG, pers. comm., Sept. 4, 2001).
N/A: Not available.

On more recent models Sea-Doo® developed an off-power assisted steering system that helps users steer during off-power, as well as off-throttle, situations. According to company literature, this system is designed to provide additional maneuverability and improve the rate of deceleration (Sea-Doo® 2001a).

PWC USE AND REGULATION AT PADRE ISLAND NATIONAL SEASHORE

Padre Island National Seashore supports a variety of boating activities throughout the year, including powerboating, windsurfing, boat fishing, sightseeing by boat, sailboating, canoeing, and kayaking. Windsurfing, sailboating, and canoeing are most common in the Laguna Madre portion of the park, while powerboating, boat fishing, sightseeing, and kayaking occur on both sides of the park. While recreational boating activities occur year-round, they increase during the summer due to warmer water temperature. PWC use falls into this category of recreational boating activity. Other recreational activities include swimming, sunbathing, shelling, birding, hiking, scuba diving, snorkeling, wildlife viewing, and driving on the beach. Padre Island averaged approximately 700,000 visitors per year from 1994 to 2004.

On April 16, 2002, the National Park Service announced that Padre Island National Seashore would prohibit use of PWCs beginning April 22, 2002. At that time, Padre Island also began the process of developing an Environmental Assessment to analyze PWC use at the park. An internal scoping

meeting was held at Padre Island December 10-11, 2002, to fulfill the internal scoping requirements of the National Environmental Policy Act and Director's Order 12, and to allow staff to confirm the purpose and need for action, identify PWC issues and concerns, create objectives for taking action, and develop preliminary alternatives. An analysis of environmental impacts was conducted in 2005, using data from 2004. Data used in the analysis have not appreciably changed between 2004 and 2006. Therefore, assumptions for 2004 used throughout the document apply to 2006 as well.

Past PWC Use

Historically, PWC use within Padre Island National Seashore was very sporadic and limited. PWC use began in the Padre Island area soon after personal watercraft were introduced into the market and increased during the 1980s. PWC use decreased in the 1990s with the increased use of the Bird Island Basin area by windsurfers. In 1997 Padre Island National Seashore began to regulate PWC use in the park under a Superintendent's Compendium that restricted use to south of the 5-mile marker on the Gulf side and to the Bird Island Basin Channel. This restriction was implemented to keep PWC users away from the more heavily used beach areas north of the 5-mile marker (e.g., Malaquite Beach), and to limit PWC disturbance to other water recreationists at Bird Island Basin while still allowing access to the Intracoastal Waterway. Between the implementation of these limitations in 1997 and the park's April 22, 2002, ban, PWC use had been declining at Bird Island Basin, while PWC use on the Gulf side increased slightly over the same period of time.

The majority of PWC users in the park were from the regional area, within a two- to three-hour drive from the park. Visitors who used the Bird Island Basin portion of the park were primarily local users (from the Corpus Christi area), while visitors using the remainder of the park were primarily from the regional area, including central and northern Texas and Oklahoma.

PWC use occurred primarily on the Gulf side of the park by shark fishermen using personal watercraft to place bait offshore. Shark fishermen are not typical PWC users, as they generally travel quickly between the shore and the wave break line to deliver bait, and do not spend a large amount of time on the water. Some PWC users would recreate near the surf line, traveling up and down the coast, but this use was also very short-term and sporadic. PWC users within the Laguna Madre portion of the park were legally able to use the park only to directly access the Intracoastal Waterway, and they generally did not spend more than 5 to 10 minutes in the waters within park boundaries.

PWC use at the park was determined through entrance station observations, park staff observations, input from the Texas Parks and Wildlife Coastal Fisheries staff familiar with the area, and the windsurfing concessioner at Bird Island Basin. According to park staff, there were approximately five PWC users in the park during a typical high-use summer day. The majority of use was observed along the gulf side of the park, with very little use in the Laguna Madre area. Park staff have subsequently worked with URS Corporation to derive numbers of PWC users for air and water quality modeling purposes.

Numerous areas in the vicinity of Padre Island National Seashore are more conducive to recreational PWC use and are generally more popular with PWC recreationists. Areas north of the park along the gulf coast include Kleberg County beach property, Padre Balli County Park, Bob Hall Pier, J. P. Luby Park, and Mustang Island State Park. Personal watercraft can also be operated in the remainder of the Laguna Madre (outside the park boundary), and use is popular at marker 37 at the John F. Kennedy Causeway (which has a marina), the Riveria at Baffin Bay (which also has a marina), and Packery Channel. These areas have few restrictions on PWC use and except for Mustang Island State Park do not charge a fee to enter or launch from the beach.

Periods of Past PWC Use

Boating at Padre Island National Seashore occurs primarily between April and September, with March and October also showing occasional use by fishermen. Fewer boats and almost no PWC use have been observed during winter months. Summer is the busiest season for boating and PWC use due to warm air and water temperatures. Although no specific data exist regarding numbers of PWC users, it can be assumed that high use periods for boats are also high use periods for personal watercraft. During summer weekend days, an average of approximately 100 boat trailers (including boats and personal watercraft) have been seen each day at Bird Island Basin over the past several years.

PWC Use Areas

Before the April 22, 2002, ban, personal watercraft primarily launched from two areas in the national seashore (see Location map):

- along the Gulf of Mexico shoreline south of the 5-mile marker
- at the Bird Island Basin boat launch ramp to travel directly to and from the Intracoastal Waterway

PWC users along the gulf shoreline consisted primarily of shark fishermen using personal watercraft for bait-running purposes. Within the Laguna Madre portion of the park, the watercraft were used to access the Intracoastal Waterway by way of the marked Bird Island Basin boat channel.

PWC Use Regulations

As described in the "PWC Notice of Determination," dated April 5, 2002, PWC use has been prohibited at Padre Island National Seashore since April 22, 2002. Prior to the "Notice of Determination" and since 1997, PWC use was regulated as described in the "Superintendents' Compendium" as follows:

- Personal watercraft were prohibited from operating within the Padre Island National Seashore portion of the Laguna Madre, except for launching at Bird Island Basin for direct travel to and from the Intracoastal Waterway by way of the marked Bird Island Basin boat channel.
- Personal watercraft could only be operated south of the 5-mile marker of South Beach on the gulf shoreline, including Mansfield Channel.

In addition, Texas state regulations prohibit PWC operation within 50 feet of another vessel, person, platform or object, or the shore, except at headway speed.

OBJECTIVES IN TAKING ACTION

Objectives are "what must be achieved to a large degree for the action to be considered a success" (*Director's Order #12* [NPS 2001b]). All alternatives selected for detailed analysis must meet *all* objectives to a large degree, as well as resolve purpose of and need for action. Objectives for managing PWC use must be grounded in the national seashore's enabling legislation, purpose, significance, and mission goals, and be compatible with direction and guidance provided by the park's forthcoming general management plan.

Using Padre Island National Seashore's enabling legislation, mandates, direction for the general management plan (in progress), issues, and servicewide objectives, park staff identified the following management objectives relative to PWC use:

Water Quality

- Manage PWC activity so that emissions of harmful compounds do not contribute to water quality degradation and do not adversely affect aquatic life or visitors' health and safety.

Air Quality

- Manage PWC activity so that air emissions of harmful compounds do not contribute to air quality degradation and do not adversely affect visitors' health and safety.

Soundscapes (Noise)

- Manage noise from PWC use in affected areas so that the visitor experience is not adversely affected.
- Protect wildlife and wildlife habitat from the effects of PWC-generated noise, especially during nesting seasons.

Wildlife and Wildlife Habitat

- Protect fish and wildlife species and their habitat from disturbances and contamination from PWC use.

Threatened, Endangered, or Special Concern Species

- Protect threatened or endangered species, or species of special concern, and their habitats from disturbances and contamination from PWC use.

Shoreline Vegetation

- Manage PWC use to protect submerged aquatic vegetation from PWC activity and access.

Cultural Resources

- Manage PWC use and access to protect marine cultural resources.

Visitor Experience

- Manage PWC use to reduce potential conflicts between PWC users and other park visitors.
- Manage PWC use so that the mission of the park is fulfilled and the visitor experience inherent in the mission is maintained or enhanced.

Visitor Conflict and Visitor Safety

- Minimize or reduce the potential for PWC user accidents.
- Minimize or reduce the potential for safety conflicts between PWC users and other water recreationists.

Socioeconomic Environment

- Enhance communications with local communities regarding the management of PWC use.

National Seashore Management and Operations

- Manage PWC use to reduce potential conflicts between PWC users and other park visitors.
- Seek cooperation with local and state entities to manage or regulate PWC use.

ISSUES RELATED TO PWC USE AT PADRE ISLAND NATIONAL SEASHORE

Issues associated with PWC use at Padre Island National Seashore were identified during scoping meetings with NPS staff and as a result of public comments. Many of these issues were identified in the settlement agreement with the Bluewater Network, which requires that at a minimum the effects of PWC use be analyzed for the following: water quality, air quality, soundscapes, wildlife and wildlife habitat, shoreline vegetation, visitor conflicts, and visitor safety. Potential impacts to other resources were considered as well. The following impact topics are discussed in the "Affected Environment" chapter and analyzed in the "Environmental Consequences" chapter. If no impacts are expected, based on available information, then the issue was eliminated from further discussion, as explained in the section "Issues Eliminated from Further Consideration" (see page 21).

WATER QUALITY

The majority of personal watercraft in use today are still powered by conventional, two-stroke, carbureted engines that discharge as much as 30% of their fuel directly into the water (NPS 1999b; California Air Resources Board 1999). Hydrocarbons, including BTEX and PAHs, are released, as well as MTBE. These discharges have potential adverse effects on water quality.

Some research shows that PAHs, including those from PWC emissions, adversely affect water quality by means of harmful phototoxic effects on ecologically sensitive plankton and other small water organisms (EPA 1998a; Oris et al. 1998; Landrum et al. 1987; Mekenyan et al. 1994; Arfsten et al. 1996). This in turn can affect aquatic life and ultimately aquatic food chains. Conversely, some PAHs may be degraded via photodegradation or microbial degradation (Fasnacht and Blough 2002; Albers 2002).

Water quality is of importance to Padre Island National Seashore and is addressed in the natural resources management objectives in the park's *Resource Management Plan*. Water quality concerns include pollution from motorcraft, pollution from oil and gas operations in and near the park, and non-point pollution from surrounding development.

AIR QUALITY

Pollutant emissions, particularly NO_x and VOCs from personal watercraft, may adversely affect air quality. These compounds react with sunlight to form ozone. To the extent that nitrogen loading in the air contributes to the nutrient loading in the water column, PWC use adversely affects water quality.

Padre Island National Seashore is a class II air quality area. Although the park is not subject to provisions that apply to class I areas for the prevention of significant deterioration, the Clean Air Act (42 USC 7401 *et seq.*) provides that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts. Air contaminants from Texas sources, including oil and gas operations, and possibly from coal-fired plants in Mexico, could degrade air quality. Steady southeast winds disperse pollutants in the vicinity of the park. Based on limited historical PWC use within the Padre Island National Seashore, park staff believe that personal watercraft contributed very little to air pollution in the park.

SOUNDSCAPES

All motorized watercraft at Padre Island, including personal watercraft, produce noise that may impact park soundscapes and visitor experiences. Any watercraft that does not meet the NPS watercraft noise

regulation of 82 dB at 82 feet at full acceleration is subject to fine and removal from the park. However, personal watercraft may be more disturbing than other motorized vessels because of rapid changes in acceleration and direction of noise. PWC-generated noise may also be perceived as more intrusive in areas of natural quiet, although use may be infrequent in such locations. Conversely, in more congested and heavily visited areas, visitors would have a greater chance of perceiving and being disturbed by the higher number of personal watercraft that often occur in these visitor areas.

At Padre Island National Seashore, personal watercraft operated mostly during the warm season, and in Texas their use is restricted by law to the hours between sunrise and sunset. Other sources of noise include large powerboats, water recreationists, oil and gas operations, and vehicle traffic. Park staff received a few complaints about PWC noise from other users (windsurfers) at Bird Island Basin. On the gulf side, winds and waves are the prevalent sounds. Management objectives for some park areas may emphasize natural quiet.

WILDLIFE AND WILDLIFE HABITAT

Some research suggests that PWC use impacts wildlife by interrupting normal activities, causing alarm or flight, causing avoidance and displacement of habitat, and affecting reproductive success. This is thought to be caused by a combination of PWC speed, noise, and ability to access sensitive areas. There is also the possibility for collisions to occur between personal watercraft and marine species.

Personal watercraft may have a greater impact on waterfowl, shorebirds, colonial nesting birds, and sea turtles because of their noise, speed, and ability to access shallow-water areas more readily than other types of watercraft. This may force nesting birds to abandon eggs during crucial embryo development stages, flush other waterfowl from habitat, and alter sea turtle behavior, causing stress and associated behavior changes.

THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES

In some areas PWC use is believed to cause harm to threatened or endangered species of sea turtles and shorebirds because the engine noise and presence of personal watercraft may cause injury from collision or change in behavior.

Federally listed threatened, endangered, or species of concern that either are or may potentially be found in or near areas of Padre Island National Seashore where personal watercraft were historically used include the sea turtle (five species), eastern brown pelican, interior least tern, reddish egret, white-faced ibis, sooty tern, black tern, piping plover, bald eagle, and northern aplomado falcon. There are no known federally threatened or endangered plants in the park in areas that were or might be frequented by PWC users. State-listed species that are or might be found in the park in or near PWC use areas include the wood stork, white-tailed hawk, and peregrine falcon, plus some federally listed animal species. Other listed species, such as the Texas horned lizard, Texas indigo snake, and several neotropical migrant birds, may be expected in the park, but not in or near areas of PWC use.

SHORELINE AND SUBMERGED AQUATIC VEGETATION

At Padre Island no shoreline vegetation would be disturbed by PWC use, other than submerged aquatic vegetation (SAV). Submerged aquatic vegetation is a diverse assembly of rooted macrophytes that grow in shallow water under the surface, but not above it. These plants, also known as seagrass beds, are beneficial to aquatic ecosystems because they provide a protective habitat for young and adult fish and shellfish, as well as food for waterfowl, fish, and mammals. They also aid in oxygen

production, absorb wave energy and nutrients, and improve the clarity of the water. In addition, seagrass beds stabilize bottom sediments and suspended sediments present in the water.

PWC use has the potential to impact submerged aquatic vegetation because the craft can access shallow-water environments. Direct impacts resulting from collision or mechanical disturbance can occur. PWC use may also affect the growth and health of submerged aquatic vegetation as a result of increased turbidity, decreased available sunlight, and deposition of suspended sediments on plants. However, impacts of personal watercraft and other motorized watercraft on submerged aquatic vegetation beds are not known.

CULTURAL RESOURCES

Cultural resources that are listed on, or potentially eligible for listing on, the National Register of Historic Places may be affected by erosion along shorelines, or uncontrolled visitor access since riders are able to access, beach, or launch in areas less accessible to most motorized watercraft. A comprehensive inventory of archeological resources within Padre Island National Seashore has not been completed, and a formal assessment of known archeological sites within the park has not been completed since 1974. Two sites are listed on the National Register of Historic Places, including the Mansfield Cut Underwater Archeological District and the Novillo line camp. The line camp is in an interior location and would not be impacted by PWC use. The Mansfield Cut Underwater Archeological District is in the Mansfield Channel, near the southern boundary of the park. Because this site is 60 miles south of the Malaquite visitor center and is infrequently patrolled, the district could be affected by PWC use.

VISITOR EXPERIENCE

Personal watercraft are viewed by some segments of the public as a nuisance due to their noise, speed, manner of operation, and overall environmental effects, especially to those seeking a remote place of solitude and wildness. However, others believe that personal watercraft are no different from other motorcraft and that users have a right to enjoy the sport.

VISITOR CONFLICTS AND SAFETY

The National Transportation Safety Board reported that in 1996 personal watercraft represented 7.5% of state-registered recreational boats, but accounted for 36% of recreational boating accidents. In the same year PWC operators accounted for more than 41% of people injured in boating accidents. PWC operators accounted for approximately 85% of the persons injured in accident studies in 1997 (NTSB 1998). In part, this is believed to be a “boater education” issue, i.e., inexperienced or aggressive riders lose control of the craft; yet it is also a function of the PWC operation, i.e., no brakes or clutch. When drivers let up on the throttle to avoid a collision, steering becomes difficult. Due to their maneuverability and ability to reach high speeds and access shallow-draft areas, personal watercraft can create waves that conflict with or pose a safety hazard to other users, such as windsurfers, swimmers, anglers, and kayakers.

Previously, the primary user conflict at the park was between windsurfers at Bird Island Basin and PWC users. Documented conflicts between windsurfers and PWC users operating illegally within Bird Island Basin (which is recognized as one of the premiere windsurfing areas in the country) have occurred. Park staff are concerned about additional potential recreational conflicts between PWC users and windsurfers at Bird Island Basin. An increase in PWC use could result in increased conflict and safety problems.

Park staff are also concerned about potential conflicts between PWC use and visitors swimming, fishing, and playing in the surf along the gulf coast, where wave running by PWC users historically occurred. Close calls and PWC collisions have occurred in areas outside Padre Island National Seashore on the north end of the island and near Bob Hall Pier County Park.

SOCIOECONOMIC ENVIRONMENT

PWC sales were once the fastest growing segment of the boating industry in the country. PWC rentals have also increased, compared to other types of motorized watercraft. Some businesses may be affected by actions to either increase or decrease PWC use.

PARK MANAGEMENT AND OPERATIONS

Impact to Park Operations from Increased Enforcement Needs

Personal watercraft, because of their increased accident rates and visitor safety conflicts, often require additional park staff to enforce standards, limits, or closures. Padre Island National Seashore conducts sporadic water patrols of the Gulf of Mexico and the Laguna Madre. Park operations (other than protection patrols) are conducted on the water more often than protection patrols. Search-and-rescue boat patrols are infrequent. Texas Parks and Wildlife game wardens routinely patrol the waterways during the summer, but they do not have enforcement authority related to locations where PWC are prohibited. The U.S. Coast Guard occasionally patrols the park by conducting flyovers.

Park staff have received unofficial reports of illegal PWC use in the Laguna Madre from park visitors. Regular patrols of the water and along the southern portion the park are necessary to detect and detour illegal PWC users; therefore, PWC use within the park requires additional workload on field personnel.

Conflict with State and Local Ordinances and Policies Regarding PWC Use

Some state and local governments have taken action, or are considering taking action, to limit, ban, or otherwise manage PWC use. While the national seashore may be exempt from these local actions, consistency with national, state, and local plans must be evaluated.

ISSUES ELIMINATED FROM FURTHER CONSIDERATION

The following issues were eliminated from further analysis for the reasons stated below.

- *Sacred Sites and Native American Concerns* — The Bureau of Indian Affairs has not recognized any tribe that claims the park as an ancestral homeland or uses the area or sites for traditional activities. Therefore, there are no affiliated tribal groups with which the park is required to coordinate. The Tonkawa Tribe of Oklahoma assimilated the Karankawa people, whose ancestors once inhabited the island. A visit to the island by an officially designated representative of the Tonkawa Tribe in 1998 revealed that Padre Island is considered too far south of customary Tonkawa territory for the tribe to have specific concerns about cultural resources on the island. However, the tribe is concerned about the health of the island's ecosystem as a whole, and it wishes to be kept informed about future park management plans in general.
- *Historic Structures* —Historic sites at Padre Island include the Zachary Taylor campsite (Mexican-American War); and three sites known as the 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 on the National Register of Historic Places. The Black Hill and Green Hill line camps have been evaluated and recommended by NPS cultural resource specialists as eligible for listing on the national register.

Most of these sites are in the park's interior, and other archeological sites on the island were found primarily on channel cuts, the west shore of the Laguna Madre, and the interior behind the foredunes. Therefore, no impacts to historic structures are expected.

- *Cultural Landscapes and Ethnographic Resources* — None of the areas potentially accessible to PWC users (the Bird Island Basin launch area and the gulf beach) are considered to be cultural landscapes, and no ethnographic associations with the park have been identified in these areas. Therefore, these topics will not be addressed in this environmental analysis.
- *Wetlands* — Any potential impacts to wetlands in the vicinity of the shoreline are evaluated under the topic "Shorelines and Shoreline Vegetation." (The extent of the area of impact is defined in the methodology section and includes submerged aquatic vegetation only.) Wetlands that occur farther inland or along the Laguna Madre shoreline would not be affected by PWC use because users do not land on tidal flats or access inland wetlands.
- *Floodplains* — The entire park is within the 100-year control floodplain; however, the level of PWC use and associated PWC activities identified in each alternative would have no adverse impacts on floodplains. No development is proposed by the alternatives; thus, no flooding would result from PWC use, resulting in no impacts to human safety, health, or welfare.
- *Prime and Unique Agricultural Lands* — No prime and unique agricultural farmland exists in the park.
- *Energy Requirements and Natural or Depletable Resource Requirements* — PWC operation requires the use of fossil fuels. While PWC use is analyzed within the national seashore, no alternative considered in this environmental assessment would affect the number of personal watercraft used within the region or the amount of fuel that is consumed. The level of PWC use considered in this environmental assessment is minimal. Fuel is not currently in short supply, and PWC use would not have an adverse effect on continued fuel availability.
- *Impacts to Economically Disadvantaged or Minority Populations (Executive Order 12898)* — Local residents may include low-income populations. However, these populations would not be particularly or disproportionately affected by continuing or discontinuing PWC use. Other areas in the immediate vicinity of the park are available to all PWC users, are generally more conducive for recreational PWC use, and are more popular areas for such use. These areas have few restrictions and do not charge for PWC use, which would be more appealing to low-income populations. Three to four PWC dealers exist in the vicinity of the park, and no PWC rental shops are known. Approximately six boat dealers are located far enough north of the park to discourage the majority of PWC operators from traveling to the park, especially since several closer alternatives exist. No minority PWC businesses would be affected by decreased or displaced PWC use.

RELATIONSHIP TO OTHER PLANS, POLICIES, AND ACTIONS

The following plans, policies, and actions could affect the alternatives being considered in this environmental assessment.

NPS POLICIES, PLANS, AND ACTIONS

Plans, policies, and actions at the federal, state, and local level that may affect decisions for PWC use were discussed with NPS staff, along with existing and future plans and policies at Padre Island National Seashore. These include the following:

- *General Management Plan and Development Concept Plan* (April 1983) — This plan is currently being updated, and new visitor surveys will be conducted. General management plans provide the foundation for addressing management objectives throughout the park. The plan describes the management zones and strategies, and the relocation and modification of some existing visitor facilities.
- *Superintendent's Compendium* (2003) — Annual compendiums are composed by park superintendents to detail specific regulations applicable to a variety of topics within park units. The current "Superintendent's Compendium" outlines regulations relevant to public recreational use within the national seashore (NPS 2003a).
- *Parkwide Development Concept Plan and Environmental Assessment* (1995) — Facility-development changes over the next 10 to 15 years, including facility needs at Bird Island Basin, the location of administrative offices, and the continuation of ranger and maintenance functions are presented in the *Parkwide Development Concept Plan*.
- *Strategic Plan* (1998)— The *Strategic Plan* presents the park's long-term goals for the next five years based on the refinement of the mission goals.
- *Resource Management Plan* (1994) — The *Resource Management Plan* provides recommended management actions and work plans as they relate to park resources.
- *Bird Island Basin Recreational Use Plan* (2001) — Develops new management actions that address several land use and resource protection issues within Bird Island Basin.
- *Survey of Down-Island Visitors and Their Use Patterns at Padre Island National Seashore* (1987) — This survey provides an understanding of dispersed beach users down-island (the 55 miles of beach south of the 5-mile marker), evaluates visitor perceptions and satisfaction with beach experiences, and identifies patterns of recreational use down-island.
- *Comprehensive Interpretive Plan* (2001) — The *Comprehensive Interpretive Plan* describes the long-range vision for the park's interpretive program, the goal of which is to increase people's understanding and appreciation of the significance of the national seashore.
- *Historic Resource Study* (1971) — The *Historic Resource Study* contains a brief survey of the island's history from its discovery in 1519 to the creation of Padre Island National Seashore in 1962.
- *Archeological Assessment* (June 1974) — The *Archeological Assessment* provides an overview of potential resources of Padre Island National Seashore.
- *Oil and Gas Management Plan* (2000) — The *Final Oil and Gas Management Plan and Environmental Impact Statement* analyzes alternatives for the management of existing and anticipated oil and gas operations within the park.
- *A Survey of Visitors to Padre Island National Seashore* — The final survey report summarizes visitor answers to questions, including demographics, visitation and recreational use patterns, and various opinions related to seashore management.
- *Air Resources Management* — The NPS *Management Policies 2001* state NPS goals and objectives regarding air quality, weather, and climate (sec. 4.7 [NPS 2001c]). The National Park Service will assume an aggressive role in preserving, protecting, and enhancing air

quality in all park units. The Park Service aims to preserve the natural quite and sounds associated with each park. To ensure protection from excessive noise, monitoring programs and necessary actions should be applied to prevent adverse effects to the natural resources and to the visitors at each park. While the plan addresses the need to protect the park's air quality and noise environment associated with all new and human sources, there are no specific regulations for personal or motorized watercraft.

- *Beach Use Management Plan* (not completed)
- *Spoil Island Management Plan* (not completed)

Padre Island is currently evaluating several management options for the park, including the Laguna Madre and approximately one third of the Nine-Mile Hole area that is within the national seashore's jurisdiction. Currently, this area of the seashore is a voluntary non-propeller zone. Texas Parks and Wildlife has jurisdiction over the remaining two-thirds of the Nine-Mile Hole area. Options being considered for public comment include establishment of no-propeller areas, motorized boating areas, non-motorized boating areas, and kayak trails. The park is also working on re-marking its water boundary to ensure that visitors know when they enter NPS waters and to aid in protecting park resources. This project is being evaluated in 2005 and will likely be implemented in 2006. In addition, Padre Island will begin enforcing the incidental business permits for all commercial fishing guides and other commercial operations using the park (Echols, pers. comm., Mar. 10 and 14, 2005).

OTHER FEDERAL AGENCY PLANS, POLICIES, OR ACTIONS

In recognition of the increasing pressures of over-development on the nation's coastal resources, Congress enacted the Coastal Zone Management Act in 1972. The act encourages states to preserve, protect, develop, and where possible, restore or enhance valuable natural coastal resources, such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife using those habitats. A unique feature of the coastal zone management program is that participation by states is voluntary. To encourage states to participate, the act makes federal financial assistance available to any coastal state or territory that is willing to develop and implement a comprehensive coastal management program.

State coastal zones include the coastal waters and adjacent shorelands that extend inland to the extent necessary to control activities that have a direct significant impact on coastal waters. For federal approval, a coastal zone management plan must (1) identify the coastal zone boundaries; (2) define the permissible land and water uses within the coastal zone that have a direct and significant impact on the coastal zone and identify the state's legal authority to manage these uses; (3) inventory and designate areas of particular concern; (4) provide a planning process for energy facilities siting; (5) establish a planning process to assess the effects of, and decrease the impacts from, shoreline erosion; and (6) facilitate effective coordination and consultation between regional, state, and local agencies. The National Oceanic and Atmospheric Administration approves coastal zone management plans and oversees subsequent implementation of programs.

LOCAL OR STATE POLICIES, PLANS, OR ACTIONS

No local actions or laws have been established by Corpus Christi or the counties surrounding the park (Kenedy, Kleberg, and Willacy counties) that affect PWC use at Padre Island National Seashore.

Several plans are in progress for government-owned land in the vicinity of the park. A master plan for Mustang Island State Park is underway. Padre Balli County Park is currently planning for new

restrooms, offices, a new concessioner for the public, and other services. Neither of these parks has restrictions on PWC use.

Other actions or projects in the vicinity of Padre Island National Seashore include the following:

- commercial development at the 37-mile marker at the causeway within the Laguna Madre, including several marinas, PWC and boat launch sites, and guided fishing tours
- oil and gas development in the Laguna Madre outside park boundaries
- dredging and expanding Packery Channel (a popular area for PWC users) — This action would provide water access to the Gulf of Mexico from the Laguna Madre and would consist of a jettied entrance extending 1,400 feet into the Gulf of Mexico and a channel 140 feet wide and 12 feet deep (a U.S. Army Corps of Engineers [ASACE] 404 permit has been received); additional residential and commercial development, including a golf course, is expected in this area. The channel would extend from the Gulf of Mexico to the Gulf Intracoastal Waterway in Corpus Christi Bay in the area of the previous channel (USACE 2003). The project has been funded, and the Corps began dredging the channel in 2003. The project is expected to be completed in 2006, providing additional recreational opportunities for various water-based activities (Echols, pers. comm., Feb. 18, 2005).
- reopening the Nine-Mile Hole State Scientific Area managed by Texas Parks and Wildlife to boating access — This action could increase boat traffic in certain areas of the park. The Nine-Nile Hole area is currently a mandatory non-propeller zone, but this regulation will be lifted in June 2005 (Echols, pers. comm., Mar. 14, 2005). Nine-Mile Hole is located in Kenedy County, approximately 36 miles south of Corpus Christi, in an area of the Laguna Madre called the Land Cut. User conflicts caused by traditional and evolving fishing strategies had begun to rapidly escalate. Nine-Mile Hole was selected as a pilot site to determine the effects of boat traffic on fishing experiences. On June 1, 2000, the Texas Parks and Wildlife Commission designated a portion of Nine-Mile Hole as a state scientific area for a five-year period so that data could be collected to determine if this type of management action would reduce user-conflicts and provide for a quality fishing experience (TPWC 2004a).
- proposed development south of Padre Balli County Park, including commercial, residential uses, and a golf course
- dredging of the Intracoastal Waterway approximately every 5 years and every 10–14 years at Bird Island Basin
- existing and ongoing barge traffic in the Intracoastal Waterway
- raising of the JFK Causeway (bridge connecting Padre Island to Corpus Christi)

ALTERNATIVES

All alternatives must be consistent with the purpose and significance of the Padre Island National Seashore, and they must meet the purpose of and need for action, as well as the objectives for the project (DO #12 Handbook, sec. 2.7, 5.3; NPS 2001b). Three alternatives are described in this section; options that were considered but dismissed are discussed on page 27.

The alternatives are analyzed in accordance with the National Environmental Policy Act and are the result of agency and public input. The alternatives range from continuing the prohibition on PWC use in all areas of the park, to reinstating PWC use as previously managed before the prohibition was implemented in April 2002.

Table 3 at the end of this chapter summarizes the alternatives being considered, and Table 4 the impacts of each alternative. Table 5 lists the issues associated with PWC use, management objectives for addressing the issues, and an analysis of how well each alternative meets the objectives.

NO-ACTION ALTERNATIVE — CONTINUE TO PROHIBIT PWC USE (PREFERRED AND ENVIRONMENTALLY PREFERRED ALTERNATIVE)

PWC use would remain prohibited in all areas of the park, as described in the April 5, 2002, "Notice of Determination," and the National Park Service would not take action to draft a special regulation to continue PWC use at Padre Island National Seashore. Information programs would be conducted at the most popular launch sites in order to ensure compliance with the ban.

ALTERNATIVE A — REINSTATE PWC USE UNDER A SPECIAL NPS REGULATION AS PREVIOUSLY MANAGED (BEFORE APRIL 22, 2002)

A special NPS regulation would be written to allow PWC use, which would be managed as it had been before the April 5, 2002, "Notice of Determination" was implemented on April 22, 2002. PWC use would be permitted under a special regulation that would allow use as described in the "Superintendent's Compendium" that was in effect before the ban. Personal watercraft would be prohibited from operating within the Padre Island National Seashore portion of the Laguna Madre, except for launching at Bird Island Basin for direct travel to and from the Intracoastal Waterway by way of the marked Bird Island Basin boat channel. PWC users would be allowed to operate south of the 5-mile marker of South Beach on the Gulf of Mexico shoreline, including Mansfield Channel.

All state and federal watercraft laws and regulations would be enforced, including regulations that address reckless or negligent operation, excessive speed, hazardous wakes or washes, hours of operation, age of the driver, and distance between vessels.

State Operating Requirements. In addition to adhering to all Texas boating laws, PWC operators must abide by state regulations specific to personal watercraft:

- Persons less than 16 years of age shall not operate a personal watercraft unless accompanied by someone at least 18 years of age. A mandatory Texas Parks and Wildlife boater education law limits the age of PWC operators. Individuals born after August 31, 1984, who are less than 18 years of age must pass a boater education course approved by Texas Parks and Wildlife.

- PWC operators and passengers are required to wear Coast Guard approved personal flotation devices (PFDs).
- PWC operators must be fastened to a lanyard cut-off device if the personal watercraft has one installed that will shut off the engine should the operator fall off.
- Riders can only operate personal watercraft from sunrise to sunset.
- A person cannot operate within 50 feet of another vessel (including other personal watercraft), person, platform, object, or the shore except at a speed just enough to maintain headway and steerage.
- PWC are not to be operated in a manner that requires the operator to swerve at the last possible moment to avoid collision. PWC operators may not jump the wake of another vessel or be unnecessarily close to other vessels.
- It is illegal to chase, harass, or disturb wildlife with a personal watercraft.
- Operating a personal watercraft with a 0.08% blood alcohol content (BAC) is illegal.

Park staff would initially provide additional information and education to the public, focusing on rules and regulations pertaining to PWC use at the park. Otherwise, there would be no changes in enforcement procedures at Padre Island. No additional monitoring or sampling would occur. The park would comply with state and federal requirements; no additional requirements would be implemented.

Equipment and Emissions. As noted in the "Background" section, the Environmental Protection Agency promulgated a rule to control exhaust emissions from new marine engines, including outboards and personal watercraft. Emission controls provided for increasingly stricter standards beginning in model year 1999 (EPA 1996a, 1997). Under this alternative, it is assumed that personal watercraft with two-stroke engines would be converted to cleaner direct-injected or four-stroke engines in accordance with the EPA rule (EPA 1996a). Padre Island would not accelerate this conversion from two-stroke to four-stroke engines for personal watercraft.

ALTERNATIVE B — REINSTATE PWC USE UNDER A SPECIAL REGULATION ONLY IN THE BIRD ISLAND BASIN BOAT CHANNEL

A special regulation would be written to permit personal watercraft to be launched at Bird Island Basin only for direct travel to and from the Intracoastal Waterway by way of the marked Bird Island Basin boat channel. Personal watercraft would be prohibited in all other areas of the park, including within the Gulf of Mexico and Mansfield Channel.

All state and federal watercraft laws and regulations would be enforced, as described in alternative A. As under alternative A, park staff would initially provide additional information and education to the public, focusing on rules and regulations pertaining to PWC use at the park.

ALTERNATIVES CONSIDERED BUT NOT ANALYZED FURTHER

Alternatives discussed but rejected included:

- *Allow PWC use along the Gulf of Mexico only, and prohibit PWC use within Bird Island Basin* — This alternative was considered because it would allow shark fishermen to continue using personal watercraft to place bait offshore, and it would allow limited recreational use. It was rejected because of wildlife and threatened and endangered species issues and cumulative

impacts on visitor experience. In addition, it is not consistent with the park's values and mission, which emphasize the preservation of undeveloped shoreline and visitor experiences associated with the remote gulf beaches.

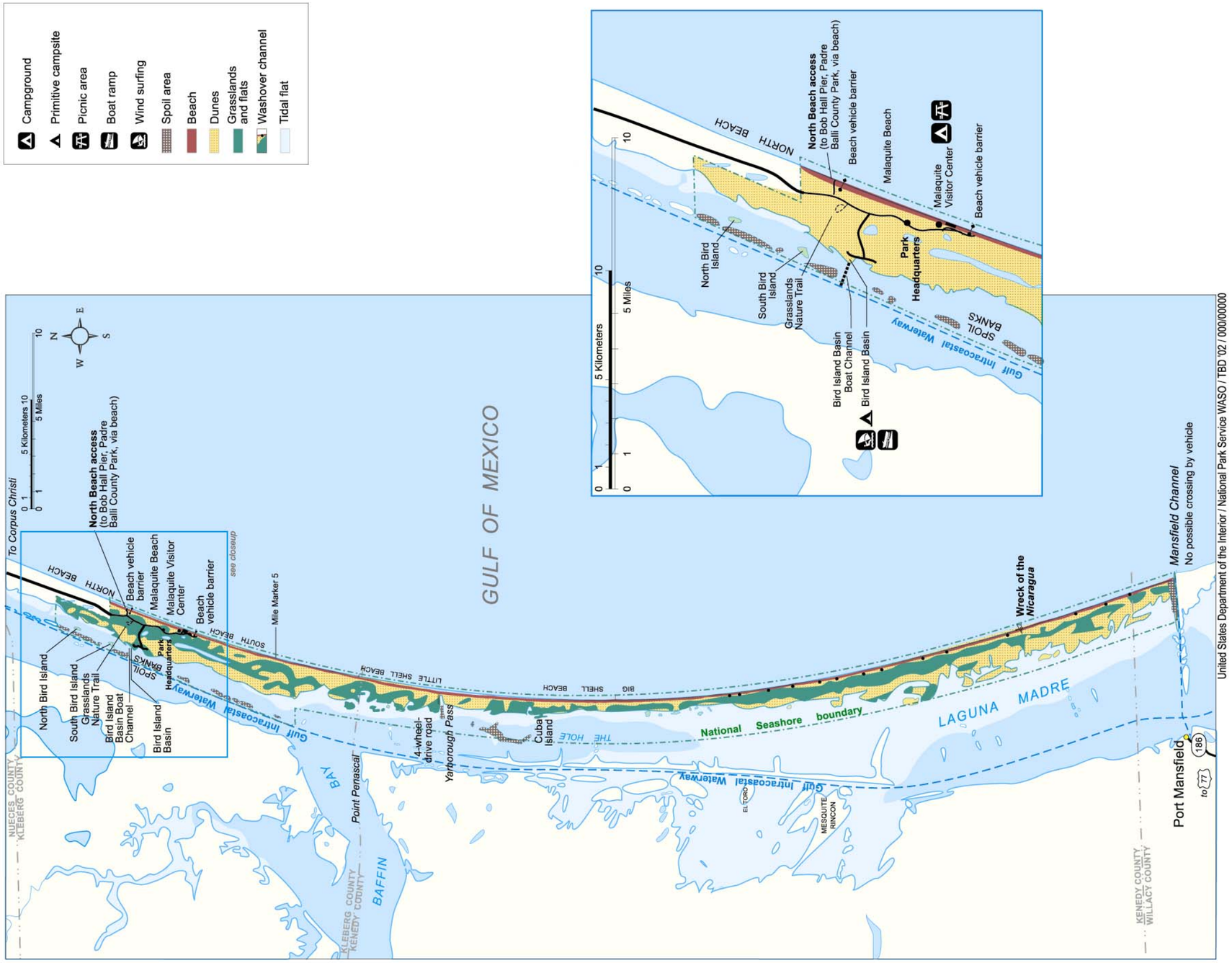
- *Allow PWC launching at Yarborough Pass* — This alternative would allow access to the spoil islands within the Laguna Madre. The launching of boats into the Laguna Madre is permitted from this point. This alternative was rejected because management oversight would be difficult since Yarborough Pass is in a remote location away from main enforcement and activity areas. No history of legal PWC use occurred in this area, and no large demand exists for PWC launching from this point. Sensitive ecological areas, such as wind-driven salt tidal flats and extensive seagrass beds, are also located in this area.
- *Reinstate PWC use under park management policies and practices existing before April 22, 2002, but with seasonal restrictions* — This alternative was considered because it was thought that seasonal restrictions would allow some visitor use, but also allow for natural resource protection. This alternative was dismissed because, after further evaluation, it was determined that the periods of seasonal restriction that would be required to protect natural resources (spring to late summer) would coincide with the personal watercraft use season at the park. Few, if any, personal watercraft would be expected during the remaining unrestricted periods (primarily late fall and winter). Because the seasonal restrictions on visitor use would essentially make this alternative equivalent to a ban on PWC use and not substantially different from the no-action alternative, this alternative was eliminated from further consideration.
- *Reinstate PWC use as previously managed before April 22, 2002, with additional restrictions* — This alternative, which was identified during the internal scoping meeting, would have prohibited personal watercraft from operating within the Padre Island National Seashore portion of the Laguna Madre, except for launching at Bird Island Basin for direct travel to and from the Intracoastal Waterway by way of the marked Bird Island Basin boat channel. In addition, personal watercraft would have been allowed to operate south of the 5-mile marker of South Beach on the Gulf of Mexico shoreline. Additional restrictions applied to all permitted uses would have included:
  - closing Mansfield Channel to PWC use
  - requiring four-stroke or other clean-burning engines by 2005
  - prohibiting use parallel to the surf line within the Gulf of Mexico
  - requiring additional visitor education for PWC users

After subsequent discussions, park staff determined that, because of the limited PWC use, requiring clean engine technology by 2005 would not provide as much resource protection as other proposed measures in alternative B. In addition, enforcement would be difficult.

Padre Island National Seashore

Texas

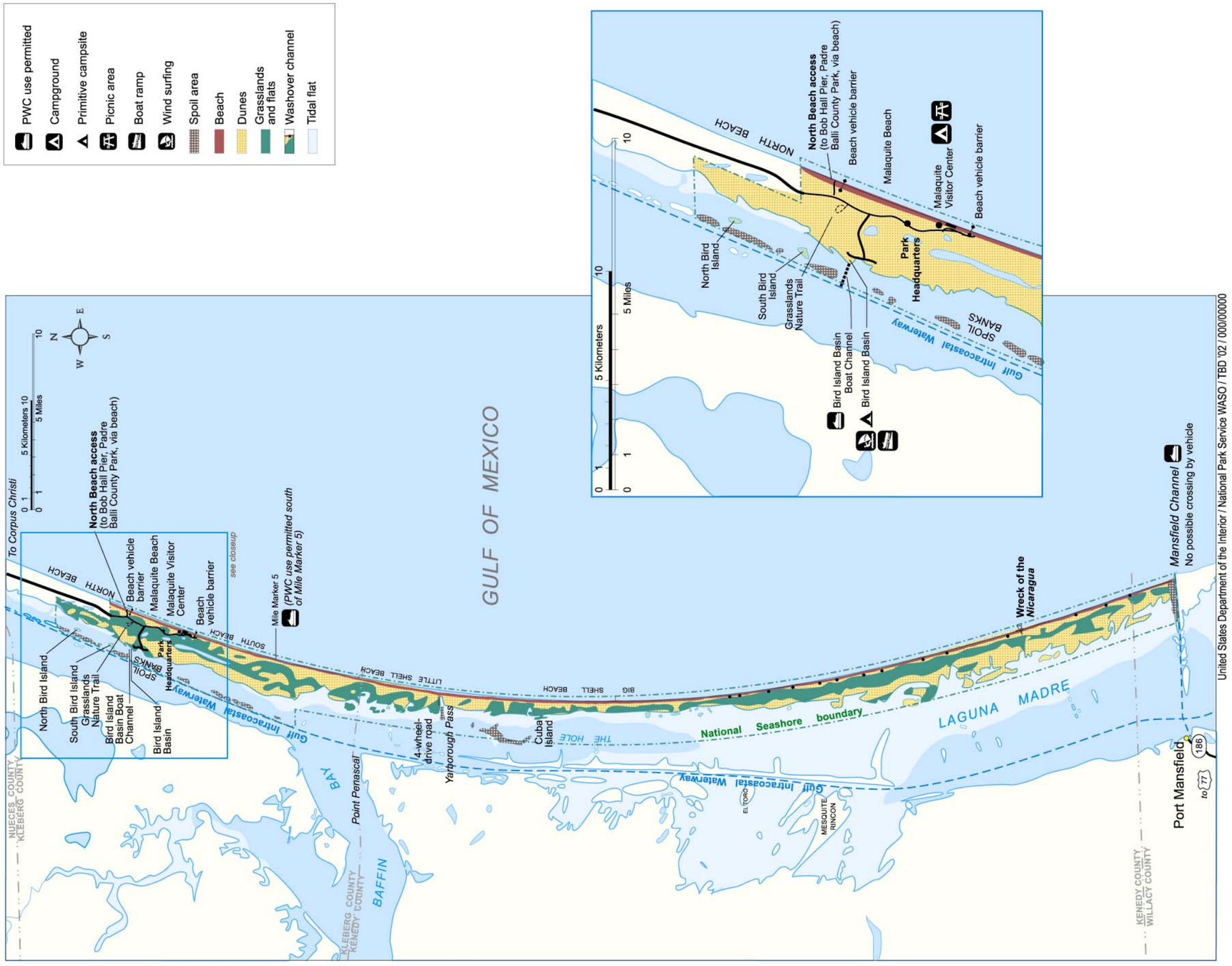
No-Action Alternative -- No PWC Use



Padre Island National Seashore

Texas

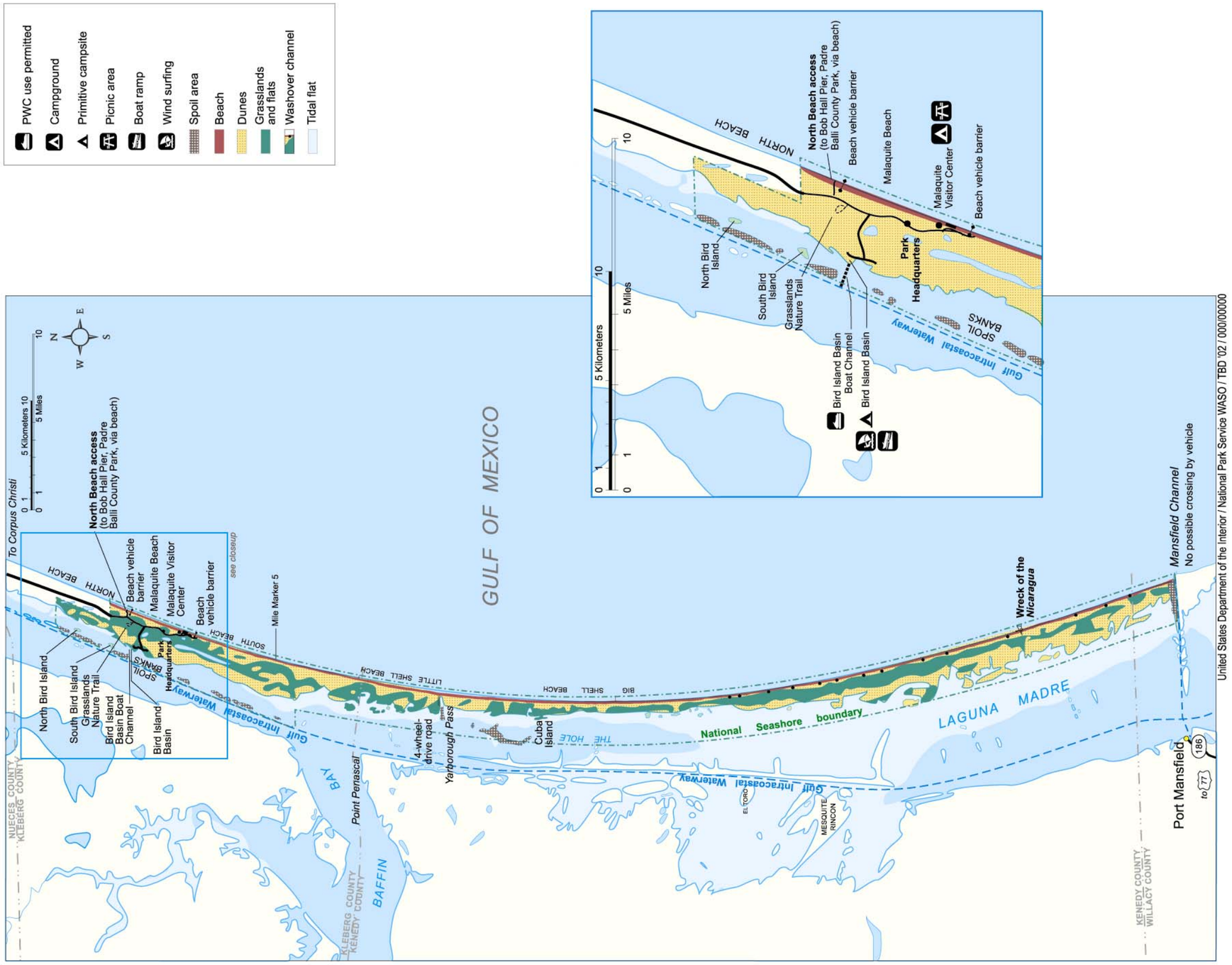
Alternative A -- Reinstate PWC Use as Previously Managed



Padre Island National Seashore

Texas

Alternative B -- Reinstate PWC Use in Bird Island Basin Channel Only



THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is defined by the Council on Environmental Quality as the alternative that best meets the following criteria or objectives, as set out in section 101 of the National Environmental Policy Act:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
- Preserve important historic, cultural, and natural aspects of our national heritage and maintain, whenever possible, an environment that supports diversity and variety of individual choice.
- Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

This discussion also summarizes the extent to which each alternative meets section 102(1) of the National Environmental Policy Act, which asks that agencies administer their own plans, regulations, and laws so that they are consistent with the policies outlined above to the fullest extent possible.

Alternative A would satisfy several of the six requirements detailed above. However, alternative A would not ensure safe, healthful, productive, and aesthetically pleasing surroundings by allowing PWC use in areas frequented by passive outdoor recreationists, such as the windsurfers in Bird Island Basin, and visitors seeking solitude on beaches down-island. Alternative A would not attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences because of the potential impacts of PWC use on visitor experiences and associated noise. Such experiences include those available on the more remote beaches on the gulf side, characterized primarily by natural quiet and a "wildlike" character. For this reason, alternative A is not preferred from an environmental perspective.

Alternative B would have impacts on the national seashore's natural resources similar to those under alternative A in the Bird Island Basin area, with potential conflicts and safety concerns, particularly regarding windsurfers and other visitors. However, over the long term this alternative would help some visitors enjoy beneficial use by allowing access to the Laguna Madre by PWC users, while accommodating more outdoor recreationists who desire a remote and quiet beach experience on the gulf side of the park. Alternative B would meet the National Park Service's general prohibition on PWC use in order to protect park resources and values, while providing PWC access to the Intracoastal Waterway (ICW) and associated islands.

The no-action alternative would ensure a safe, healthful, productive, and aesthetically and culturally pleasing area for visitors without the potential noise and safety concerns caused by PWC use. The no-action alternative would limit diversity and variety of individual choice for those few visitors who desire to use personal watercraft at Bird Island Basin or along the coast; however, removing the PWC use from the national seashore entirely would attain a wide range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.

Based on the analysis prepared for PWC use at Padre Island National Seashore, the no-action alternative is considered the environmentally preferred alternative by best fulfilling park responsibilities as trustee of sensitive habitat; by ensuring safe, healthful, productive, and aesthetically and culturally pleasing surroundings; and by attaining a wide range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.

TABLE 3: COMPARISON OF THE ALTERNATIVES

Elements	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation As Previously Managed (before April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation only in the Bird Island Basin Channel
Location Restrictions	Prohibit PWC use throughout the park.	Prohibit PWC use in the Laguna Madre (within park boundaries), except for launching at Bird Island Basin for direct travel to and from the Intra-coastal Waterway by way of the marked Bird Island Basin boat channel. Allow PWC use south of the 5-mile marker at South Beach on the Gulf of Mexico shoreline.	Allow no PWC use within the gulf portion of the park. Same restrictions within the Laguna Madre as described under Alternative A.
Wake Restrictions	Not applicable.	Require all watercraft to observe the flat-wake zone the currently exists within this portion of Bird Island Basin.	Same as alternative A.
Launch Restrictions	No launching or retrieval of personal watercraft permitted.	Within the Laguna Madre, allow personal watercraft to be launched only at the Bird Island Basin boat ramp. On the gulf side, allow personal watercraft to launch from the beach south of the 5-mile marker on South Beach.	Within the Laguna Madre, allow personal watercraft to launch only at the Bird Island Basin boat ramp.
Operating / Safety Requirements	Not applicable.	Enforce Texas regulations: • Each occupant must wear a personal flotation device. • Cut-off or kill switch (if provided) must be attached to the operator. • All operational rules for regular motorboats apply to personal watercraft. • Persons less than 16 years of age shall not operate a personal watercraft unless accompanied by someone at least 18 years of age. A mandatory Texas Parks and Wildlife boater education law limits the age of PWC operators. Individuals born after August 31, 1984, who are less than 18 years of age must pass a boater education course approved by Texas Parks and Wildlife. • Riders can only operate personal watercraft from sunrise to sunset. • Riders cannot operate above headway (flat-wake) speed when within 50′ of another vessel, PWC user platform, person, object, or shore. • Riders are not to operate in a manner requiring them to swerve to avoid collisions, jump the wake of another vessel, or come unnecessarily close. • Riders cannot operate a personal	Same as alternative A.

Elements	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation As Previously Managed (before April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation only in the Bird Island Basin Channel
		watercraft while intoxicated. • It is illegal to chase, harass, or disturb wildlife.	
Enforcement	Focus enforcement on the personal watercraft ban.	Focus enforcement on ensuring compliance with permitted uses.	Same as alternative A.
Monitoring and Sampling	Not applicable.	No additional monitoring or sampling.	Same as alternative A.
Education	Educate visitors on why personal watercraft are prohibited from the seashore.	Conduct information programs at most popular launch sites to ensure compliance with use restrictions. Comply with state minimum requirements.	Provide initial education focusing on rules and regulations. Comply with state minimum requirements.
Engine Type	Not applicable.	No restrictions.	No restrictions.

TABLE 4: SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Impact Topic	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed (Prior to April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
Water Quality	No water quality impacts from PWC use. Cumulative water quality impacts would be negligible in both the Bird Island Basin area of Laguna Madre and Gulf of Mexico waters within the national seashore through 2014. A major oil spill or release could result in minor to moderate, short-term, adverse impacts. The no-action alternative would not result in an impairment of water resources.	Water quality impacts through 2014 from PWC use alone would be negligible. On a cumulative basis impacts from personal watercraft and other outboard motorboats would also be negligible. A major oil spill or release in the vicinity of the national seashore could result in minor to moderate, short-term, adverse impacts. Alternative A would not result in an impairment of water resources.	Continuing the ban on PWC use in Gulf of Mexico waters would have no impact on water quality relative to the no-action alternative. Impacts to water quality from PWC use in the Bird Island Basin would be negligible. Cumulative impacts from PWC and other motorboat use in Bird Island Basin, and from motorboat use in the gulf, would be negligible. A major oil spill or release could create short-term, minor to moderate, adverse impacts. Alternative B would not result in an impairment of water resources.
Air Quality			
• Impact to Human Health from Airborne Pollutants Related to PWC Use	No impacts on human health for PWC-related CO, PM_{10}, HC, or NO_x emissions. Cumulative adverse impacts through 2014 would be adverse, long term, and negligible for HC, PM_{10} and NO_x and minor and long term for CO. Slightly increased NO_x emissions in 2014 would result from increased boating activity and the conversion to new technology engines. However, with improved emission controls, future CO and HC emissions would continue to decline. Reduced HC emissions from cleaner engines would lessen contributions to regional ozone levels in 2014. All impacts would be long term. The risk from PAHs would be negligible through 2014. This alternative would not result in an impairment of air quality.	Reinstating PWC use would result in negligible adverse impacts to human health related to the PWC airborne pollutants (CO, PM_{10}, HC, and NO_x) for 2004. The risk from PAHs would also be negligible. In 2014 there would be increases in CO and NO_x emissions and a decrease in HC and PM_{10} emissions. The impact level for these pollutants would remain negligible, the same as in 2004. Cumulative emission impacts from all boating would be negligible for PM_{10}, NO_x, and HC and minor for CO through 2014. This alternative would not result in impairment of air quality.	Allowing PWC use in the Bird Island Basin Channel area only would result in negligible impacts to air quality through 2014. Emissions would be reduced slightly compared to alternative A because PWC use would be restricted to the Bird Island Basin Channel. The risk from PAHs would also be negligible through 2014. Cumulative emission levels for all motorized watercraft through 2014 would be minor for CO and negligible for PM_{10}, HC, and NO_x. This alternative would not result in impairment of air quality.
• Air Quality Related Values from PWC Pollutants	No impact to air quality related values from PWC use through 2014. On a cumulative basis and	There would be negligible impacts to visibility from PWC use through 2014, and minor adverse impacts from ozone exposure through	There would be a negligible impact to visibility from personal water-craft through 2014 and a minor adverse impact from ozone

Impact Topic	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed (Prior to April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
	considering the combined predicted effects on visibility and vegetation, there would be an overall minor impact level to air quality related values from all motorized watercraft emissions through 2014. This alternative would not impair air quality related values.	2014, based on SUM06 index values. The overall impact to air quality related values from PWC use would be minor. On a cumulative basis there would be an overall minor impact to air quality related values from all motorized watercraft emissions through 2014. This alternative would not impair air quality related values.	exposure through 2014. The overall impact to air quality related values from PWC use would be minor. On a cumulative basis there would be a negligible impacts to visibility and a minor impact from ozone exposure through 2014. This alternative would not impair air quality related values.
Soundscapes	No PWC use at Padre Island would result in no impacts on park soundscapes. Cumulative noise impacts from motorboats and other visitor activities would be adverse and negligible to minor over the short and long terms, particularly near the Bird Island Basin boat launch and the gulf beaches, but there would be no contribution to noise from PWC use within Padre Island. This alternative would not impair park soundscapes.	Noise generated by PWC use would have adverse, negligible to moderate impacts over the short and long term, depending on location within the park. Impact levels would be related to the number of personal watercraft operating in concentrated areas, as well as the sensitivity of other visitors. Over the long term PWC noise levels would be reduced with the introduction of newer engine technologies. Cumulative noise impacts from personal watercraft, motorboats, oil and gas operations, and other visitor activities would be negligible to moderate and adverse in some locations over the short and long terms because these sounds would be heard occasionally throughout the day. For the most part, natural sounds would still predominate at most locations. This alternative would not impair park soundscapes.	Noise generated by PWC use would have adverse, short- and long-term, negligible to minor impacts at Bird Island Basin, depending on the number of personal watercraft operating in the area, as well as the sensitivity of other visitors. Over the long term PWC noise levels would be reduced with the introduction of newer engine technologies. Cumulative noise impacts from personal watercraft, motorboats, and other visitors would be adverse and negligible to minor at Bird Island Basin over the short and long terms because these sounds would be heard occasionally throughout the day. For the most part, natural sounds would still predominate at most locations. This alternative would not impair park soundscapes.

Impact Topic	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed (Prior to April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
Shoreline and Submerged Aquatic Vegetation	There would be no PWC-related impacts on shorelines or submerged aquatic vegetation. Cumulative impacts from other uses in the Laguna Madre would be adverse, localized, short and long term, and negligible to minor except in areas of propeller scarring, potentially resulting in adverse, localized, long-term, minor impacts. PWC contribution to overall vegetation impacts would be eliminated. There would be no perceptible changes to shoreline or submerged aquatic vegetation community size, integrity, or continuity through 2014. This alternative would not impair shoreline or submerged aquatic vegetation.	PWC use and activities would have adverse, localized, negligible impacts to shoreline or sub-merged aquatic vegetation beds over the short and long term. There would be no perceptible changes to submerged aquatic vegetation community size, integrity, or continuity, through 2014. On a cumulative basis other activities would have much more effect on shoreline and sub-merged aquatic vegetation than would PWC use. Adverse impacts would be localized and negligible to minor over the short and long term except in areas of propeller scarring, where potential impacts could be adverse, localized, long term, and minor. Only minor additional adverse impacts would be expected in the future from a projected increase in boat numbers over time. There would be no perceptible changes to submerged aquatic vegetation community size, integrity, or continuity through 2014. This alternative would not impair shoreline or submerged aquatic vegetation.	PWC use and activities would have adverse, localized, negligible impacts to shoreline vegetation and submerged aquatic vegetation over the short and long term. There would be no perceptible changes to sub-merged aquatic vegetation community size, integrity, or continuity through 2014. On a cumulative basis other activities would have much more effect on shoreline and sub-merged aquatic vegetation than would PWC use. Adverse impacts would be localized and negligible to minor over the short and long term except in areas of propeller scarring, where potential impacts could be adverse, localized, long term, and minor. Only minor additional adverse impacts would be expected in the future from a projected increase in boat numbers. There would be no perceptible changes to submerged aquatic vegetation community size, integrity, or continuity through 2014. This alternative would not impair shoreline or submerged aquatic vegetation.
Wildlife and Wildlife Habitats	No impacts to wildlife or habitat from PWC use. Cumulative impacts from other uses would have adverse, short-term, negligible impacts to fish, and negligible to minor impacts to waterfowl, nesting birds, and other wildlife on both the gulf and bay sides of the park. There would be no perceptible changes in wildlife populations or their habitat community structure. An offshore oil spill or release could have adverse, long-term, moderate impacts. This alternative would not impair wildlife or wildlife habitat.	PWC use would generally have adverse, localized, short-term, negligible to minor impacts on wildlife and habitat at both Bird Island Basin and along the gulf shore. On a cumulative basis, all visitor activities and other uses would continue to have mostly short-term, minor, adverse effects on wildlife and wildlife habitat, with the potential for adverse, long-term, moderate impacts from an offshore oil spill or release. No perceptible changes to wildlife populations or their habitat are expected. This alternative would not impair wildlife or wildlife habitat.	Overall impacts on wildlife and habitat caused by PWC use would be reduced because of restricting use on the gulf beaches, resulting in adverse, short-term, negligible to minor impacts only in Bird Island Basin. On a cumulative basis, all visitor activities and other uses of the Bird Island Basin area would continue to have short-term, negligible to minor, adverse effects on wildlife and wildlife habitat, with the potential for adverse, long-term, moderate impacts from an offshore oil spill or release. No perceptible changes to wildlife populations or their habitat are expected. This alternative would not impair wildlife or wildlife habitat.
Threatened, Endan-gered, and Special Concern Species	Because PWC users would no longer have access to Padre Island National Seashore, there would be no impacts on federal or state listed species. On a cumulative basis, the activities of other visitors and users of the Laguna Madre and Gulf beaches, including other boaters, could affect, but are not likely to adversely affect, federal or state listed animals because	PWC use at Padre Island at Bird Island Basin and the gulf shore could affect, but would not be likely to adversely affect, any federal or state listed species, since little PWC use would be expected. Also, the identified species are often not present as permanent residents, can readily avoid personal watercraft, or are protected by actions of park staff. Cumulative effects from all park	PWC use could affect, but would not be likely to adversely affect, any federal or state listed or sensitive species since potential interactions with the few PWC in the Bird Island Basin area would be limited and short term. Cumulative effects from all park visitor activities would not likely adversely affect these species because many of the identified species are present only sea-

Impact Topic	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed (Prior to April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
	many of these species are present only seasonally, do not nest in the park, or are subject to protective measures in place to minimize impacts such as posted areas, nest patrols (sea turtles), and public information. PWC contribution to overall cumulative impacts to federal or state listed species within the park would be eliminated. This alternative would not impair threatened, endangered, or special concern species.	visitor activities would not likely adversely affect these species, since many of the identified species are present only seasonally, do not nest in the park, or can readily avoid PWC users and other disturbances. This alternative would not impair threatened, endangered, or special concern species.	sonally, do not nest in the park, or can readily avoid PWC users and other disturbances. This alternative would not impair threatened, endangered, or special concern species.
Cultural Resources	Continuing to prohibit PWC use would have no impact on the Mansfield Cut Underwater Archeological District. All visitor activities and uses in the area could continue to result in adverse, long-term, minor to moderate, cumulative impacts, depending on the accessibility of the resource and the potential for illegal collection or damage. Oil operations in nearshore waters and the natural impacts related to storm events and hurricanes could adversely affect resources. This alternative would not impair any marine cultural resources.	PWC use within the national sea-shore could result in adverse, minor impacts on the Mansfield Cut Underwater Archeological District as a result of illegal collection, vandalism, and damage. Cumulative impacts could be adverse, long term, and minor to moderate due to the number of visitors and the potential for illegal collection or destruction, plus the potential for impacts from oil operations in nearshore waters and the natural impacts related to storm events and hurricanes. This alternative would not impair any marine cultural resources.	PWC use would have no effect on the Mansfield Cut Underwater Archeological District because no PWC use would be permitted to operate in the district. All visitor activities and uses in the area could continue to result in adverse, long-term, minor to moderate, cumulative impacts, depending on the accessibility of the resource and the potential for illegal collection or damage, the same as the no-action alternative. This alternative would not impair any marine cultural resources.
Visitor Use and Experience	The continued ban would have no further impact on the experiences of most park visitors. Impacts on PWC users who could no longer ride in the national seashore would be adverse, long term, and minor. Cumulative impacts would be adverse and negligible for the majority of visitors.	PWC use would have adverse, short- and long-term, negligible to moderate impacts on overall visitor experiences. PWC users would benefit by being able to recreate within park waters, although a very small percentage of the total park visitors would be affected. If PWC use increased substantially in the future, impacts could be adverse, short and long term, and moderate. Cumulative effects of PWC use, other watercraft, and other visitor activities would be adverse, short and long term, and negligible to moderate because there would be little noticeable change in visitor experiences.	PWC use at Bird Island Basin would have adverse, short- and long-term, negligible to minor impacts on overall visitor experiences. PWC users would benefit from being able to recreate within the park, although only a very small percentage of the total park visitors would be affected. Cumulative effects of PWC use, other watercraft, and other visitors would be adverse, short and long term, and negligible to minor due to the historically low number of PWC users within the park.
Visitor Conflicts and Safety	A continued ban on PWC use would result in no visitor use conflicts or impacts on safety. PWC-related contributions to overall cumulative impacts to visitor safety would be eliminated. Visitor safety impacts from other sources would be adverse and negligible.	PWC use would have adverse, short- and long-term, minor to moderate impacts on visitor conflicts and safety due to the number of visitors and boats present on high-use days, particularly at Bird Island Basin. Conflicts on the gulf side would be minor because of the small number of personal watercraft that would be typically used and fewer boats and other vessels. Cumulative impacts related to visitor conflicts and safety would	PWC use would have adverse, short- and long-term, minor to moderate impacts on visitor conflicts and safety at Bird Island Basin due to the potential conflict with windsurfers on high-use days. Cumulative impacts related to visitor conflicts and safety would be adverse and minor to moderate for all user groups in the short and long term.

Impact Topic	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed (Prior to April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
		be adverse and minor to moderate for all user groups in the short and long term.	
Socioeconomic Effects	The total impact of any of the alternatives on regional economic output would be negligible compared to the size of the regional economy, because of the relatively small number of PWC users affected by the ban or by the reinstatement of limited PWC use. The no-action alternative would have no benefits or costs compared to the baseline. Both the benefits and costs of implementing alternative A would likely be quite small and of similar magnitude. Under alternative B the benefits and costs would both be expected to be negligible, but the benefits to the PWC community would likely outweigh the costs to other recreationists and those who place a nonuse value on the natural environment at Padre Island National Seashore.		
Padre Island Seashore Management and Operations			
• Conflicts with State and Local Ordinances and Policies	Discontinuing PWC use within the national seashore would not result in conflict with state PWC regulations, and no local PWC regulations exist. Therefore, impacts (including cumulative impacts) related to such conflicts would be negligible.	PWC use at certain locations within the park under alternative A would not result in conflicts with state regulations. Therefore, impacts (including cumulative impacts) would be negligible.	PWC use restrictions under alternative B would not result in conflicts with state PWC regulations or policies. Impacts (including cumulative impacts) related to conflicts with federal or state requirements or policies would be negligible.
• Impact to Park Operations from Increased Enforcement Needs	This alternative would have adverse, short-term, negligible impacts on park operations.	This alternative would have adverse, short-term, negligible to minor impacts on park operations since some additional public information and educational efforts would be required to inform the public about PWC use restrictions in the park.	Similar to alternative A, this alternative would have adverse, negligible to minor impacts on park operations, because most violations would occur in Bird Island Basin. Park staff would have to spend more time initially enforcing and educating visitors about the new regulation.

TABLE 5: ANALYSIS OF HOW ALTERNATIVES MEET OBJECTIVES

Issue	Objective	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation As Previously Managed (before April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
Water Quality				
Nationwide, the vast majority of personal watercraft in use today are powered by conventional two-stroke, carbureted engines, which discharge as much as 30% of their fuel directly into the water. Hydrocarbons such as benzene, toluene, and xylene are released. These discharges have potential adverse effects on water quality.	Manage PWC activity so that emissions of harmful compounds do not contribute to water quality degradation and do not adversely affect aquatic life or visitors' health and safety.	Fully meets objective.	Meets objective. Two-stroke engines would still exist and be used in Bird Island Basin, where water circulation is limited.	Same as alternative A.
Some research shows that in clear waters phototoxicity may occur, increasing toxicity of PWC emissions, which can damage ecologically sensitive plankton and other small water organisms. This in turn can affect aquatic life and ultimately aquatic food chains. The primary concern is in shallow water ecosystems.				
Other water quality issues may include impacts on public health, indirect effects on threatened and endangered species sensitive to water quality changes and degradation, and effects on other fish.				
Air Quality				
Pollutant emissions, particularly nitrogen oxides and volatile organic compounds from personal watercraft, may adversely affect air quality. These compounds react with sunlight to form ozone. To the extent that nitrogen loading in the air contributes to the nutrient loading in the water column, PWC use adversely affects water quality.	Manage PWC activity so that PWC air emissions of harmful compounds do not contribute to air quality degradation and do not adversely affect visitors' health and safety.	Fully meets objective.	Meets objective. Because so few personal watercraft would be in use and Padre Island has strong air circulation, this alternative would not contribute much to degradation of air quality or health and safety problems except in very localized areas.	Same as alternative A.
Soundscapes				
PWC-generated noise varies from vessel to vessel. No literature was found that definitively described scientific measurements of PWC noise. Some literature stated that all recently manufactured watercraft emit fewer than 80 dB at 50 feet from the vessel, while other sources attributed levels as high as 102 dB without specifying distance. None of this literature fully described the method used to collect noise data.	Manage noise from PWC use in affected areas so that the visitor experience is not adversely affected.	Fully meets objective.	Does not meet objective in areas where PWC use would be permitted. Padre Island visitors have complained about PWC sounds (and actions) interfering with quieter visitor uses at Bird Island Basin; on the gulf side sound travels toward beach and can be annoying if PWC users run surf. Fully meets objective in	Meets objective on gulf side and in other areas where PWC would be prohibited by eliminating PWC use and associated noise on beaches. Does not meet objective at Bird Island Basin (similar to Alternative A).

Issue	Objective	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation As Previously Managed (before April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
A noise measurement study of personal watercraft and other motorized vessels at Glen Canyon National Recreation Area (Harris Miller Miller & Hanson, Inc. 2002) showed that maximum PWC noise levels at 50 feet ranged between 68 to 76 dBA. Noise levels for other motorboat types measured ranged from 65 to 86 dB at 50 feet. Noise limits established by the National Park Service are 82 dB at 82 feet from the vessel. Personal watercraft may be more disturbing than other motorized vessels because of rapid changes in acceleration and direction of noise.			areas where PWC would be prohibited.	
Some research suggests that personal water-craft have a greater impact on waterfowl, shorebirds, colonial nesting birds, and sea turtles because of their noise, speed, and ability to access shallow-water areas more readily than other types of watercraft. This may force nesting birds to abandon eggs during crucial embryo development stages, flush other waterfowl from habitat, and alter sea turtle behavior, causing stress and associated behavior changes.	Protect wildlife and wildlife habitat from the effects of PWC-generated noise, especially during nesting seasons.	Fully meets objective.	Does not meet objective in areas where PWC would be permitted. Potential exists for noise disturbance in Bird Island Basin (especially near rookery islands) and on the gulf side. Meets objective in areas of the park where PWC would be prohibited.	Does not meet objective at Bird Island Basin, where PWC use would be allowed; meets objective elsewhere in the park by eliminating potential noise impacts on wildlife on the gulf side and Laguna Madre.
Wildlife and Wildlife Habitat				
Some research suggests that PWC use impacts wildlife by interrupting normal activities, causing alarm or flight, causing animals to avoid habitat, displacing habitat, and affecting reproductive success. This is thought to be caused by a combination of PWC speed, noise, and ability to access sensitive areas, especially in shallow-water depths. Literature suggests that personal watercraft can access sensitive shorelines, disrupting wetland habitat areas critical to wildlife. There is also the possibility for collisions to occur with marine species.	Protect fish and wildlife species and their habitat from dis-turbances and contamination from personal watercraft.	Fully meets objective.	Does not meet objective in areas where PWC use would be permitted. There is potential for collision with wildlife on the gulf side. Physical disturbance and contamination issues are of concern in Bird Island Basin; water circulation is limited and PAHs could accumulate in sediments. Meets objective in areas where PWC use would be prohibited.	Does not meet objective at Bird Island Basin due to concerns about disturbances to colonial nesting birds and contamination. Meets objective elsewhere in the park.
Threatened and Endangered Species				
Some research suggests that PWC use impacts wildlife by interrupting normal activities, causing alarm or flight, causing animals to avoid habitat, displacing habitat, and affecting reproductive success. This is thought to be	Protect fish and wildlife species and their habitat from dis-turbances and contamination from personal watercraft.	Fully meets objective.	Does not meet objective in areas where PWC use would be permitted, due to potential for collision with nesting threatened and endangered turtles on the	Does not meet objective at Bird Island Basin due to concerns about disturbances to colonial nesting birds and contamination. Meets objective elsewhere in the

Issue	Objective	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation As Previously Managed (before April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
caused by a combination of PWC speed, noise, and ability to access sensitive areas, especially in shallow-water depths. Literature suggests that personal watercraft can access sensitive shorelines, disrupting wetland habitat areas critical to wildlife. There is also the possibility for collisions to occur with marine species.			gulf side. Physical disturbance and contamination issues are of concern in Bird Island Basin; water circulation is limited and PAHs could accumulate in sediments. Meets objective elsewhere in the park where PWC use would be prohibited.	park.
Shoreline Vegetation				
PWC use can impact submerged aquatic vegetation because the craft can access shallow water environments. Direct impacts resulting from collision or mechanical disturbance can occur. Some research shows that personal watercraft create a wake at slower speeds than most larger boats, and when driven close to shore their wakes can lead to erosion.	Manage PWC use to protect submerged aquatic vegetation from PWC activity and access.	Fully meets objective.	Meets objective. Protects submerged aquatic vegetation as long as PWC users stay within the channel, but PWC users are known to occasionally travel across areas with sporadic submerged aquatic vegetation.	Same as alternative A.
Cultural Resources				
The Mansfield Cut Underwater Archeological District, which is listed on the National Register of Historic Places, could be affected by PWC use.	Manage PWC use and access to protect marine cultural resources.	Fully meets objective.	Meets objective. Some potential exists for disturbance to resources in Mansfield Channel area.	Fully meets objective.
Visitor Conflicts and Safety				
Personal watercraft make up 7.5% of the registered vessels in the United States, but are involved in 36% of all boating accidents. In part, this is believed to be a “boater education” issue, i.e., inexperienced riders lose control of the craft. Also, personal watercraft are high performance vessels designed for speed and maneuverability and are often operated in an aggressive manner.	Minimize or reduce the potential for PWC user accidents.	Fully meets objective.	Does not meet objective in areas where PWC use would be permitted. Potential for conflicts and accidents at crowded Bird Island Basin launch and channel and on gulf side with individuals seeking quieter, more remote experiences. Fully meets objective in areas where PWC use would be prohibited.	Does not meet objective for Bird Island Basin area as described under alternative A. Fully meets objective in areas where PWC use would be prohibited.
Personal watercraft, due to their ability to reach speeds up to 60 mph and their ability to access shallow-draft areas, can create wakes that pose a conflict and safety hazard to other users, such as windsurfers, swimmers, anglers, and kayakers.	Minimize or reduce the potential for safety conflicts between PWC users and other water recreationists.	Fully meets objective.	Does not meet objective in areas where PWC use would be permitted because of potential conflicts with other boaters and windsurfers at the Bird Island Basin launch area. Fully meets objective in areas where PWC use would be prohibited.	Does not meet objective because the highest potential for safety conflicts is at the Bird Island Basin area during crowded visitor use periods. Fully meets objective in areas where PWC use would be prohibited.

Issue	Objective	No-Action Alternative: Continue to Prohibit PWC Use	Alternative A: Reinstate PWC Use under a Special NPS Regulation As Previously Managed (before April 22, 2002)	Alternative B: Reinstate PWC Use under a Special NPS Regulation Only in the Bird Island Basin Boat Channel
Visitor Experience				
Personal watercraft are viewed by some segments of the public as a nuisance due to their noise, speed, manner of operation, and overall environmental effects, especially to those who visit Padre Island National Seashore to reflect in a remote place of solitude and wildness. However, others believe that personal watercraft are no different from other motorcraft and that users have a right to enjoy the sport.	Manage PWC use to reduce potential conflicts between PWC users and other park visitors. Manage PWC use so that the mission of the park is fulfilled and the visitor experience inherent in the mission is maintained or enhanced.	Meets objective.	Does not meet objective in areas where PWC use would be permitted because of potential future increase in users along gulf beach. Personal watercraft are inherently different from fishing vessels and uses that focus on remoteness or solitude in this area. Meets objective in areas where PWC use would be prohibited.	Meets objective by eliminating PWC presence and use from the more remote and quieter gulf coast.
Socioeconomic				
National PWC ownership increased every year between 1991 and 1998; the rate of annual increase peaked in 1994 at 32% and dropped slightly in 1999 , 2000, and 2001. PWC rentals have also increased exponentially, compared to other types of motorcraft. Some businesses may be affected by actions to either increase/decrease PWC use.	Enhance communications with local communities regarding the management of personal watercraft.	Meets objective by providing public information and opportunity for public input.	Same as the no-action alternative.	Same as the no-action alternative.
Park Management and Operations				
Personal watercraft, because of their increased accident rates and visitor safety conflicts, may require additional park staff to enforce standards and limits.	Manage PWC use to reduce potential conflicts between PWC users and other park visitors.	Fully meets objective.	Does not meet objective in areas where PWC use would be permitted. Potential for conflicts and accidents exists at crowded Bird Island Basin launch and channel. Conflict could occur on gulf side with those seeking quieter or more remote experiences. Meets objective in areas where PWC use would be prohibited.	Does not meet objective for Bird Island Basin area as described under Alternative A. Meets objective elsewhere in the park.
Some states and local governments have taken action, or are considering taking action, to limit, ban, or otherwise manage PWC use. While the park may be exempt from these local actions, consistency with state and local plans must be evaluated.	Seek cooperation with local and state entities that manage or regulate PWC use.	Fully meets objective by providing for cooperation and coordination with other regulatory entities; does not conflict with enforcement of other laws and regulations.	Same as the no-action alternative.	Same as the no-action alternative.

AFFECTED ENVIRONMENT

WATER QUALITY

DESCRIPTION OF WATERS

Padre Island National Seashore is on Padre Island, a barrier island that separates the Gulf of Mexico from the Laguna Madre lagoon on the Texas coastline south of Corpus Christi. The 60-mile-long national seashore includes waters in the Gulf of Mexico and the Laguna Madre. The southern boundary of the national seashore is the midpoint of Mansfield Channel. The national seashore boundary in the Gulf of Mexico is defined by a water depth of 12 feet and is typically within 0.25 mile of the shoreline. Mixing of waters in the surf zone and near-surf zone is expected to be substantial.

The national seashore boundary in the Laguna Madre lagoon is along a line between 2 and 3 miles west of the gulf shoreline. In the northern portion of the national seashore, near Bird Island Basin, the boundary adjoins the eastern edge of the Intracoastal Waterway and is approximately 3 miles west of the gulf shoreline. From near the 5-mile marker south, the Laguna Madre boundary is closer to the island shoreline, along a line approximately 2 miles west of the gulf shoreline.

Waters within the lagoon are hypersaline, with salinity varying annually between 22 and 54 parts per thousand (ppt). The Laguna Madre ranges from 0.3 to 9.3 miles wide, depending on the wind-driven tide height (NPS 2002b). Depth of the boat channel at Bird Island Basin is approximately 6 feet; in the Intracoastal Waterway, water depth is 8 feet. Depths in the lagoon outside the channels are 2 to 3 feet. Approximately 18,700 acres of the Laguna Madre lie within the national seashore (NPS 2002b). Mixing of waters in the Laguna Madre is not expected to be substantial.

As defined in the *Draft 2004 Texas Water Quality Inventory Status of All Waters*, waters in the Gulf of Mexico are described as “ocean”, and waters in the Laguna Madre are described as “estuary” (TCEQ 2004). All surface waters within the national seashore would, therefore, be termed “salt water” for the purpose of identifying appropriate water quality standards.

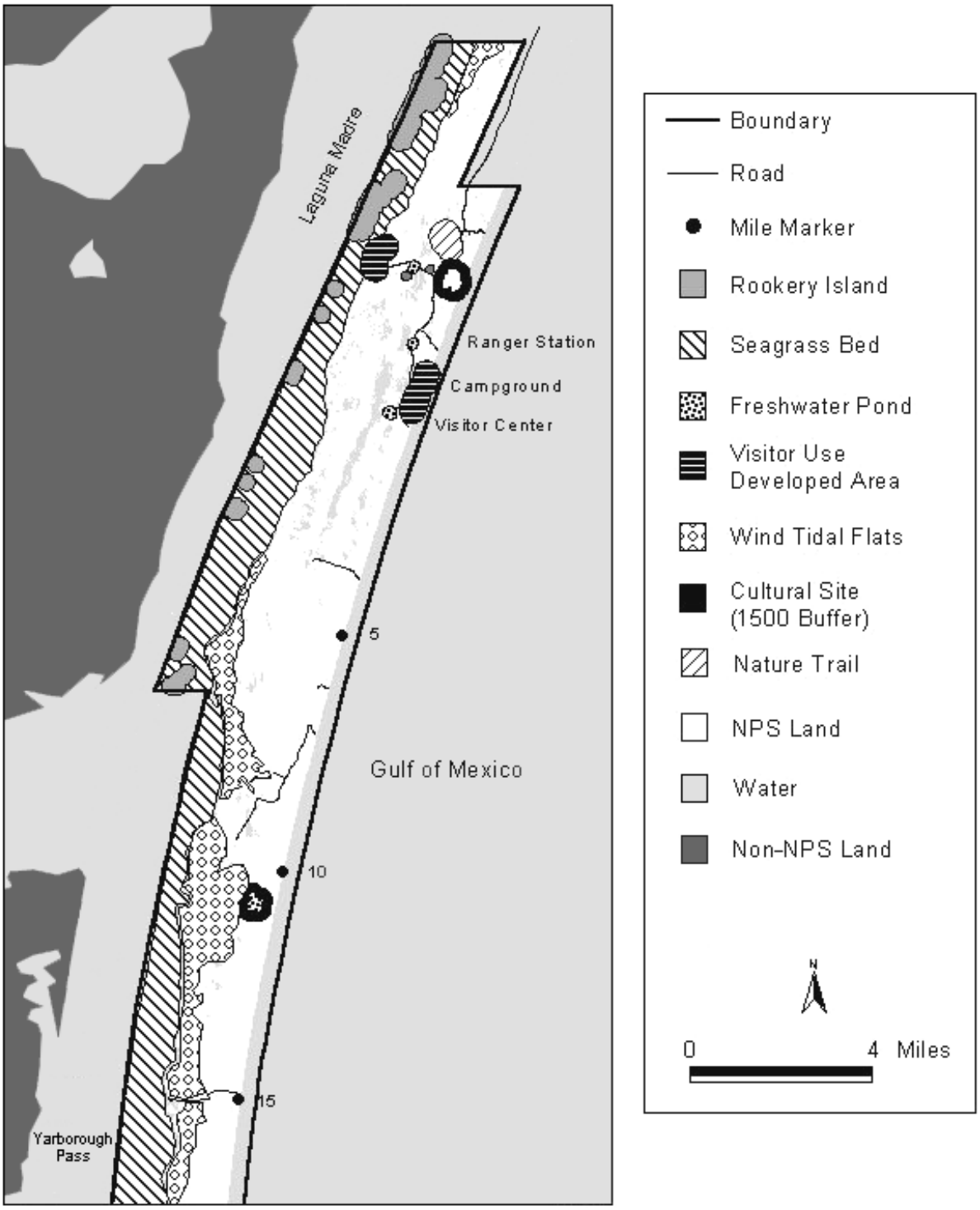
STATE-DESIGNATED USES

In accordance with EPA guidelines, the Texas Commission on Environmental Quality has classified major surface water segments within the state according to designated uses. In order to support or achieve the designated uses of these segments, the commission has promulgated specific numeric criteria for each use and each segment. The area of historical PWC use within Padre Island National Seashore includes portions of segments 2501 (Gulf of Mexico) and 2491 (Laguna Madre; TCEQ 2004).

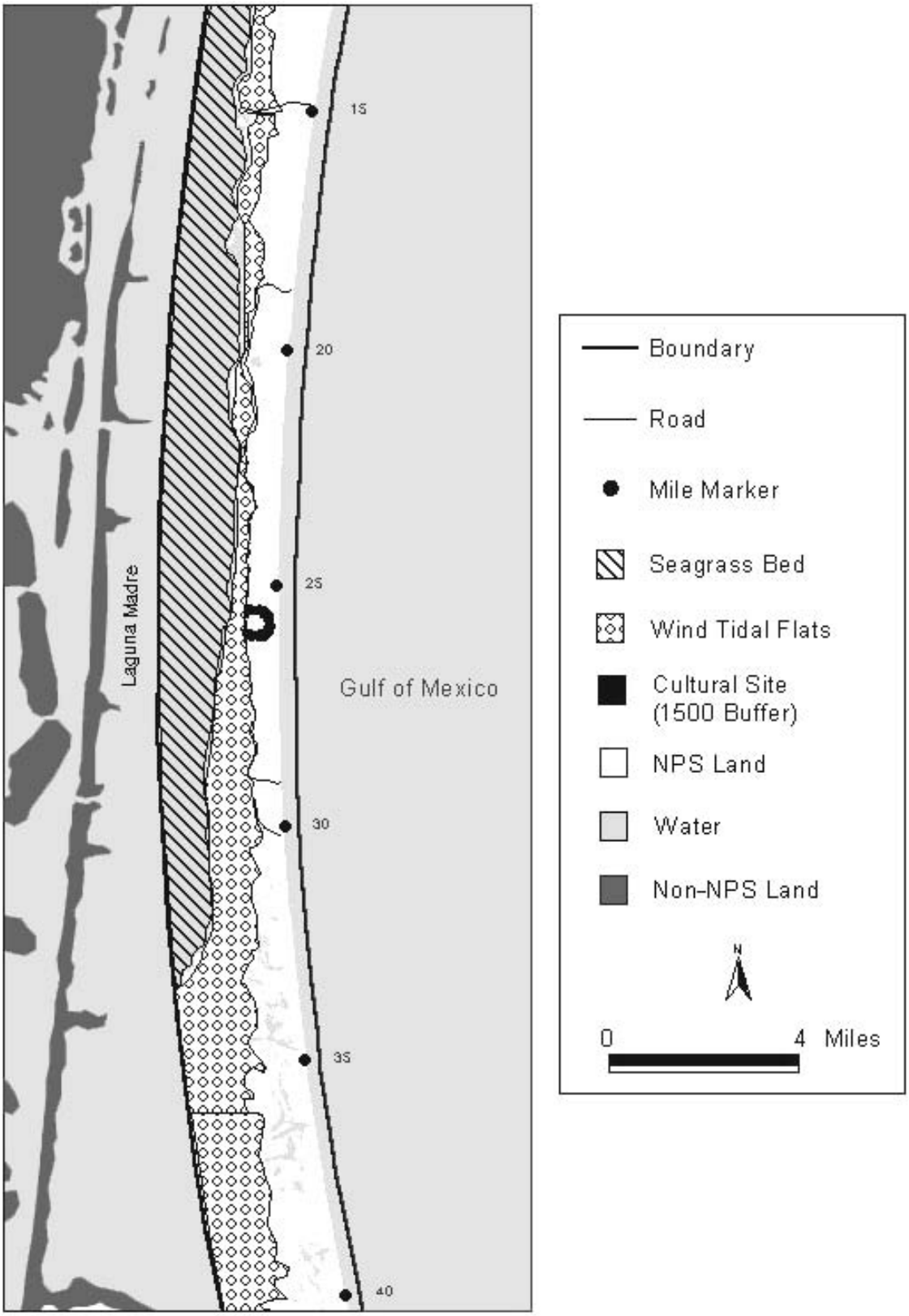
Six general categories for water use are defined in the *Draft 2004 Texas Water Quality Inventory Status of All Waters* (TCEQ 2004):

1. aquatic life use
2. contact recreation
3. general use
4. fish consumption
5. public water supply
6. oyster waters use

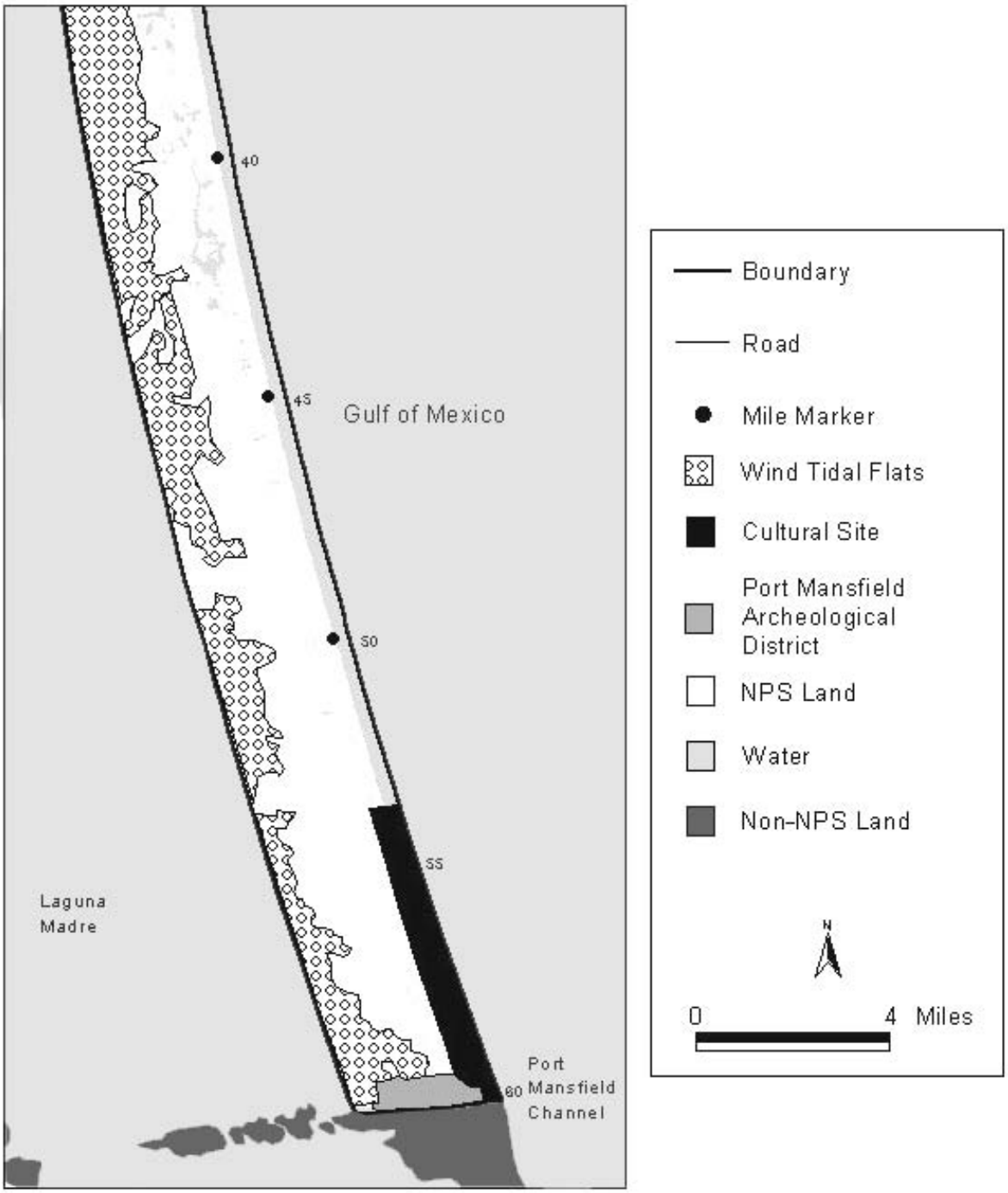
Padre Island – Affected Environment (sheet 1 of 3)



Padre Island – Affected Environment (sheet 2 of 3)



Padre Island – Affected Environment (sheet 3 of 3)



Of the categories for the Gulf of Mexico near the national seashore (segment 2501), aquatic life use, contact recreation, general use, and oyster waters use have not been assessed. Public water supply is not applicable, and fish consumption use is not supported. Fish consumption use is not supported because of "mercury in king mackerel greater than 43 inches" for the Gulf of Mexico segment in the vicinity of the national seashore (TCEQ 2004). For the Port Mansfield area, which is closest to the national seashore, the Commission on Environmental quality plans to collect additional data and information before a total maximum daily load (TMDL) is established (TCEQ 2004).

Of the use categories for Laguna Madre (segment 2491) near the upper end of the national seashore, aquatic life use, contact recreation, and general use are fully supported. Public water supply is not applicable. Oyster waters and fish consumption uses are not assessed. Regarding aquatic life use, the commission describes "depressed dissolved oxygen" in the Laguna Madre in the vicinity of the national seashore for 2004 (TCEQ 2004). For the portion of Laguna Madre adjacent to the national seashore, the commission also plans to collect additional data and information before a TMDL is established (TCEQ 2004).

TEXAS WATER QUALITY STANDARDS

Antidegradation Policy. The state-established antidegradation policy (Section 307.5 of the "Texas Surface Water Quality Standards"; TNRCC 2000) is designed to protect water quality at existing levels and to prevent a deterioration of water quality below achievable uses for a given stream segment. The policy has three levels of protection:

1. Existing uses will be maintained and protected.
2. For segments whose quality exceeds designated uses, degradation may only be allowed for important social and economic development.
3. No degradation will be allowed for outstanding natural resource waters. (No waters in the state are currently designated as an outstanding natural resource.)

For waters bordering the Padre Island National Seashore, antidegradation means that existing uses should be maintained and protected.

Numeric Standards. The Texas Natural Resource Conservation Committee (TNRCC) has established surface water quality standards for toxic materials and the protection of aquatic life (sec. 307.6, table 1, TNRCC 2000), and for the protection of human health (ingestion of fish only, salt water) from toxic materials (sec. 307.6, table 3, TNRCC 2000). However, there are no aquatic life standards for typical gasoline organic constituents such as benzene or polyaromatic hydrocarbons (PAHs).

Specific water quality standards for segments 2501 (Gulf of Mexico) and 2491 (Laguna Madre) are presented for Cl^{-1}, SO_4^{-2}, TDS, dissolved oxygen, pH, bacteria, and temperature (sec. 307.10, TNRCC 2000). No segment-specific standards are provided for organic compounds associated with gasoline.

For salt water, standards for benzene and benzo(a)pyrene, are provided in Table 6.

TABLE 6: TEXAS SURFACE WATER QUALITY STANDARDS

Chemical	Ingestion of Fish Only—Salt Water (μg/L)
Benzene	70.8
Benzo(a)pyrene	0.54

WATER QUALITY DATA

Based on a search of the TNRCC surface water quality monitoring data sets (TNRCC 2003) for years 2000–2003 No surface water quality data for organic compounds associated with gasoline are available for either the Gulf of Mexico (segment 2501) or Laguna Madre (segment 2491). This was confirmed by the Texas Commission on Environmental Quality (Kolbe, pers. comm., Mar. 9, 2005).

AIR QUALITY

Padre Island National Seashore is an area of shallow open water, tidal flats, and coastal barrier island on the Texas gulf coast. The national seashore is in Kenedy and Kleberg counties; the northern tip of the national seashore borders on Nueces County and the Corpus Christi urban area. The Texas Commission on Environmental Quality (formerly the Texas Natural Resources Conservation Commission [TNRCC]) is the state's lead environmental agency and is responsible for air monitoring in the Corpus Christi area. The national seashore is located in region 14. The State Implementation Plan is Texas' plan for complying with the federal Clean Air Act. The plan consists of narrative, rules, and agreements that Texas will use to clean up polluted areas (TNRCC 2002).

The national seashore is in an attainment area for all regulated criteria pollutants and is not subject to a maintenance plan; overall air quality in the area is good (EPA 2004). The Corpus Christi urban area is a deep-water port and industrial/petrochemical complex with highway network and associated air pollutant emissions. No exceedances of the one-hour national ambient air quality standard (NAAQS) for ozone have occurred in this area since 1995; however, the Corpus Christi urban area is considered by the Texas Commission on Environmental Quality to be a near non-attainment area for ozone.

Generally, air monitoring sites are located in or near metropolitan areas since these areas have the highest pollutant levels. The nearest continuous air monitoring site to Padre Island National Seashore is on the south end Corpus Christi in Kleberg County. This site monitors fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) and meteorological parameters. Monitoring sites for a broader range of pollutants including ozone are within the Corpus Christi urban area in Nueces County. Ozone measurements have approached the standard within the Corpus Christi urban area. However, air quality in this area is not representative of the Padre Island coastal region.

The predominant wind direction in the area is onshore from the southeast through most of the year, especially in the summer; in winter the winds trend more from the north (TCEQ 2005).

Personal watercraft use contributes air pollutants through combustion and vaporization of gasoline fuel. Close to 100% of total hydrocarbons in PWC exhaust are also volatile organic compounds (VOCs), which contribute to ozone formation and visibility impairment. Sulfur dioxide (SO_2), nitrogen oxides (NO_x), and VOCs are chemical constituents of $PM_{2.5}$. Other air pollutant contributors within the area include active oil and gas field development, with several gas wells producing within the seashore limits. Motor, boat, and ship traffic associated with commercial and recreational use also contribute pollutants.

TABLE 7: NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Primary Standards (Human Health)		Secondary Standards (Air Quality Related Values)	
	Average Type	Concentration[a]	Average Type	Concentration[a]
CO	8-hour[b]	9 ppm	No secondary standard	
		(10 mg/m^3)		
	1-hour[b]	35 ppm	No secondary standard	
		(40 mg/m^3)		
Pb	Maximum Quarterly Average[h]	1.5 µg/m^3	Same as primary standard	
NO_2	Annual Arithmetic Mean[h]	0.053 ppm	Same as primary standard	
		(100 µg/m^3)		
O_3 (implementation of 8-hour standard not currently final)	1-hour[c]	0.12 ppm	Same as primary standard	
		(235 µg/m^3)		
	8-hour[I]	0.08 ppm	Same as primary standard	
		(157 µg/m^3)		
PM_{10}	Annual Arithmetic Mean[d]	50 µg/m^3	Same as primary standard	
	24-hour[e]	150 µg/m^3	Same as primary standard	
$PM_{2.5}$ (monitored but standards not currently final)	Annual Arithmetic Mean[d,f]	15 µg/m^3	Same as primary standard	
	24-hour[g]	65 µg/m^3	Same as primary standard	
SO_2	Annual Arithmetic Mean[h]	0.03 ppm	3-hour[b]	0.50 ppm
		(80 µg/m^3)		
	24-hour[b]	0.14 ppm		(1,300 µg/m^3)

a. Parenthetical value is an approximately equivalent concentration.
b. Not to be exceeded more than once per year.
c. Attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1, as determined according to appendix H of the O_3 NAAQS.
d. Not to be exceeded by the three-year average of the annual mean concentrations.
e. Not to be exceeded by the three-year average of the annual 99th percentile concentrations.
f. May be spatially averaged over several "community-oriented" sites in an area.
g. Not to be exceeded by the three-year average of the annual 98th percentile concentrations.
h. Never to be exceeded.
i. Not to be exceeded by the 4th highest annual value averaged over a three-year period.

SOUNDSCAPES

NATURAL AND HUMAN NOISE LEVELS

Noise is defined as unwanted sound. Sound is more typically described as noise if it interferes with an activity or disturbs the person hearing it. Sound is measured in a logarithmic unit called a decibel (dB). Since the human ear is more sensitive to middle and high frequency sounds than to low frequency sounds, sound levels are weighted to reflect human perceptions more closely, referred to as dBA, which stands for A-weighted decibels.. Table 8 illustrates common sounds and the measured sound level.

For the average human a 10 dB increase in the measured sound level is subjectively perceived as being twice as loud, and a 10 dB decrease is perceived as half as loud. The decibel change at which the average human would indicate that the sound is just perceptibly louder or perceptibly quieter is 3 dB.

One aspect of experiencing a national park system area is the ability to hear sounds associated with natural resources, often referred to as “natural sounds” or “natural quiet.” Natural sounds generally include sounds such as wind through trees and calling birds, while natural quiet includes the sounds associated with still nights.

TABLE 8: SOUND LEVEL COMPARISON CHART

Decibels	How it Feels	Equivalent Sounds
140-160	Near permanent damage level from short exposure	Large caliber rifles (e.g., .243, 30-06)
130-140	Pain to ears	.22 caliber weapon
100	Very loud	Air compressor at 20 feet; garbage trucks and city buses
	Conversation stops	Power lawnmower; diesel truck at 25 feet
90	Intolerable for phone use	Steady flow of freeway traffic; 10-hp outboard motor; garbage disposal
80		Muffled Jet ski at 50 feet; automatic dishwasher; near drilling rig; vacuum cleaner
70		Drilling rig at 200 feet; window air conditioner outside at 2 feet
60	Quiet	Window air conditioner in room; normal conversation
50	Sleep interference	Quiet home in evening; drilling at 800 feet
		Bird calls
40		Library
30		Soft whisper
20		A quiet house at midnight; leaves rustling

Note: Modified from *Final Environmental Impact Statement, Miccosukee 3-1 Exploratory Well, Broward County, Florida* (U.S. Department of the Interior, n.d.).

NOISE LEVELS AT PADRE ISLAND NATIONAL SEASHORE

Natural sounds within Padre Island National Seashore include waves, near constant winds, and calls of birds. Sources of noise include oil and gas production, powerboating, vehicles driving on the beach, and recreational users.

Some of the primary reasons people visit Padre Island National Seashore include being outdoors and experiencing peace and quiet, as well as rest and relaxation. Therefore, the natural quiet of Padre Island greatly contributes to a positive visitor experience and is a direct or indirect component of many of the priorities reported for park visitors (NPS 2000b).

Background noise measurements were taken in January and March 1998 at various locations in the national seashore (NPS 2002b). The study measured ambient noise levels, which include natural and human made sounds heard at specific locations. A useful measure of background or ambient sound is the sound level exceeded 90% of the time, abbreviated L90.

Table 9 presents ambient noise measurements at Padre Island. Background sound levels throughout most of the seashore range from 30 dBA to 63 dBA 90% of the time. The areas with the highest ambient noise levels are closest to the beaches, including North Beach, South Beach, and Malaquite Beach. These areas are closest to waves, swimmers, and vehicles (except for Malaquite Beach).

TABLE 9: MEASURED SOUND LEVELS AT VARIOUS LOCATIONS WITHIN PADRE ISLAND NATIONAL SEASHORE

Measurement Location	Sound Level (dBA) L_{90}
Bird Island Basin boat ramp	30
Bird Island Basin windsurfing area	45
Grasslands Nature Trail	38
Malaquite Beach	59
Malaquite Visitor Center	48–51
North Beach	61–62
Pan Am Road (back island)	44
South Beach	62–63

SOURCE: NPS 2000b.

VISITOR RESPONSES TO PWC NOISE

Many factors affect how an individual responds to noise. Primary acoustical factors include the sound level, its frequency, and duration. Secondary acoustical factors include the spectral complexity, sound level fluctuations, frequency fluctuation, rise-time of the noise, and localization of the noise source (Mestre Greve Associates 1992). Non-acoustical factors also play a role in how an individual responds to sounds. These factors vary from the past experience and adaptability of an individual to the predictability of when a noise will occur. The listener's activity also affects how he or she responds to noise.

PWC and outboard motors are similar in the actual noise levels they generate, which are generally around 80 dB or less at 50 feet from a motorized boat or personal watercraft (EPA 1974) but can range from below 80 dB to as much as 102 dB (Sea-Doo® 2000; Bluewater Network 2001). The National Park Service has established a noise limit for boating and water use activities of 82 dB at 82 feet (25 meters) (36 CFR 3.7). Personal watercraft generate noise that varies in pitch and frequency due to the nature of their construction and use. The two-stroke engines are often used at high speeds, and the craft bounce along the top of the water such that the motor discharges noise below and above the water surface. To visitors this irregular noise seems to be more annoying than that of a standard motorboat that is cruising along the shoreline, even though the maximum noise levels may be similar for the two watercraft. Additionally, visitors who expect to experience natural quiet may consider the irregular noise of personal watercraft more annoying, especially if the craft is operating in one location for extended periods of time (Komanoff and Shaw 2000).

SHORELINE AND SUBMERGED AQUATIC VEGETATION

SUBMERGED AQUATIC VEGETATION

The only vegetation along or near the shorelines of Padre Island National Seashore that would be affected by PWC use is submerged aquatic vegetation, which is commonly known as seagrass beds and grows in the shallows of the Laguna Madre. The gulf beach has no shoreline vegetation, and the shoreline of the Laguna Madre is characterized by a naturally occurring, unvegetated area consisting of wind tidal flats. Blue-green algal mats occur on these flats, but these would not be disturbed by PWC wakes or wave action, and PWC users do not land on these shallow, muddy areas. In addition, algal mats are not found on wind tidal flats at Bird Island Basin (NPS 1995).

Submerged aquatic vegetation is a diverse assembly of rooted macrophytes that grow in shallow water, under the surface, but not above it. Under federal regulations, SAV beds are considered special aquatic sites (40 CFR 239). These plants are beneficial to aquatic ecosystems because they provide a protective habitat for young and adult fish and shellfish, as well as food for waterfowl, fish, and mammals. They also aid in oxygen production, absorb wave energy and nutrients, and improve the clarity of the water. In addition, SAV beds stabilize bottom sediments and suspended sediments present in the water.

Water depth, as well as the salinity and turbidity, determines the types of seagrasses that grow in these areas. Shoalgrass is the dominant seagrass in Laguna Madre; it tolerates the highest salinity and turbidity and prefers the shallowest depths. Other seagrasses include widgeongrass, turtlegrass, clovergrass, and manatee grass. Seagrass beds containing these species occur throughout the park in the northern end of the Laguna Madre (see Padre Island – Affected Environment map). Several large seagrass beds exist in the shallows on either side of the Bird Island Basin launch area.

The seagrass beds support a large invertebrate population, predominantly a variety of snails and clams. These beds provide spawning grounds or nurseries for many fish and crustaceans, as well as habitat

for other wildlife, including migratory waterfowl, two species of federally protected sea turtles (Kemp's ridley and green turtle), and various wading and diving birds (mergansers, loons, cormorants, pelicans). Some of these animals consume seagrasses directly — redhead ducks feed on rhizomes, and sea turtles eat the leaves (up to 100% of the diet of juvenile green and hawksbill turtles consists of seagrass leaves; NPS 2004b).

Seagrass cover in the upper Laguna Madre has decreased in the last decade due to an increase in turbidity and brown tide conditions, which limit light penetration. Some areas have been scarred or damaged by boat traffic (propeller scars) and other uses. Seagrass meadows in shallower areas of the Laguna Madre are vulnerable to shallow-draft motorboats that can maneuver in very shallow waters. Boat propellers bury into soft sediments of the bay, causing direct damage to leaves aboveground and roots and rhizomes belowground. The areas most impacted by shallow-draft boats are also favored by anglers. Some propeller scars are able to revegetate in the absence of continued disturbance. However, most propeller scars remain evident several years following the impact. Propeller scars often cover large seagrass areas (NPS 2004b).

The area of Nine-Mile Hole within the national seashore boundaries is designated as a voluntary no motor zone. However, no scientific data are available to assess the impact this designation has had on seagrass protection and recovery (NPS 2004b).

SHORELINE EROSION

Shoreline erosion along the Laguna Madre occurs primarily from wind-driven waves and currents, although boating activity does contribute to the generation of waves. PWC-caused wakes are generally much smaller than those caused by the larger boats that typically use the bayside. No shoal formation has been detected in the park, but some erosion could occur from both boat and PWC wakes. On the gulf side, shoreline dynamics are controlled solely by waves and winds, and the erosion caused by the action of winds and surf would override any other factors relating to shoreline erosion.

WILDLIFE AND WILDLIFE HABITAT

The native animal population at Padre Island National Seashore includes an extensive diversity of both marine and terrestrial species. Wildlife known to occur in the park includes over 350 species of 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 under "Threatened and Endangered Species and Their Habitat." The primary sources for much of the information presented below are the park's *Final Oil and Gas Management Plan / Environmental Impact Statement* (NPS 2000b), the *BNP Petroleum Corporation Lemon / Lemon Seed Unit Wells, Environmental Assessment* (NPS 2002b), and the park's web site.

MAMMALS

Terrestrial Mammals

Forty-seven species of terrestrial mammals may be found in the park, including white-tailed deer, coyotes, bobcats, striped skunks, badgers, raccoons, jackrabbits, mice, rats, and bats. All of these species inhabit the interior of the island and would not be expected in or near areas used by personal watercraft. Bats may occasionally fly over the Laguna Madre, but the remainder of the park's terrestrial mammals would not occur in Bird Island Basin or along the gulf shoreline.

Marine Mammals

Very few marine mammals are found within Padre Island National Seashore. Most occur in the park only when they are stranded due to illness or death. An exception is the bottlenose dolphin, which is occasionally seen in the Laguna Madre, the Mansfield Channel, and in the park waters along the Gulf Coast.

FISH AND INVERTEBRATES

Laguna Madre

Laguna Madre is an extremely productive ecosystem and ranks first in finfish production in Texas. It provides essential habitat for many species of vertebrates and invertebrates due to the presence of extensive seagrass beds (also known as submerged aquatic vegetation or SAV). Marine vertebrates include two species of sea turtles, the Kemp's Ridley and green turtle, and at least 31 species of fish, such as the striped mullet, redfish, pinfish, and black drum.

Laguna Madre serves as nursery habitat for shrimp, including brown, grass, and mantis shrimp. Crustacean species include the blue crab, the striped hermit crab, and the longnose spider crab, as well as amphipod and isopod species. Bivalve species include the scorched mussel and the dwarf surf clam. Laguna Madre historically supported oyster beds and scallops, but these do not currently exist in the bay. Cnidarian species include anemones, moon jelly, sea walnut, and hydromedusa.

Finfish inhabit all areas of the lagoon, including seagrass beds, bare substrate, and the Intracoastal Waterway. Over 23 species of finfish occur in the Laguna Madre, including the dwarf seahorse, the tidewater silverside, the sheepshead minnow, the longnose killifish, and the spotted sea trout. Populations of most fish species tend to decrease in the winter months due to colder temperatures and shortage of food sources (Chaney 1998). 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, while the fewest number and diversity in the spring and winter months. Some Gulf of Mexico species include the scaled sardine, the longnose anchovy, the striped mullet, the Atlantic threadfin, and the crevalle jack (Shaver 1984).

BIRDS

Padre Island has over 350 species of birds (NPS 2006), including migratory and resident waterfowl, shorebirds, neotropical songbirds, and raptors. Many bird species use ephemeral and freshwater ponds, which are not near PWC use areas, while many others inhabit the Laguna Madre and the gulf shoreline.

Padre Island is on the Central Flyway for migratory birds and supports over 350 migratory, overwintering, and resident bird species. Padre Island has been designated a globally important bird area, and the park is also pursuing a designation as a western hemisphere shorebird preserve network (Echols, pers. comm., Dec. 9–10, 2002).

Nesting habitat for numerous bird species exists on the colonial waterbird rookery islands along the Intracoastal Waterway in the Laguna Madre. The Bird Island Basin area of the park contains two natural islands, North and South Bird Islands. Additionally, 25 human-made islands, referred to as

spoil islands, were created by the U.S. Army Corps of Engineers (USACE) during the establishment of the Intracoastal Waterway. To maintain a proper depth, the Corps must dredge the waterway, 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 and are used by waterbirds as nesting areas, and large rookeries for numerous species have become established on these islands. Species include the great blue heron, the reddish egret, the caspian tern, the royal tern, the white pelican, the laughing gull, and the white-faced ibis. An annual recurring population of white pelicans has become established on one island referred to as Pelican Island. Any activity on the rookery islands during nesting season will harm nesting birds, eggs, or hatchlings; therefore, rookery islands are posted by sign as closed between February 1 and August 31. The U.S. Fish and Wildlife Service recommends a 1,000-foot buffer around these islands during nesting season.

FIGURE 1: WHITE PELICANS AT PADRE ISLAND NATIONAL SEASHORE

During the fall and winter, sandhill cranes 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. Other migratory wildlife observed in the Laguna Madre area include snow geese, Canada geese, and numerous species of waterfowl.

The gulf beach is also home to many shorebirds and other migratory species. Most common throughout the year are willet, sanderling, black skimmer, great blue heron, cormorant, cattle egret, black-bellied plover, laughing gull, brown pelican, reddish egret, and five species of terns. During the winter another four species of gulls appear, along with various other birds. A study was conducted on the south end of the park along the gulf shore from July 1992 through April 1993. A total of 281,045 birds were counted, representing 97 species, including several threatened and endangered species, which are discussed below. Species of goose, duck, gull, tern and sandpiper were also observed (NPS 2002b).

REPTILES AND AMPHIBIANS

Many species of snakes, turtles, and frogs are known to occur at Padre Island National Seashore; however, these species occur primarily in or near the ephemeral ponds in the interior of the island because these areas provide important freshwater habitat. PWC use areas (the gulf beach, Bird Island Basin) generally do not provide habitat for any reptiles or amphibian species.

THREATENED, ENDANGERED, OR SPECIAL CONCERN SPECIES

According to the U. S. Fish and Wildlife Service and the Texas Parks and Wildlife Department, 44 federally listed endangered, threatened, or species of special concern have the potential to occur at Padre Island National Seashore (appendix C) and 21 state-listed endangered or threatened species potentially occur (17 of the 21 state-listed species are also on the federal list; TPWD 2003b). The Texas Parks and Wildlife has indicated that 9 state-listed species are documented within or possibly within the park (appendix C). Of all state or federally listed species, 27 have actually been documented at Padre Island National Seashore, as listed in Table 10. The remaining species have either not been documented or no suitable habitat exists within the park; therefore, they are not further discussed in this document.

Most of the migratory birds in the United States, including all of those listed by the U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department in the table below, are protected by the Migratory Bird Treaty Act (MBTA). The MBTA implements treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds, including those not otherwise listed under federal or state endangered species laws. Unless otherwise permitted by regulations, the MBTA makes it unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture or kill; possess, offer to sell, barter, purchase, or deliver; or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not.

In March 2005, the U.S. Fish and Wildlife Service published a list of 125 species not covered by the MBTA, as part of the Migratory Bird Treaty Reform Act of 2004.

TABLE 10: STATE AND FEDERALLY LISTED SPECIES OCCURRING OR LIKELY TO OCCUR AT PADRE ISLAND NATIONAL SEASHORE

Species	Federal	State	Habitat in/near PWC Use Areas
Turtles			
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)	E	E	Yes
Loggerhead Sea Turtle (*Caretta caretta*)	T	T	Yes
Green Sea Turtle (*Chelonia mydas*)	T	T	Yes
Atlantic Hawksbill Sea Turtle (*Eretmochelys imbricata*)	E	E	Yes
Leatherback Sea Turtle (*Dermochelys coriacea*)	E	E	Yes
Birds			
•Shorebirds			
Eastern Brown Pelican (*Pelecanus occidentalis*)	E	E	Yes
Interior Least Tern (*Sterna antillarum*)	E	E	Yes
Black Tern (*Chlidonias niger*)	SOC		Yes
Sooty Tern (*Sterna fuscata*)		T	Yes
Piping Plover (*Charadrius melodus*)	T	T	Yes
Reddish Egret (*Egretta rufescens*)	SOC	T	Yes
White-faced Ibis (*Plegadis chihi*)	SOC	T	Yes
Wood Stork (*Mycteria americana*)		T	Yes
Swallow-tailed Kite (*Elanoides forficatus*)		T	No
Cerulean Warbler (*Dendroica cerulea*)	SOC		No
Black-capped Vireo (*Vireo atricapillus*)	E	E	No
Tropical Parula (*Parula pitiayumi*)	SOC	T	No
Loggerhead Shrike (*Lanius ludovicianus*)	SOC		No
•Raptors			
Northern Aplomado Falcon (*Falco fermoralis septentrionalis*)	E	E	Yes
Peregrine Falcon (*Falco peregrinus*)	Delisted	E	Yes
White-tailed Hawk (*Buteo albicaudatus*)		T	Yes
Bald Eagle (lower 48 states) (*Haliaeetus leucocephalus*)	T	T	Yes
Ferruginous Hawk (*Buteo regalis*)	SOC		No
Reptiles and Amphibians			
American Alligator (*Alligator mississippiensis*)	T (S/A)		No

Species	Federal	State	Habitat in/near PWC Use Areas
Texas Horned Lizard (*Phrynosoma cornutum*)	SOC	T	No
Texas Indigo Snake (*Drymarchon corais erebennus*)		T	No
Plants			
Roughseed Sea-purslane (*Sesuvium trianthemoides*)	SOC		No

T – threatened
E – endangered
SOC – species of concern (As shown in Appendix C, the Fish and Wildlife Service defines SOC as a species for which there is some information showing evidence of vulnerability, but not enough data to support listing at this time. This status has no legal protection under the Endangered Species Act.)
S/A – similar in appearance

Several species listed in Table 10 may be known or expected in the park, but would not occur in or near PWC use areas because of lack of habitat (Bird Island Basin and the gulf coast). The following species are not expected to be affected by PWC use, and they are not addressed further in this document.

- *American Alligator, Texas Horned Lizard, and Texas Indigo Snake* — These species are all inland species and inhabit areas in or near freshwater ponds, coastal sandhills, grasslands, and island scrublands. Only one alligator has been documented in the park since 1991 in an area close to the freshwater ponds. Texas horned lizards have not been documented in the park, and only one specimen of Texas indigo snake has been documented in the park. None of these species would be expected at the Bird Island Basin launch area or along the gulf coast.
- *Ferruginous Hawk and Swallow-Tailed Kite* — The ferruginous hawk is an inland species that would be expected in interior grasslands and only during the winter months. The swallow-tailed kite has been documented only in bottomland hardwood forests. It may fly over the interior portion of the park, but has not been documented at Padre Island National Seashore because its preferred habitat is lacking.
- *Black-capped Vireo, Tropical Parula, Cerulean Warbler* — These are all neotropical migrants that would be expected only temporarily in and near inland habitats containing black willows, live oaks, or other species of woody vegetation. None has been documented breeding in the park, and none would be expected near areas of PWC use.
- *Loggerhead Shrike* — This species commonly occurs in park grasslands, black willows, and small shrub habitats in the northern section of the park. None of these habitats is near PWC use areas.
- *Roughseed Sea-purslane* — This is the only listed plant (federal species of concern) that could occur in Padre Island National Seashore. It has been typically found in dune habitats, and there is only one documented occurrence within the national seashore — on a mudflat habitat near Bird Island Basin. However, PWC use at Bird Island Basin would be restricted to the launch area and adjacent waters and would not land or cause disturbance to mudflats in the area.

TURTLES

Of particular concern at Padre Island National Seashore are the five species of sea turtles — the Kemp's ridley, the loggerhead, the green sea, the Atlantic hawksbill, and the leatherback — that exist within the park; three are federally endangered. These five species are known to nest, hatch, or strand along gulf beaches of the park or rest in the waters of the Gulf of Mexico, Laguna Madre, and Port Mansfield Channel. Sea turtles can be at danger when crossing a beach or entering surf.

Recovery plans have been developed for all of the species, and specific recovery plan tasks, including patrols, monitoring, and habitat management, have been assigned to the park for the Kemp's ridley.

No critical habitat or specific recovery plan tasks have been assigned to the national seashore for the other species; however, park and USFWS staff and volunteers conduct, support, and assist in the daily patrols for these species to protect, document, and monitor nesting occurrence.

FIGURE 2: SEA TURTLES CROSSING BEACH, ENTERING SURF

- *Kemp's Ridley Sea Turtle* — The Gulf of Mexico shoreline of Padre Island provides essential habitat for nesting sea turtles, particularly the endangered Kemp's ridley sea turtle. Fewer than 2,000 adult turtles comprised the world population in the early 1900s, and it is the most endangered sea turtle species. The population has increased since then, but many factors threaten its recovery, including capture and drowning in shrimp nets, poaching of eggs from nests, and collection for food. The entire nesting population was estimated to be fewer than 700 in the 1990s (NPS 2004b). It is the smallest of the sea turtles, and adults reach maturity at about 10–15 years of age. Kemp's ridley turtles nest mostly during the daytime, and a single turtle may nest as many as three times a season (USFWS and NMFS 1992), with an average of 2.5 clutches per season. Clutch size averages around 100 eggs. Hatchlings emerge after about 50 days of incubation, which may be in the day or night. More Kemp's ridley nests are consistently found in south Texas, including at Padre Island National Seashore, than any other location in the United States.

  Kemp's ridley is a native nester at Padre Island National Seashore (Hildebrand 1963, 1981, 1983; Shaver 1998a; Shaver and Caillouet 1998). Since 1978, an international experimental project involving the National Park Service, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and other agencies has been attempting to establish a secondary nesting colony of Kemp's ridley turtles at Padre Island National Seashore. Since 1996, some turtles from this project have been documented returning to south Texas and Padre Island National Seashore to lay eggs (Shaver 1997, 1998a, 1999a, 1999b; Shaver and Caillouet 1998).

  In 1986 an NPS and USFWS program was initiated to detect, monitor, and protect sea turtle nests at Padre Island National Seashore as part of the recovery plan for this species, and this ongoing program has since expanded. From 1979 to 2001, 45 Kemp's ridley nests were confirmed in the park, but additional nests were likely missed, especially when patrols were not conducted or were less comprehensive. In 2002, 23 nests were found along the entire gulf beachfront of the national seashore (Echols, pers. comm., Dec. 9–10, 2002). Fourteen nests were found in 2003 in the park, and 22 in 2004 (Echols, pers. comm., Mar. 10, 2002). The patrol season and procedures are designed primarily to detect nesting by Kemp's ridley turtles, but the other sea turtle nests have also been documented and recovered.

  The date of the nesting season varies slightly each year. In Mexico, Kemp's ridley nests have been recorded as early as March and as late as August. The 104 nests documented at Padre Island National Seashore from 1979 to 2004 were found during April, May, and June, when

beach surveys were conducted most intensively. Nesting may also occur at the national seashore during other months, but this has not been confirmed. A dead Kemp's ridley turtle containing eggs was found washed ashore at Padre Island during July, and Kemp's ridley tracks have been documented in July as well.

At the national seashore, some Kemp's ridley turtles nest every year and many are found stranded (washed ashore, alive or dead) (Shaver 1997, 1998a, 1998b, 1999a, 1999b; Shaver and Caillouet 1998). Additionally, Kemp's ridley turtles sometimes inhabit nearshore gulf waters for foraging or migration.

- *Loggerhead Sea Turtle* — The threatened loggerhead sea turtle occurs in temperate and tropical waters of both hemispheres. Adult loggerhead turtles reach maturity in 25 to 30 years. Loggerheads are nocturnal nesters, although some daytime nesting occurs. They nest from one to seven times within a nesting season (average of approximately 4.1 clutches); clutch size averages 100–125 eggs along the southeastern U.S. coast (NMFS and USFWS 1991b). Hatchlings typically emerge at night.

  At Padre Island National Seashore loggerhead turtles sometimes inhabit nearshore gulf waters for foraging or migration. Additionally, a few occasionally nest at the national seashore, and many more are found stranded here (Shaver 1998b, 1999b). Two nests were found in 2003, and one in 2004. From 1979 to 2004, 23 loggerhead nests were documented at various locations along the coast of the national seashore, but additional nests were likely missed, especially since patrols are reduced and become less comprehensive after the Kemp's ridley patrol season ends mid July. Loggerhead nests are found on North Padre Island from mid-May through early August, although nesting has been documented in the southeastern United States from late April through early September.

- *Green Sea Turtle* — The threatened green sea turtle reaches maturity at 30 to 50 years of age. Female green turtles nest at night. From one to seven clutches are deposited within a breeding season (the average number is usually two to three clutches, with an average of 110–115 eggs per clutch) (NMFS and USFWS 1991a). Hatchlings emerge at night.

  At Padre Island National Seashore, juvenile green sea turtles inhabit nearshore gulf waters, the Laguna Madre, and the Mansfield Channel. The Mansfield Channel jetties support a large population of green sea turtles (especially during the summer) and is likely one of the most important developmental habitats for this species in the northwestern Gulf of Mexico. Additionally, a few green turtles occasionally nest within the national seashore, and many are found stranded there each year (Shaver 1989, 1998b, 2000). From 1979 to 2004, 10 green turtle nests were documented in the park, all in roughly the southern half of the park (Shaver 1989, 2000). Two green turtle nests were found in both 2002 and 2003, and one in 2004. The nests were found during June and July, although nesting occurs from May through September in this region.

- *Hawksbill Sea Turtle* — Young hawksbill sea turtles, which are endangered, occur with some regularity in Texas waters, since northern currents carry them from nesting beaches in Mexico (Hildebrand 1981). Nesting on the Texas coast is unknown. At Padre Island National Seashore young hawksbills occasionally inhabit nearshore gulf waters and Mansfield Channel. Additionally, many are found stranded in the park each year, but nesting very rarely occurs there (Shaver 1998b, 1999b).

  Female hawksbill turtles nest mostly during the night, but rare daytime nesting is known. They nest an average of 4.5 times per season (up to 12 clutches); clutch size averages approximately 140 eggs (NMFS and USFWS 1993). Hatchlings emerge at night.

- *Leatherback Sea Turtle* — The endangered leatherback seas turtle is the largest and most pelagic of the sea turtle species and is normally found in the deeper waters of the Gulf of Mexico, where it may undertake extensive migrations. Nesting occurs primarily at night, but diurnal nesting occurs only occasionally. Leatherbacks nest five to seven times per year, with an average clutch size of 110–116 eggs (NMFS and USFWS 1992). Hatchlings emerge typically at night. Leatherbacks infrequently strand at Padre Island National Seashore (Shaver 1998b).

  One researcher reported leatherback nesting at Little Shell on Padre Island National Seashore, including one documented nesting in 1928 and at least one observed nesting in the mid 1930s (Hildebrand 1963, 1981). No leatherback nests have been confirmed on the Texas coast since that time or recorded within the park during recent years, although it is possible that some were missed, especially when patrols were not conducted or were less comprehensive.

BIRDS

Shorebirds

- *Eastern brown pelican* — The eastern brown pelican, an endangered species, is a coastal inhabitant that ranges from the southern United States to northern South America. They nest in colonies on isolated islands where they are safe from predators. Breeding season generally begins in early March and lasts until August. Flocks then move north along both the Atlantic and Pacific coasts. These birds return south to warmer waters by winter. Small numbers of immature birds regularly wander inland in summer, especially in the southwest (Peterson 2003).

  Brown pelicans occur year-round along both the gulf and Laguna Madre sides of Padre Island National Seashore. Individuals use the park for resting and foraging. Based on several studies, brown pelicans prefer the gulf beach shoreline instead of the Laguna Madre shoreline, (Chaney et al. 1993a, 1995a). They are generally found along the gulf beach tide line in the morning hours and along the Laguna Madre shoreline and washover channels in the southern portion of the park in the afternoons. Brown pelicans are not observed in other habitats within the park. Brown pelicans feed almost entirely on fish, including menhaden, smelt, and anchovies, and occasionally on crustaceans.

  Based on nearly 30 years of park colonial waterbird census data, brown pelicans have not been documented nesting within the park (TPWD 2003b). However, they do nest on an island in Corpus Christi Bay, approximately 20 miles from the park.

- *Interior Least Tern* — The interior least tern is the smallest member of the tern family (Nebraska Game and Parks Commission 2002). Only colonies within 50 miles of the coast are considered endangered at the federal level. However, all interior least tern colonies throughout Texas are considered endangered at the state level. Interior least terns are found along the western and eastern coasts of the United States and from southern Maine to the southern tip of Texas.

  The interior least tern's habitat includes mudflats, beaches, and sandbars (Scott 1983); no critical habitat has been designated for this species in the park. Interior least terns forage on small fish captured in shallow coastal waters. Fall migration begins in mid to late July and continues through early September. Wintering habitat for interior least terns exist along the beaches of Central and South America.

  Interior least terns are present at Padre Island National Seashore seasonally between April and September, using the park for foraging, nesting, and migration. These colonial nesters use the

isolated human-made and natural islands in the Laguna Madre. Nesting season in south Texas generally occurs between April and July and has occurred within the park since 1973 (TPWD 2002b). Three nests have also been discovered on the gulf beach (Echols, pers. comm., Dec. 9–10, 2002). Documentation shows that interior least terns generally prefer the Laguna Madre shoreline during June and July, possibly for breeding, and the gulf beach shoreline during April, May, August, and September (Chaney et al. 1995b).

- *Black Tern* — The black tern is considered a species of concern at the federal level. Black terns inhabit temperate grassland, freshwater lakes, freshwater rivers, prairies, lakeshores, and marshes with fairly dense cattail or other marsh vegetation and pockets of open water (Null 1997). Black terns breed in the north central United States northward into Canada and the Northwest Territories. They generally nest in colonies from March to early August. The black tern is a spring and fall migrant through the park, and is a common summer resident along the Gulf shore within Padre Island National Seashore. Terns are seen foraging in the coastal waters off the national seashore during the summer months. Breeding habitat consists of dead canes of marsh or floating masses of dead plants. No breeding has been documented along the Texas coast (Rappole and Blacklock 1985), and no critical habitat has been designated within the national seashore.

  Black terns forage on insects (such as dragonflies, moths, grasshoppers, and beetles) and freshwater fish when at the breeding grounds. Prey consists of small marine fish, including anchovies and silversides, as well as crayfish and mollusks.

  In a survey conducted from August 1994 to August 1995, 5,107 black terns were documented in the park, with three times as many black terns documented on the Laguna Madre side of the park than on the gulf beach (Chaney et al. 1995b).

- *Sooty Tern* — The sooty tern, a threatened species at the state level, is found in tropical and subtropical coasts and islands throughout the world (Rappole and Blacklock 1994). This species inhabits the offshore waters of the Gulf of Mexico and lower southeast United States coast (Sibley 2000). Sooty terns are rare at Padre Island, but have been documented in the Gulf of Mexico, primary bays, and the Laguna Madre (USFWS 1979). If present, they would be observed flying over marine bays or resting on beaches. Sooty terns forage in coastal waters, feeding almost exclusively on small fish, but have been documented feeding on aquatic invertebrates. Surveys conducted in 1993 and 1995 identified no sooty terns (Chaney et al. 1993a, 1993b, 1995a, and 1995b).

  Sooty terns breed locally between April and July on coastal islands in the Laguna Madre. Between 1985 and 1998 only two nests were documented within the park, both on a human-made rookery island in the Laguna Madre (TPWD 2002b).

- *Piping Plover* — The piping plover, one of the least common members of the plover family, is listed as threatened by both the federal and state governments. The population is currently estimated to be approximately 1,400 pairs (USFWS 2000b). The piping plover is a shorebird that migrates from Nova Scotia to North Carolina and winters along the gulf coast from Florida to Mexico, along the Atlantic coast from Florida to North Carolina, and in the Caribbean. They are found on sandy beaches, lakeshores, dunes, and often well above the water line (Sibley 2000). Breeding can occur between March and August, with both fledglings and parents leaving the nest by September. Piping plovers forage mostly on benthic invertebrates, insects, and crustaceans found within the inter-tidal areas of ocean beaches, washover areas, mudflats, sand flats, wrack lines, and shorelines of coastal ponds, lagoons or salt marshes.

Piping plovers have been documented throughout the park as a winter resident and fall/spring migrant (Chaney et al. 1993a, 1993b, 1995a, and 1995b). Generally found along the Laguna Madre, gulf beach, and washover channels within the national seashore, they occur in all months except February (Chaney et al. 1993a and 1993b). The highest concentrations are between August and December, with September typically showing peak numbers (Chaney et al. 1995b). Padre Island National Seashore protects substantial acreage of wintering habitat for the piping plover, with the most important area being the broad wind tidal flats at the north boundary of the park. It is estimated that 60%–65% of all piping plovers winter in south Texas (Chaney et al. 1995a).

Between 1992 and 1993 a study documented 602 plovers over the entire 60 miles of South Beach, with 400 along the gulf beach foreshore (Chaney et al. 1993a). Of the 600 birds observed, 87 (14%) occurred between the 0 and 12-mile mark (Chaney et al. 1993a). Between 1994 and 1995, 150 plovers were documented between the 0 and 15-mile mark on the gulf side, with the majority of these inhabiting the gulf beach foreshore (Chaney et al. 1995b).

No nesting has been documented in south Texas or Padre Island National Seashore to date, and no critical habitat has been designated for this species. In 2000 the U.S. Fish and Wildlife Service proposed 80% of the park as piping plover critical habitat. Final habitat designation figures did not include Padre Island National Seashore as critical habitat, partly because the species is already protected by existing NPS regulations, policies, and management measures, and designating critical habitat would not provide a greater level of protection.

- *Reddish Egret* — The reddish egret, a species of concern at the federal level and threatened at the state level, ranges from the coast areas of Florida and the gulf states to the east and west coasts of Mexico and the Greater Antilles (Rappole and Blacklock 1994). Reddish egrets forage singly in shallow, saltwater habitats including lagoons, saltpans, and tidal pools. The primary food source includes fish and marine invertebrates. Reddish egrets nest in colonies in isolated habitats, including islands.

  Reddish egrets are year-round residents at Padre Island National Seashore, with the largest number documented during the summer and winter months. They are typically found in and around the shallow waters of the Laguna Madre, the flooded wind tidal flats, and washover channels between the park's northern boundary southward to the Port Mansfield Channel (Chaney et al. 1993b and 1995a). Surveys conducted at the park from 1993-1995 indicate that the reddish egret prefers the Laguna Madre habitat to the Gulf beach, with 1,000 or more seen along the Laguna Madre shoreline, compared to less than 50 on the gulf side (Chaney et al. 1993b, 1995a).

  Breeding generally begins in early spring and can extend into August. Since 1973, reddish egrets have been documented nesting yearly in large colonies on several of the park's isolated human-made and natural islands. During the 2001 colonial waterbird census, 50 pairs of nesting reddish egrets were documented on a spoil island approximately 2 miles south of the park's northern boundary (TPWD 2002b).

- *White-faced Ibis* — The white-faced ibis, a species of concern at the federal level and threatened at the state level, ranges from the western United States southward along the Pacific coast to El Salvador, eastward into north and south-central South America, and northward into south Texas (Rappole and Blacklock 1994). It is a common migrant along coastal plains during late spring and early summer, and late summer and early fall. In Texas, these birds are summer residents, breeding on isolated coastal islands from Galveston to the lower Laguna Madre. This species is uncommon or rare in Texas during the winter.

The white-face ibis is a colonial nester, and the breeding season is March through July. General nesting habitat includes bays, marshes, lakes, and ponds. These birds nest and roost in trees with other wading birds, such as herons and egrets, or they may erect nests in bulrushes or reeds (Terres 1991). This species has been documented nesting on several isolated islands within the Laguna Madre portion of the park since 1973, but it has not nested there since 2000, when only two nests were observed (TPWD 2002b). This species does not forage in the park because its foraging habitat is freshwater marshes, which are not found within the park. This species has not been documented resting along the Laguna Madre and Gulf beach shorelines (Chaney et al. 1993a, 1993b, 1995a, 1995b).

- *Wood Stork* — The wood stork, a state threatened species, is a year-round resident in Florida and the coastal areas of Mexico. It occurs in Texas, Louisiana, Alabama, and Mississippi as it migrates into Mexico, Central and South America, and Argentina. Wood storks forage in freshwater and brackish wetlands, narrow tidal creeks, or flooded tidal pools (USFWS 1996). They are often found feeding with herons and egrets. Fish comprise the bulk of their diet, but they are also known to eat frogs, snakes, young alligators, and insects.

  Wood storks nest in large colonies from 30 to several thousand pairs. Nesting habitat consists of cypress or mangrove swamps in Florida, Georgia, and South Carolina (Terres 1991); this species formerly bred in Texas and most of the southeastern United States. The wood stork is a common migrant of Padre and Mustang Islands during the summer and fall (Blacklock 1997; USFWS 1979). Wood storks arrive in the area in June and depart in November, with the greatest density generally between July and October. Wood storks are known to forage in estuaries, secondary bays, and freshwater marshes (Blacklock 1997).

Raptors

- *Peregrine Falcon* — The peregrine falcon, listed as endangered at the state level, winters along the Gulf of Mexico and as far south as Central and South America. Falcons are known as common winter inhabitants of the southern portion of Padre Island National Seashore, arriving some time in early fall and departing mid-May (Chaney et al. 1993a). They are generally seen only during spring and fall migrations (TPWD 2002a). Peregrine falcons hunt on broad mudflats along the Laguna Madre shoreline, and rest on any higher elevation, typically on the foredunes along the gulf beach (Chaney et al. 1995b). These birds are generally concentrated in the southern portion of Padre Island National Seashore (from the 30- to 36-mile markers), which is unique in that it is a main component of the migration route "staging area," particularly for juveniles, during the spring and fall migration (Maechtle 1993). From actual counts, more than 2,000 peregrine falcons have utilized this area annually during their fall migration (Maechtle 1993). The gulf beach is a very important stopover area for foraging, resting, and is a landmark guide for many migratory birds (Chaney et al. 1993a). Padre Island National Seashore and South Padre Island are the only known localities in the Western Hemisphere where peregrine falcons can be found in such high concentrations during their spring migration. No critical habitat has been designated for this species at the park.
- *Northern Aplomado Falcon* — The northern aplomado falcon, an endangered species at the federal and state level, is rare at Padre Island National Seashore. Over the past 10 years, there have been approximately four sightings of individual falcons in the park along the main road, on beach foredunes, and in grasslands of the northern ten miles of the park. These sporadic sightings generally occurred in winter and early spring. The most recent park sighting was in December 1999 on the park's northern boundary. Individuals sighted appeared to be transients, and no established adult pairs, territories, or nests have been documented within the park. Transients could pass over a portion of the park potentially used by PWC recreationists.

- *White-tailed Hawk* — The white-tailed hawk, a state threatened species, is a tropical and subtropical species ranging from southern Texas (year-round) to Mexico and Central and South America, and some of the islands of the southern Caribbean. Its preferred habitat includes open, semi-open, or thinly forested country, whether flat or hilly. In southern Texas, they are most visible in the grassland prairies near the coast, often where only scattered bushes, yuccas, or large cacti exist (Channing 2002). In southern Texas, where rabbits are abundant, white-tailed hawks feed upon them extensively, as well as cotton rats, snakes, lizards, frogs, grasshoppers, cicadas, and beetles, and occasionally a quail or other bird.

  White-tailed hawks have been observed in grassland and wind-tidal flat habitats within Padre Island National Seashore. They are common during the winter and uncommon the rest of the year (McCraken and Clark, 1990). In 1993 four white-tailed hawks were seen flying over the wind tidal flats between the 19- and 26-mile markers, and 20 birds were observed between Yarborough Pass and the north boundary (Chaney et al. 1993b, 1995a). Less than 10% of the white-tailed hawks documented in 1995 occurred over gulf beach habitat, while the remaining 90% were seen flying over the wind tidal flats of the Laguna Madre (Chaney et al. 1995b). This indicates that the white-tailed hawk generally prefers the western portion of the park. No critical habitat has been designated for this species in the park.

  Nesting accounts for white-tailed hawks are rare. A single nest was documented in the park in 2002, 6.5 miles south of the end of park road 22 in a grassland habitat. The nest was built in a 6-foot huisache and appeared to be have been used previously. The nest appears to have since been abandoned.

- *Bald Eagle* — The bald eagle, listed as threatened at the state and federal level, ranges through the north, northeast, east, southeast, and central portions of Texas; they are not observed in southwest or western Texas (Rappole and Blacklock 1994). In Texas, bald eagles breed primarily in the northern and eastern portions of the state (TPWD 2000). They were formerly common, breeding on the islands in Nueces Bay and elsewhere, but they are now considered a rare resident (Rappole and Blacklock 1994).

  The threatened bald eagle prefers quiet coastal areas, rivers, or lakeshores with tall trees but can also be found around reservoirs (TPWD 2000). They forage primarily on fish, but will feed on almost anything they can catch, including ducks, rodents, and snakes, as well as carrion. Bald eagles mate for life and build large nests in the tops of large trees near rivers, lakes, marshes, or other wetland areas (USFWS 2001).

  Bald eagles have been documented in winter months at Padre Island National Seashore (NPS 1999a) but are considered rare. They are found in greater abundance on the mainland than the island (McCraken and Clark 1990), since approximately only 0.5 acre of oak woodland and no riparian habitat occur within the park. Recent documentation has not identified any bald eagles within the park (Chaney et al. 1993a, 1993b, 1995a, and 1995b).

CULTURAL RESOURCES

BACKGROUND

Padre Island has been continually occupied and used by humans for perhaps the past 4,500 years, when the island reached its present form. Native Americans used the island, at least on a seasonal basis, before the Spanish arrived around 1519 and began exploring, mapping, and describing the Texas coast. In 1554, 16 to 20 ships sailed from Vera Cruz to Havana en route to Spain. This fleet, carrying a large bullion shipment and other cargo, encountered a Gulf storm, and three of the vessels wrecked off Padre Island near the present Mansfield Channel.

The first recorded permanent habitation of Padre Island by Europeans was by Padre Nicolas Balli' and his nephew, Juan Jose Balli' who, in 1805, established Rancho Santa Cruz de Buena Vista on the southern end of the island. Through a succession of owners, the island remained primarily focused on cattle ranching, and several line camps were constructed to support the cattle ranches on the island. In 1907 active efforts to establish a resort community on the southern end of the island began, with similar efforts on the northern end in 1927.

During World War II and continuing through 1970, portions of the island were used by the U.S. Navy for bombing practice. In 1962 a portion of Padre Island was established as a unit of the national park system.

ARCHEOLOGICAL RESOURCES

Although a complete inventory of archeological resources within Padre Island has not yet been conducted, cultural resource surveys completed to date have recorded 44 sites within the boundary of the seashore (Echols, pers. comm., Apr. 25, 2003). 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. A smaller vessel was also lost during attempts to salvage the cargo of the vessels. Remains of two of these wrecks are buried underwater but within the park boundaries, and occasionally artifacts from the wrecks wash onto the beach. One associated site is located onshore and could be the survivors' or salvagers' camp related to the 1554 wrecks. Due to years of destruction by "treasure hunters," sites of this era have become extremely rare in U.S. waters, and any remains in NPS areas are extremely significant.

Additionally, magnetometer surveys along the southern portion of the island have resulted in several shipwreck possibilities yet to be confirmed. Research into historical records indicates that as many as 20 shipwrecks may have occurred within 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 19th 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.

The only cultural resources in the park that are in or near potential PWC use areas are those in the archeological district, which is approximately 60 miles south of the Malaquite visitor center.

VISITOR USE AND EXPERIENCE

Visitors coming to Padre Island National Seashore are generally from the regional area, including Corpus Christi, central and northern Texas, and Oklahoma.

ANNUAL VISITOR USE

An average of approximately 700,000 people visited Padre Island National Seashore annually over the past 11 years (see Table 11). During that time visitation has decreased an average of 2.4% annually, while population levels in the immediate region have remained relatively constant, and the majority of visitor use is regional (Echols, pers. comm., Dec. 9–10, 2002).

FIGURE 3: VISITOR USE AT SOUTH BEACH

SEASONAL USE PATTERNS

Visitor use patterns vary seasonally, with the greatest use occurring in the spring and summer. During March, April, and May the weather becomes pleasant and the waters of the Gulf of Mexico and Laguna Madre begin to warm. Spring and early summer are also the most popular time for windsurfing at Bird Island Basin due to steady winds.

TABLE 11: AVERAGE ANNUAL VISITATION AT PADRE ISLAND NATIONAL SEASHORE, 1994–2004

Year	Number of Visitors	Percentage Change from Previous Year
1994	915,596	
1995	755,817	-17.5
1996	840,236	11.2
1997	677,492	-19.4
1998	707,999	4.5
1999	630,562	-10.9
2000	759,596	20.5
2001	656,873	-13.5
2002	532,843	-18.9
2003	568,737	6.7
2004	643,792	13.2
Average	**699,049**	**-2.4%**

SOURCE: NPS 2003c.

Warm, sunny weather in June, July, and August brings crowds of visitors to the beach for swimming and sunbathing. At Bird Island Basin, the highest visitor use occurs in June and July. Day use becomes extremely heavy at Malaquite Beach. Summer is also the busiest season for overnight camping at the Malaquite campground and along the beach south of Malaquite. Campsites have been known to fill the

FIGURE 4: VISITOR USE DOWN-ISLAND

beach in the area directly south of Malaquite Beach from the high-tide zone to the dune line. Down-island activities also reach their peak during the summer. Four-wheel-drive vehicle camps are established at Little Shell and Big Shell beaches, and near the Mansfield Channel, where fishing and beachcombing are popular activities. There is very little inland backcountry use. Visitor use is highest on weekends, indicative of heavy day use by residents of nearby communities (NPS 2000b).

Park attendance begins to decline in the middle of August, even though September, October, and November are pleasant for camping and enjoying the coastal environment. Most gulfside use during the fall occurs at Little Shell and Big Shell beaches, where fishing is more productive. Fishing becomes popular late October and November, resulting in increased weekend visits by locals and increased camping on beaches. In the Malaquite campground, use is limited mainly to weekends during the fall. At Bird Island Basin, windsurfing continues through November (NPS 2000b).

December historically has the lowest visitor use in the park (NPS 2003c). In December, January, and February the park attracts out-of-state visitors from the northern states to camp for extended periods on the beach and at Bird Island Basin. Unlike spring and summer visitors, these visitors, who are generally older and retired, are very supportive of park interpretive programs and have greater interest in nature walks, birding, photography, and hiking (NPS 2000b).

VISITOR ACTIVITIES

Visitor use can be divided into areas along the gulf side and the Laguna Madre portion of Padre Island National Seashore. Areas along the gulf include Malaquite Beach and the visitor center, North Beach, and South Beach. Areas along the Laguna Madre include Bird Island Basin and Yarborough Pass (see the Padre Island Location map). Water-oriented activities include boating, fishing, windsurfing, water-skiing, and swimming. Other recreational activities are described below (NPS 2000b, 2003b).

Malaquite Pavilion serves as the center of visitor services. The visitor center has an information desk that provides schedules of park programs, a bookstore, exhibits, and interpretive facilities. There are also picnic tables, an auditorium, two observation decks, restrooms, rinse-off showers, first-aid facilities, and a public telephone. A camp store sells supplies, bait, fishing tackle, and fishing licenses.

The visitor center complex also contains a wheelchair-accessible boardwalk that leads to a supervised swimming beach. Malaquite Beach is off-limits to vehicular traffic. The visitor center and beach are the most frequently visited sites at Padre Island. Approximately 67% of respondents to a 2004 visitor survey reported visiting the visitor center, and 65% visited the beach (Texas A&M University 2004).

North Beach and South Beach are on the Gulf of Mexico shoreline. North Beach is north of Malaquite Beach and extends to the northern park boundary, while South Beach extends the remaining 60 miles of shoreline south of Malaquite Beach. Approximately 31% of visitors reported going to South Beach (Texas A&M University 2004); no services are available on the beach. The beaches provide swimming, fishing, primitive camping, four-wheel driving, surfing, picnicking, hiking, bird watching, and beachcombing.

Bird Island Basin is classified as a natural environment subzone, meaning the "lands and waters in this subzone are managed for resource-oriented recreation" and public appreciation and interpretation with a minimum impact on the environment. Developments are confined to unsurfaced back-island roads, chemical toilets, and signs. Allowable activities include boating, hiking, fishing, windsurfing, birding, swimming, primitive camping, and regulated vehicle use (NPS 2001c). Bird Island Basin also has a boat launching ramp, a fish-cleaning station, and a dredged channel for access to Laguna Madre and the Intracoastal Waterway. Bird Island Basin is being upgraded to allow more boat trailer parking and improved access with a new road. Camping opportunities here are also being improved along the Laguna Madre shoreline (Echols, pers. comm., Mar. 10, 2005). Bird Island Basin was visited by 37% of survey respondents (Texas A&M University 2004).

Yarborough Pass is 15.5 miles south of the visitor center on Laguna Madre. It is accessible only by boat or from the four-wheel-drive area of South Beach, at approximately the 15-mile marker. Very few visitors (5%) reported visiting Yarborough Pass (Texas A&M University 2004), which provides excellent wade fishing and bird watching. Boats can be launched from the beach into the Laguna Madre.

Camping

Camping is permitted along the entire gulf side beach, including North Beach, Malaquite Beach, and South Beach. Both tent camping and recreational vehicle (RV) camping are allowed. Camping is also permitted in several areas along Laguna Madre. Facilities range from primitive to individual developed campsites.

- The Malaquite Beach campground has 50 designated camping sites, including 26 sites for tents or RVs, 8 sites for tents only, and 16 for RVs only. Facilities include toilets, rinse showers, and picnic tables. There are no hookups, but a water-filling station and sanitary dump station are located outside the campground entrance. A camping permit is required and the fee is $8 a day. Only 14% of summer visitors reported visiting the Malaquite Beach campground (Texas A&M University 2004).
- North Beach provides primitive camping with no designated camping sites. A camping permit is required but no fees are charged. The beach is open to RVs and tents. Camping is permitted between the dunes and on the water's edge. The beach is open to two- and four-wheel-drive vehicles.
- South Beach provides primitive camping with no designated camping sites. A camping permit is required but no fees are charged. The beaches are open to RVs and tents. Camping is permitted between the dunes to within 100 feet of the water's edge. The first 5 miles of South

Beach are open to two- and four-wheel-drive vehicles, while the lower 55 miles are open only to four-wheel-drive vehicles.

- Primitive tent and RV camping is available at Bird Island Basin. Camping permits are required, with fees of $5 per day, or $10 for an annual pass. The park is currently reorganizing and expanding the camping facilities as part of a recreational use plan.
- Primitive camping is available at Yarborough Pass, 15.5 miles south of the visitor center on the Laguna Madre. Yarborough Pass is accessible only from the four-wheel-drive area of South Beach, at approximately the 15-mile marker. A camping permit is required, but no fees are charged. The campground has no facilities.

Roads and Trails

Paved roads include the main road, the North Beach access road, the Bird Island Basin road, the campground road, and the visitor center loop road. Unpaved roads include a portion of the Bird Island Basin road leading to the boat ramp, the ranger road, Yarborough Pass, and the Back Island road (NPS 2000b). Because all beaches are defined as roads in Texas, vehicles can also drive on the beach at North Beach and South Beach (however, driving off the beach and into the dunes, grasslands, and mudflats is not permitted). The first 5 miles of South Beach are open to all vehicles, while only four-wheel-drive vehicles are permitted south of the 5-mile marker along the remaining 55 miles to Mansfield Channel. This stretch of beach contains soft sand and slippery shells and can be difficult to travel. A four-wheel-drive road connects Little Shell Beach (at approximately the 15-mile marker) to Yarborough Pass on the Laguna Madre. The dunes, grasslands, and tidal flats are off-limits to vehicles, along with the Malaquite Beach area.

The Grasslands Nature Trail is a 0.75-mile long loop at the northern end of the park. The trail is a self-guiding, unpaved nature trail that winds through a grasslands and dunes area. This is the only designated trail for public use within the park and the only developed access to the interior grasslands (NPS 2000b). Approximately 11% of park visitors reported using this trail (Texas A&M University 2004). No trails exist in the vicinity of PWC use areas, and sounds from personal watercraft in the Laguna Madre would not be heard in the inland location of the trail.

Fishing Areas

Fishing is an all-season sport on Padre Island. Approximately 22% of visitors in 2004 reported fishing from the shore (Texas A&M University 2004). Surf anglers can catch redfish, speckled sea trout, black drum, and whiting. Shark fishing is also popular in the Gulf of Mexico. Fish that can be found in the Laguna Madre are sheepshead, croaker, and flounder (NPS n.d.; Padre Island Safaris 2003). Yarborough Pass provides excellent wade fishing. A Texas state fishing license with a saltwater stamp is required to fish within the park (NPS n.d.).

Shoreline Use

The shorelines along the Gulf of Mexico and Laguna Madre are the most heavily used portions of the national seashore. The most heavily used section of the park is from the north boundary south 10 miles to approximately to the 5-mile marker on South Beach. Facilities in this portion are easily accessible, and two-wheel drive vehicles are prohibited south of approximately the 5-mile marker along South Beach.

The down-island portion of the park, south of the 5-mile marker, is only accessible by four-wheel-drive vehicle and provides “rare opportunities for beach recreation in an environment of isolation and

solitude," as described in the park's significance statements (NPS 1998b). Approximately 38% of visitors reported traveling between 1 and 10 miles down the beach. Less than half of these traveled more than 10 miles down the beach (Texas A&M University 2004). Little Shell Beach (approximately between the 8- and 10-mile markers) and Big Shell Beach (approximately between the 18- and 28-mile markers) provide excellent opportunities for collecting seashells (NPS n.d.).

Bird Island Basin is the most heavily used portion along the Laguna Madre. Shoreline activities include swimming, boating, water-skiing, windsurfing, fishing, camping, and bird watching.

Throughout the national seashore, about 80% of respondents to the 2004 visitor survey said they walked on the beach. More than half said they went sightseeing (68%), drove on the beach (58%), and collected shells and things (53%). A large number of respondents watched birds (45%), went swimming (32%), sunbathed (31%), picnicked on the beach (28%), and played games on the beach (9%). Nineteen percent of visitors said they camped on the beach. Of these activities, visitors reported walking on the beach as the most enjoyable activity in which they participated (Texas A&M University 2004).

Watercraft Use (Motorboats, Sailboats, Windsurfing, and Sea Kayaks)

The largest group of motorized watercraft in the national seashore consists of motorboats. Bird Island Basin provides the park's only boat launching ramp into Laguna Madre, and approximately 125 boats use the boat launch on a typical high-use day. Boating occurs primarily between April and September, with March and October also showing occasional use by anglers. There are usually fewer boats during winter. Small power boats, fishing boats, sailboats, and other small watercraft can navigate the waters of Laguna Madre. Inflatable boats up to 12 feet long with engines of 15 hp or less, such as Zodiacs®, may be launched into the Gulf of Mexico at any location south of the 5-mile marker on South Beach. A permit must first be obtained from a park ranger. Boats may also be launched into Laguna Madre from the beach at Yarborough Pass.

Boating from Bird Island Basin is also a traditional method to access leased cabins on the spoil islands outside of the park boundary near the Intracoastal Waterway. These islands are administered by the Texas General Land Office (NPS 2002f).

Bird Island Basin is considered one of the top windsurfing locations in the United States because of the shallow, warm water and nearly constant winds. (The average depth of Laguna Madre is about 4 feet, but it is approximately 6 feet deep in the dredged Bird Island Basin boat channel, which provides access to the Intracoastal Waterway.) Rental equipment and lessons are available at Bird Island Basin from a concessioner. Most windsurfing occurs immediately in front of the concessioner, out to the Intracoastal Waterway, and extending south and north to the Bird Island Basin boat channel. On a typical spring day, 35–50 windsurfers can be seen in this area, increasing to over 100 on special event days (Larson, pers. comm., Mar. 25, 2003). Sea kayakers can also be found in both the Laguna Madre and the Gulf of Mexico.

PWC Use

Historically, PWC use within Padre Island National Seashore was very sporadic and limited. Use began in the Padre Island area soon after personal watercraft were introduced into the market and increased during the 1980s. PWC use decreased in the 1990s with the increased use of the Bird Island Basin area by windsurfers.

In 1997 the National Park Service began to regulate PWC use in Padre Island National Seashore under the "Superintendent's Compendium," which restricted use to south of the 5-mile marker on the gulf side and to the Bird Island Basin Channel within Laguna Madre. This restricted PWC users from the more popular beach areas north of the 5-mile marker (e.g., Malaquite Beach), and it limited disturbance from PWC users to other water recreationists within Bird Island Basin while still allowing access to the Intracoastal Waterway. Between the implementation of these limitations in 1997 and the April 22, 2002, ban, PWC use had been declining in Bird Island Basin and had been increasing slightly on the gulf side over the same period.

Prior to the April 22, 2002, ban, approximately five PWC users were in the park on a typical high-use summer day, based on observations from the entrance station and park staff, plus input from the Texas Parks and Wildlife Coastal Fisheries staff familiar with the area, and the windsurfing concessioner at Bird Island Basin. Approximately 75% of total PWC use within the park occurred on the gulf side south of the 5-mile marker, and the other 25% occurred in Bird Island Basin. Therefore, on a typical high-use summer day there would be approximately three PWC users on the gulf side and two in Bird Island Basin.

PWC use on the gulf side was primarily by shark fishermen who used the craft to place bait offshore. Shark anglers are not typical PWC users, as they generally travel quickly between the shore and the wave break line to deliver bait, and do not spend a large amount of time on the water. Some other PWC users would recreate near the surf line, traveling up and down the coast, but this use was also very short term and sporadic. PWC users within Laguna Madre could only use the park to directly access the Intracoastal Waterway through the Bird Island Basin boat channel, and they generally did not spend more than 5 to 10 minutes in park waters. PWC users have also used the Bird Island Basin boat channel to access the leased spoil islands outside the park boundary near the Intracoastal Waterway.

As with boating, most PWC use occurred between April and September. Almost no PWC were observed during the winter months. PWC launched from the following areas in the national seashore:

- along the Gulf of Mexico shoreline south of the 5-mile marker on South Beach
- at the Bird Island Basin boat launch ramp to travel directly to and from the Intracoastal Waterway

Numerous areas in the vicinity of Padre Island National Seashore are more conducive to recreational PWC use and are generally more popular with PWC recreationists. Along the Gulf of Mexico, areas north of the park include beach property owned by Kleberg County, Padre Balli County Park, Bob Hall Pier, J. P. Luby Park, and Mustang Island State Park. Additional areas include Laguna Madre outside park boundaries, especially at the 37-mile marker at the John F. Kennedy Causeway (which has a marina), the Riveria at Baffin Bay (which also has a marina), and Packery Channel. These areas have few restrictions on PWC use, and except for Mustang Island State Park, they do not charge a fee to enter or launch personal watercraft from the beach.

VISITOR SATISFACTION

The most recent information regarding Padre Island National Seashore visitor satisfaction is detailed in the July 2004 "Survey of Visitors to Padre Island National Seashore: A Final Report" (Texas A&M University 2004). Visitor satisfaction was measured several ways. Almost all respondents (95%) reported they thoroughly enjoyed their visit to Padre Island, and nearly half (49%) said Padre Island was their favorite place to go for beach and saltwater recreation. About 85% of respondents felt that sections of Padre Island should remain in an untouched state, and over 70% said they would disap-

prove of actions that would make the national seashore less natural. Respondents were split with regard to noise: 30% favored making Padre Island free of human noises, while 25% disapproved of such a plan. Respondents regarded few conditions at the national seashore as "serious problems." The most serious problem cited by respondents was "man-made debris" (40% of respondents). Respondents were primarily drawn to Padre Island by a desire to enjoy the sights, sounds, and smells of nature. Respondents also felt that seeking relaxation was very important. A small proportion of respondents (16%) felt there were not enough places to launch a boat at Padre Island. Respondents reported observing few behaviors or conditions that might be regarded as harmful or having negative consequences.

Since the PWC ban went into effect, three complaints have been received regarding the ban. One complaint came from a fisherman who used the craft to place bait offshore for shark fishing, one from a recreational PWC user, and one from a person using PWC to access a cabin on a spoil island along the Intracoastal Waterway. However, the latter individual was illegally launching from Yarborough Pass (Echols and Larson, pers. comm., Dec. 9–10, 2002).

VISITOR CONFLICTS AND SAFETY

RELATED FEDERAL AND STATE PWC REGULATIONS

Padre Island National Seashore abides by Texas Parks and Wildlife regulations. Boating regulations are enforced by NPS rangers and Texas Parks and Wildlife Department officers. In addition, the U.S. Coast Guard Auxiliary occasionally patrols the park by conducting flyovers. The Texas Parks and Wildlife Code stipulates the following regulations for PWC use (Texas Parks and Wildlife 2004b):

- Persons less than 16 years of age shall not operate a personal watercraft unless accompanied by someone at least 18 years of age. A mandatory Texas Parks and Wildlife boater education law limits the age of PWC operators. Individuals born after August 31, 1984, who are less than 18 years of age must pass a boater education course approved by Texas Parks and Wildlife.
- PWC operators and passengers are required to wear Coast Guard approved personal flotation devices (PFDs).
- PWC operators must be fastened to a lanyard cut-off device if the personal watercraft has one installed, which will shut off the engine should the operator fall off.
- Riders can only operate personal watercraft from sunrise to sunset.
- A person cannot operate within 50 feet of another vessel (including other personal watercraft), person, platform, object, or the shore except at a speed just enough to maintain headway and steerage.
- PWC should not be operated in a manner that requires the operator to swerve at the last possible moment to avoid collision. PWC operators may not jump the wake of another vessel or be unnecessarily close to other vessels.
- It is illegal to chase, harass, or disturb wildlife with a PWC.

Between 1997 and April 22, 2002, PWC were prohibited from operation within the Padre Island National Seashore portion of Laguna Madre, except for launching at Bird Island Basin for direct travel to and from the Intracoastal Waterway by way of the marked Bird Island Basin boat channel. On the gulf side, PWC users could only operate south of the 5-mile marker of South Beach. PWC operators

were subject to all federal and state laws. Regulations applying to vessels also apply to personal watercraft. No local ordinances affect PWC operation.

Boating regulations are enforced by NPS rangers and Texas Parks and Wildlife officers. However, Texas Parks and Wildlife officers cannot enforce PWC-related bans within the park. Within the past five years, three boating accidents have occurred at the national seashore, none of which involved personal watercraft. One accident involved a boat and a windsurfer, one a catamaran that capsized in the Gulf of Mexico, and the third a powerboat that swamped in the surf zone of the Gulf of Mexico.

PWC-RELATED CONFLICTS WITH OTHER VISITORS

Reported conflicts have occurred between windsurfers and PWC users operating illegally within Bird Island Basin. PWC users have been known to illegally cut across the basin in the area of windsurfers, rather than use the Bird Island Basin boat channel (Echols and Larson, pers. comm., Dec. 9–10, 2002). Park staff are concerned about additional potential recreational conflicts between PWC users and windsurfers that could occur in Bird Island Basin. An increase in PWC use could result in more conflict and safety problems. Because Bird Island Basin is recognized as one of the premiere wind-surfing areas in the country, PWC use was deemed incompatible within this area given the inherent conflict between the two activities. There is also concern about potential conflicts between PWC users and visitors swimming, fishing, and playing in the surf along the gulf coast, where wave running by PWC users historically occurred. Close calls and collisions by PWC users have occurred in areas outside Padre Island National Seashore on the north end of the island and near Bob Hall Pier County Park (Larson, pers. comm., Dec. 9–10, 2002).

SOCIOECONOMIC ENVIRONMENT

Census data show that the population in Kenedy, Kleberg, Willacy, and Nueces counties (which are where the majority of park visitors live) experienced an average annual population growth rate of 0.74% from 1990 to 2000, below the national average of 0.9%. As previously discussed, an average of approximately 700,000 people have visited Padre Island National Seashore annually over the past 11 years (see Table 11); during that time visitation has decreased an average of 2.4% annually.

Prior to April 2002, PWC use was a very minor recreational activity in the national seashore, with only about 0.04% of annual visitors using personal watercraft in the park. NPS staff are not aware of PWC rental shops in nearby towns. Several businesses that provide PWC-related services are located in Corpus Christi, South Padre Island, and other commercial centers along the southern Gulf coast. The low number of PWC users at the park prior to the April 2002 ban and the low volume of comments received following implementation of the ban suggest that none of these establishments relied heavily on Padre Island visitors for their PWC-related revenues. These businesses generally have diverse sources of income, such as motorboat, motorcycle, and ATV sales and service.

Several alternative areas for PWC use exist in the region. These include county-owned parks just north of the seashore and Mustang Island State Park. Additional areas include Laguna Madre outside the national seashore boundary, especially near marinas and in Packery Channel.

NATIONAL SEASHORE MANAGEMENT AND OPERATIONS

Padre Island National Seashore currently has one permanent law enforcement staff position, or ranger, and one seasonal staff employee. On summer weekend days two to three employees patrol the park

from 7 a.m. until midnight. The rangers focus on land activities. Park rangers conduct sporadic water patrols of the Gulf of Mexico and Laguna Madre. Search-and-rescue patrols are rare within the park. Texas Parks and Wildlife game wardens routinely patrol the waterways during summer months, but do not have enforcement authority related to locations where PWC use is prohibited. The U.S. Coast Guard occasionally patrols the park by conducting flyovers (Larson, pers. comm., Dec. 9, 2002).

Park staff have received unofficial reports of illegal PWC use in park waters within Laguna Madre by other park visitors. Regular patrols of the water and along the southern portion the park are necessary to detect and detour illegal PWC use. The park has recently received additional funding for its law enforcement program, and more patrol rangers are in force. This is allowing more of an enforcement presence for water monitoring, such as boat use, fishing licenses, and compliance (Echols, NPS, Mar. 10, 2005).

ENVIRONMENTAL CONSEQUENCES

SUMMARY OF LAWS AND POLICIES

Three overarching environmental protection laws and policies guide the National Park Service — the National Environmental Policy Act of 1969, and its implementing regulations; the National Parks Omnibus Management Act of 1998; and the NPS Organic Act of 1916.

1. The National Environmental Policy Act is implemented through regulations of the Council on Environmental Quality (CEQ) (40 CFR 1500–1508). The National Park Service has in turn adopted procedures to comply with the act and the CEQ regulations, as found in DO #12 and its accompanying handbook.

2. The National Parks Omnibus Management Act of 1998 (16 USC 5901 et seq.) underscores the National Environmental Policy Act in that both are fundamental to NPS park management decisions. Both acts provide direction for articulating and connecting resource management decisions to the analysis of impacts, using appropriate technical and scientific information. Both also recognize that such data may not be readily available, and they provide options for resource impact analysis should this be the case.

   The Omnibus Act directs the National Park Service to obtain scientific and technical information for analysis. The NPS *DO #12 Handbook* states that if "such information cannot be obtained due to excessive cost or technical impossibility, the proposed alternative for decision will be modified to eliminate the action causing the unknown or uncertain impact or other alternatives will be selected" (sec. 4.4).

   Section 4.5 of DO #12 adds to this guidance by stating "when it is not possible to modify alternatives to eliminate an activity with unknown or uncertain potential impacts, and such information is essential to making a well-reasoned decision, the NPS will follow the provisions of the regulations of CEQ (40 CFR 1502.22)." In summary, the Park Service must state in an environmental assessment or impact statement (1) whether such information is incomplete or unavailable; (2) the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific adverse impacts that is relevant to evaluating the reasonably foreseeable significant adverse impacts; and (4) an evaluation of such impacts based on theoretical approaches or research methods generally accepted in the scientific community.

3. The 1916 NPS Organic Act (16 USC 1) commits the National Park Service to making informed decisions that perpetuate the conservation and protection of park resources unimpaired for the benefit and enjoyment of future generations.

GENERAL METHODOLOGY FOR ASSESSING IMPACTS

While much has been observed and documented about the overall PWC effects on the environment, as well as public safety concerns, the site-specific impacts, or impacts on any particular resource under all conditions and scenarios, are more difficult to measure and affirm with absolute confidence. Since personal watercraft were introduced in parks, data collected and interpreted about them, as well as their effects on park resources relative to other uses and influences, are difficult to define and quantitatively measure, despite monitoring.

Recognizing this dilemma, the interdisciplinary planning team created a process for impact assessment, based upon the directives of the *DO #12 Handbook* (sec. 4.5(g)). National park system units are directed to assess the extent of impacts on park resources as defined by the context, duration, and intensity of the effect. While measurement by quantitative means is useful, it is even more crucial for the public and decision-makers to understand the implications of those impacts in the short and long term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists.

To determine impacts, methodologies were identified to measure the change in park resources that would occur with the implementation of the PWC management alternatives. Thresholds were established for each impact topic to help understand the severity and magnitude of changes in resource conditions of the various management alternatives. In the absence of quantitative data, best professional judgment prevailed. In general, the thresholds used come from existing literature on personal watercraft, federal and state standards, and consultation with subject matter experts and appropriate agencies.

Potential impacts are described in terms of type (are the effects beneficial or adverse?), context (are the effects site-specific, local, or even regional?), duration (are the effects short-term, lasting less than one year, or long-term, lasting more than one year?), and intensity (are the effects negligible, minor, moderate, or major?). Because definitions of intensity (negligible, minor, moderate, or major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document.

Each alternative is compared to a baseline to determine the context, duration, and intensity of resource impacts. For purposes of impact analysis, the baseline is the continuation of the ban on PWC use projected over the next 10 years (the no-action alternative).

In addition to establishing impact thresholds, the national seashore's resource management objectives and goals (as stated in the "Purpose of and Need for Action" chapter) were integrated into the impact analysis. In order to further define resource protection goals relative to PWC management, the park's *Strategic Plan* was then used to ascertain the "desired future condition" of resources over the long term. The impact analysis considers whether each management alternative would contribute substantially to the park's achievement of its resource goals, or whether it would be an obstacle. The planning team then considered potential ways to mitigate effects of PWC use on park resources and modified the alternatives accordingly.

For the purposes of analysis, the following assumptions are used for all impact topics (the words "impact" and "effect" are used synonymously throughout the discussion):

> *Short-term impacts:* Those impacts occurring from PWC use in the immediate future or through a single season of use, usually 1 to 6 months.
>
> *Long-term impacts:* Those impacts occurring from PWC use over several seasons of use through the next 10 years.
>
> *Direct impacts:* Those impacts occurring from the direct use or influence of PWC use.
>
> *Indirect impacts:* Those impacts occurring from PWC use that indirectly alter a resource or condition.
>
> *Impact Analysis Area:* Each resource impact is assessed in direct relationship to those resources affected both inside and outside the park, to the extent that the impacts can be substantially traced, linked, or connected to PWC use inside park boundaries. Each impact

topic, therefore, has an impact analysis area relative to the resource being assessed, and it is further defined in the impact methodology.

CUMULATIVE IMPACTS

The CEQ regulations to implement the National Environmental Policy Act require the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for all alternatives, including the no-action alternative.

Cumulative impacts were determined by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at Padre Island and, if applicable, the surrounding region. Park, local, or state policies, plans, and actions are listed on page 23.

IMPAIRMENT ANALYSIS

The NPS *Management Policies 2001* require an analysis of potential effects to determine whether or not actions would impair park resources. The fundamental purpose of the national park system, as established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within a park system unit, that discretion is limited by the statutory requirement that the agency must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values. An impact to any park resource or value may constitute an impairment, but an impact would be more likely to constitute an impairment to the extent that it would have a major or severe adverse effect on a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

The following process was used to determine whether the various PWC management alternatives had the potential to impair park resources and values:

1. The park's enabling legislation, the *General Management Plan,* the *Strategic Plan,* and other relevant background materials were reviewed with regard to the unit's purpose and significance, resource values, and resource management goals or desired future conditions.

2. PWC management objectives specific to resource protection goals at the park were identified.
3. Thresholds were established for each resource of concern to determine the context, intensity and duration of impacts, as defined above.
4. An analysis was conducted to determine if the magnitude of impact reached the level of "impairment," as defined in NPS *Management Policies 2001.*

The impact analysis includes findings of impairment to park resources and values for each of the management alternatives.

PWC AND BOAT USE TRENDS

AVAILABLE DATA

PWC and boat use trends were identified to determine direct and indirect impacts of PWC management strategies on national seashore resources. Other visitor use trends were identified to help assess cumulative effects. Use trends were determined using data available from the national seashore records and discussions with state agency and park representatives.

Based on conversations with park staff (Echols and Larson, pers. comm., Dec. 9–10, 2002; Echols, pers. comm., Mar. 9, 2005) and records from annual Bird Island Basin boat trailer counts, it is estimated that 2 personal watercraft and approximately 125 motorboats used Bird Island Basin on a typical high-use day in 2002. Most personal watercraft and boats use only the waters in the area of the Bird Island Basin during transit to the Intracoastal Waterway. For park waters along the gulf shoreline, it is assumed there were 3 personal watercraft and 1 Zodiac® boat on a high-use day. It is estimated that a total of approximately 250 personal watercraft and 11,390 other outboard motorboats were used in the park for all of 2002. The estimates of PWC use are based on the assumption that personal watercraft were in use all of 2002, but in fact their use in the national seashore was banned after April 22, 2002.

It was assumed that the numbers of personal watercraft and motorboats using the national seashore would increase by 1.1% per year from 2002 to 2004 and from 2004 to 2014. This estimated increase is based on the average annual increase in boat trailer counts at Bird Island Basin for the period 2001 through 2004. Trailer counts by seashore staff are presented in Table 12.

TABLE 12: BOAT TRAILER COUNTS AT BIRD ISLAND BASIN

Year	Trailer Count
2001	11,164
2002	11,362
2003	11,304
2004	11,524

SOURCE: Echols and Larson, pers. comm., Dec. 9–10, 2002; Echols, pers. comm., Mar. 9, 2005.

An average annual increase of 1.1% agrees with the estimated 1%–2% annual increase provided by the park staff based on visitation trends and relatively flat regional population growth (Echols and Larson, pers. comm., Dec. 9–10, 2002). This rate of increase in boats using Bird Island Basin data is applied to personal watercraft and other outboard motorboats using both Bird Island Basin and the Gulf of Mexico.

ESTIMATES FOR TYPICAL HIGH-USE DAYS IN 2004 AND 20014

To evaluate potential impacts to water quality, estimates are needed of personal watercraft and boats using the national seashore on a typical high-use day. In contrast, to evaluate impacts to air quality, estimates are needed of annual totals for PWC and boat use at the national seashore. Estimates were made for 2004 and 2014, the beginning and end of the evaluation period. PWC and boat use for 2002 is the starting point for PWC and boat use in the two evaluation years.

Estimates of PWC and outboard motorboat use in the national seashore is based on an estimated 1.1% annual increase in the numbers of personal watercraft and other outboard motorboats. This estimated increase in numbers was first applied to the numbers for 2002, when a total of 5 personal watercraft and 126 boats were present on a typical high-use day. For 2004 it is estimated that 5 personal watercraft and 129 boats used the waters around the national seashore. For 2014 it is estimated that 7 personal watercraft and 145 boats would use the waters. (These projected numbers are rounded up to the nearest whole number in order to serve as conservative estimates.) Table 13 shows where the estimated numbers of personal watercraft and other boats would be located within the national seashore.

TABLE 13: NUMBERS OF PERSONAL WATERCRAFT AND BOATS ON HIGH-USE DAYS IN 2004 AND 2014

	Personal Watercraft		Boats	
Year	Bird Island Basin	Gulf of Mexico	Bird Island Basin	Gulf of Mexico
2002 (base year)	2	3	125	1
2004*	2	3	128	1
2014*	3	4	143	2

* Projected numbers based on an estimated annual increase of 1.1% from estimates for 2002.

ESTIMATES FOR ANNUAL TOTAL USE IN 2004 AND 2014

Air quality impacts are analyzed for the area of the national seashore, unlike the water quality analysis, which focuses on specific areas (Bird Island Basin and the gulf shore). The original total 2002 usage numbers of 250 personal watercraft and 11,390 other motorboats for the entire national seashore were increased by 1.1% on an annual basis, so in 2004 there would have been 256 personal watercraft and 11,640 other motorboats (of which 92 were assumed to be inflatable boats with engines of 15 hp or smaller). In 2014 there would be a total of 286 personal watercraft, assuming that use had not been banned, and 12,990 other motorboats (including 103 inflatable boats with engines of 15 hp or smaller). Table 14 shows the total use estimates at Padre Island for 2004 and 2014:

TABLE 14: TOTAL NUMBERS OF PERSONAL WATERCRAFT AND BOATS AT PADRE ISLAND IN 2004 AND 2014

Year	Personal Watercraft	Boats
2004	256	11,640*
2014	286	12,990**

*Includes 92 inflatable boats with engines of 15 hp or smaller.
**Includes 103 inflatable boats with engines of 15 hp or smaller.

WATER QUALITY

Most research on the effects of personal watercraft on water quality focuses on the impacts of two-stroke engines, and it is assumed that any impacts caused by these engines would also apply to the personal watercraft powered by them. There is general agreement that two-stroke engines discharge a

gas-oil mixture into the water. Fuel used in PWC engines contains many hydrocarbons, including benzene, toluene, ethylbenzene, and xylene (collectively referred to as BTEX).

Polycyclic aromatic hydrocarbons (PAHs) are formed by incomplete fuel combustion and are present in uncombusted petroleum. Some research has shown that certain PAHs, including some found in PWC emissions, become much more toxic to plankton and other small aquatic organisms when exposed to the ultraviolet radiation in sunlight, a process known as phototoxicity (EPA 1998a; Oris et al. 1998; Landrum et al. 1987; Mekenyan et al. 1994; Arfsten et al. 1996). Conversely, some PAHs may be degraded via photodegradation or microbial degradation (Fasnacht and Blough 2002; Albers 2002). Factors controlling the amount of ultraviolet radiation penetrating water include the presence and abundance of algae, water clarity, and water color. Padre Island National Seashore does not have data to evaluate the phototoxicity process in park waters.

As described in appendix B, an estimated gasoline discharge rate of three gallons per hour at full throttle is used in the water quality impact calculations (CARB 1998). A typical conventional (i.e., carbureted) two-stroke PWC engine discharges as much as 30% of the unburned fuel mixture into the exhaust (CARB 1999). At common fuel consumption rates, an average two-hour ride on a two-stroke personal watercraft may discharge three gallons (11.34 liters) of fuel into the water (NPS 1999b). The Bluewater Network states that personal watercraft can discharge between three and four gallons of fuel over the same time period. However, the newer direct-injection two-stroke or four-stroke technology can reduce these emissions to meet current regulatory standards for both water and air quality (EPA 1996a). The percentage of emissions of BTEX compounds from four-stroke inboard or outboard motors is less than those from a two-stroke outboard engine or an existing two-stroke PWC engine.

The gasoline emission rate for two-stroke outboards is estimated at approximately the same as for personal watercraft with the same or higher horsepower outboards (80–150 hp). Smaller two-stroke outboard engines (e.g., 15 hp) discharge approximately twice the hydrocarbons as larger outboard or PWC engines (80–150 hp) at operating speed (see Allen et al. 1998, figures 5, 6, and 8). Other studies may show different results, with about the same emissions regardless of horsepower or larger horsepower engines having more emissions than smaller engines (e.g., CARB 2001).

As described below, hydrocarbon discharges to water are expected to decrease considerably over the next 10 years due to mandated improvements in engine technology (i.e., direct injection two-stroke and four-stroke engines) (US EPA 1996a, 1997) and the replacement of older, two-stroke personal watercraft and outboard engines with the newer technology engines.

GUIDING REGULATIONS AND POLICIES

The Environmental Protection Agency has developed national recommended ambient water quality criteria for 158 pollutants for the protection of both aquatic life and human health (through ingestion of fish/shellfish and water or fish/shellfish only) (EPA 2002a). These criteria have been adopted as enforceable standards by most states. The Environmental Protection Agency has not established aquatic life criteria for any of the PWC-related compounds stated above. For human health, however, the agency has established benchmarks for benzene, ethylbenzene, toluene, and several PAH compounds, including benzo(a)pyrene. There are no criteria for xylene.

Simply stated, a water quality standard defines the water quality goals of a waterbody by designating uses to be made of the water, by setting minimum criteria to protect the uses, and by preventing degradation of water quality through antidegradation provisions. The antidegradation policy is only one portion of a water quality standard. Part of this policy (40 CFR 131.12(a)(2)) strives to maintain water quality at existing levels if it is already better than the minimum criteria. Antidegradation should not

be interpreted to mean that "no degradation" can or will occur, as even in the most pristine waters, degradation may be allowed for certain pollutants as long as it is temporary and short term (Rosenlieb, pers. comm., 2001).

Other considerations in assessing the magnitude of water quality impacts is the effect on those resources dependent on a certain quality or condition of water. Sensitive aquatic organisms, submerged aquatic vegetation, riparian areas, and wetlands are affected by changes in water quality from direct and indirect sources.

The NPS *Management Policies 2001* state that the National Park Service will perpetuate surface water and groundwater as integral components of park aquatic and terrestrial ecosystems (sec. 4.6.1; NPS 2000c). Furthermore, the Park Service will determine the quality of park surface and groundwater resources and avoid, whenever possible, the pollution of park waters by human activities occurring within and outside parks, by

- working with appropriate governmental bodies to obtain the highest possible standards available under the Clean Water Act for the protection of park waters
- taking all necessary actions to maintain or restore the quality of surface water and groundwater within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations
- entering into agreements with other agencies and governing bodies, as appropriate, to secure their cooperation in maintaining or restoring the quality of park water resources (NPS *Management Policies 2001,* sec. 4.6.3; NPS 2000c)

While many parks do have established water quality monitoring programs, the specific organic compounds emitted from personal watercraft and outboard motors are not systematically measured. Neither the national seashore nor the Texas Commission on Environmental Quality (Kolbe, pers. comm., Mar. 9, 2005) has quantitative water quality data for gasoline constituents that could be used to monitor the effects of personal watercraft since they were introduced in the 1970s. In the absence of baseline data for Laguna Madre or the gulf, available water quality benchmarks or criteria and estimated discharge rates of organics were used as the basic tools to address water quality impacts potentially resulting from PWC use.

METHODOLOGY AND ASSUMPTIONS

To assess the magnitude of water quality impacts to national seashore waters under the various PWC management alternatives, the following methods and assumptions were used:

1. The regulation at 40 CFR 131.12(a)(2) represents an overall goal or principle with regard to PWC use in that the park will strive to fully protect existing water quality so that "fishable / swimmable" uses and other existing or designated uses are maintained. Therefore, PWC use could not be authorized to the degree that it would lower this standard and affect these uses. To do so would potentially violate 40 CFR 131.10, which basically forbids the removal of an existing use (e.g., personal watercraft) because the activity was authorized knowing this level of pollution would occur.
2. State water quality standards governing the waters of the park were examined for pollutants whose concentrations in gasoline were available in the literature and for which ecological and/or human health toxicity benchmarks were available in the literature.
3. Baseline water quality data (if available), especially for pollutants associated with two-stroke engines (PAHs, other hydrocarbons), were examined. In Texas, MTBE is not used in gasoline;

therefore, it was not included in the analysis. Personal watercraft and other motorboats from other states utilizing MTBE as an additive may be found in the national seashore, but given the small numbers involved, they were not considered in the calculations of water quality impacts.

4. Since no models were available to predict concentrations in water of selected pollutants emitted by personal watercraft and motorboats, an approach was developed to provide estimates of whether PWC (and outboard motor) use over a particular time (for example, over a typical busy weekend day) would result in exceedances of the identified standards, criteria, or toxicity benchmarks. The approach is described in appendix B. Details of this approach were then taken into account, along with site-specific information about currents, mixing, wind, and turbidity, as well as the specific fate and transport characteristics of the pollutant involved (e.g., volatility), to assess the potential for adverse water quality impacts.

5. In general, the approach provides the information needed to calculate emissions to the receiving waterbody from PWC and outboard motors of selected hydrocarbons whose concentrations in the raw gasoline fuel were available in the literature and for which ecological and/or human health toxicity benchmarks could be acquired from the literature. The selected chemicals were benzene and three PAHs (benzo[a]pyrene, naphthalene, and 1-methyl naphthalene). The approach outlined a procedure to first estimate the emissions of these pollutants to the water per operational hour (based on literature values) and to then estimate the total loading of the pollutants into the water, based on numbers of personal watercraft and boats and on the estimated hours of use. The approach then provided an estimate of how much water would be required to dilute the calculated emission loading to the level of the water quality standard or benchmark. That volume of water (referred to as the "threshold volume" of water) was then compared with the total available volume of water within the area being evaluated. All the mechanisms that result in loss of the pollutant from the water also were qualitatively considered. In this way, an assessment could be made as to the potential for the standards or benchmarks to be exceeded, even on a short-term basis.

   Hydrocarbons, depending on their physical characteristics, have the potential to evaporate from water or to accumulate in the sediment and solids on which marine organisms feed. BTEX compounds tend to transfer from water to air more rapidly than PAHs. As a result of accumulation in sediment, long-term adverse health effects are possible in the mammals and humans who use marine life as a food source. PAHs, however, do not dissolve easily in water and tend to bond to particulate matter and settle to bottom sediments. Research has found that increased exposure to PAHs can adversely affect immune systems and could cause cancer in humans (Agency for Toxic Substances and Disease Registry 1996).

   When released to water, benzene is subject to rapid volatilization, with a half-life for evaporation of about five hours (EPA 2002a). The loss of benzene from the water column is discussed qualitatively where applicable.

6. The most current "Texas Surface Water Quality Standards" (TNRCC 2000) do not include aquatic life standards for typical gasoline organic constituents such as benzene or PAHs. In the absence of water quality standards from the state or ambient water quality criteria from the Environmental Protection Agency), this analysis adopted chronic marine screening benchmarks for naphthalene (250 μg/L) and benzene (100μg/L) from the EPA Region 6 screening benchmarks for marine water (EPA 2005a); no marine water screening benchmarks are available for benzo(a)pyrene or benzene from this EPA 6. For benzo(a)pyrene, a benchmark of 0.014 μg/L is adopted from the EPA Region 6 freshwater screening benchmarks. This value also is a chronic benchmark from Suter and Tsao (1996). No benchmarks are available for 1-methyl naphthalene from the EPA Region 6 surface water

screening benchmarks (marine or freshwater) or from Suter and Tsao (1996). Therefore, the acute toxicity (LC_{50}) value of 1,900 µg/L for the dungeness crab from the U.S. Fish and Wildlife Service (2000a) is adjusted to 19 µg/L for a chronic benchmark.

7. As shown in Table 6, TNRCC surface water quality standards for the protection of human health from ingestion of fish/shellfish only (salt water) are 70.8 µg/L for benzene and 0.54 µg/L for benzo(a)pyrene. The waters of Laguna Madre and the Gulf of Mexico are marine waters, and therefore, are not designated as a public water supply. Consequently, the Texas human health standards for ingestion of fish/shellfish were compared with EPA ambient water quality criteria (2002), and the lower of the two sets of benchmarks were used.

   Table 15 shows the benchmarks used to assess impacts to aquatic organisms and to human health.

TABLE 15: ECOLOGICAL AND HUMAN HEALTH BENCHMARKS FOR ORGANIC POLLUTANTS

Chemical	Ecological Benchmark (µg/L)	Source	Human Health Benchmark* (µg/L)	Source
Benzo(a)pyrene	0.014	EPA 2005a	0.018	EPA 2002a
Naphthalene	250	EPA 2005a	--	--
1-methyl naphthalene	19**	USFWS 2000a	--	--
Benzene	100	EPA 2005a	51	EPA 2002a

*Based on the consumption of fish/shellfish.
**Based on LC_{50} of 1900 for dungeness crab; 19 µg/L used for marine and estuarine calculations.

8. The threshold volume of water (defined above) is calculated in acre-feet (1 acre-foot = 1 acre of water 1 foot deep). For example, if results showed that for benzo(a)pyrene, 55 acre-feet of water would be needed to dilute the expected emissions to below the benchmark level, and the receiving body of water is a 100-acre reservoir with an average depth of 20 feet (2,000 acre-feet) and is well-mixed, then this would indicate little chance of a problem, especially when adding the effects of any other processes that contribute to the loss of benzo(a)pyrene from the water column. However, if the impact area is a 5-acre backwater averaging 2 feet deep (10 acre-feet), then there could be at least a short-term issue, especially if outboard emissions were added or there was limited water circulation through the area.

9. To assess cumulative impacts, non-PWC vessel emissions were added to PWC emissions to get a more complete estimation of loading to the receiving waterbody. Total emissions to water for personal watercraft and outboard boats were originally estimated by calculating emissions for the year 2000 assuming that all vessels, including PWC, are carbureted two-stroke engines of 80 horsepower. This emission rate is assumed to be three gallons (11.36 liters) per hour at full throttle. Because newer fuel-injected two-stroke and four-stroke engines are being integrated into personal watercraft and other vessels, emissions for 2004 were calculated by reducing the emissions from 2000 by 15%, based on the EPA projection of hydrocarbon reductions (EPA 1996b, 1997).

10. Reductions in hydrocarbon (HC) emissions from personal watercraft and outboards are outlined by the Environmental Protection Agency over the next 16 years (see Table 16).

TABLE 16: ESTIMATED EPA REDUCTIONS IN WATERCRAFT EMISSIONS

Date	Action
1999	EPA requires production line testing for 75% HC reduction in new outboards and begins to see reductions as newer models are introduced (EPA 1997).
2000	EPA requires production line testing for 75% HC reduction in new personal watercraft and begins to see reductions as newer models are introduced (EPA 1997).
2004	A 15% reduction in HC emissions conservatively estimated for this analysis, based on reduction rates

Date	Action
	and dates in EPA (1996a, 1997).
2006	EPA fully implements 75% HC reduction in new outboards and personal watercraft (US EPA 1996a).
2010	EPA estimates a 52% reduction in overall HC emissions from outboards and personal watercraft (EPA 1996a).
2014	A 60% reduction in HC emissions conservatively estimated for this analysis, based on reduction rates and dates in EPA (1996a, 1997).
2015	EPA estimates a 68% reduction in overall HC emissions from outboards and personal watercraft (EPA 1996a).

Key dates in this chronology begin in 1999, when the Environmental Protection Agency began to require production line testing for 75% HC reduction in new outboard motors, and 2000, when production line testing for 75% HC reduction in new personal watercraft was required (EPA 1997). These dates represent a delay in testing implementation that was originally scheduled for 1998 for both personal watercraft and outboard motors (EPA 1996a). By 2006 all new personal watercraft and outboards manufactured in the United States must have a 75% reduction in HC emissions (EPA 1996a). For the purpose of estimating water quality impacts in 2014, overall reductions in HC emissions are conservatively estimated to be 60% of baseline emissions by PWC and outboard motors. This estimate is based on interpolations of the emission reduction percentages reported by the Environmental Protection Agency in 1996 (EPA 1996a), but with a one-year delay in production line testing (EPA 1997). For the purpose of calculating water quality impacts, the 2004 baseline emission rates are assumed to be equal to 15% of the rates available in the literature, which do not incorporate EPA-mandated reductions in emissions.

In the no-action alternative, personal watercraft would continue to be banned, and emissions by other motorboats were assumed to decrease by 60% in 2014 (EPA 1996a, 1997). The 60% overall average reduction estimated for 2014 also was applied to personal watercraft and outboard motorboats in calculations for alternatives A and B in this assessment.

11. To evaluate water quality impacts on Padre Island National Seashore water quality calculations were performed for each of two areas (see Table 17). These areas are:

    - Area 1 — Bird Island Basin: This area includes the Bird Island Basin boat channel plus 1 mile north and south of the boat channel in Laguna Madre to the national seashore boundary, which coincides with the eastern edge of the Intracoastal Waterway. A width of 1 mile on either side of the channel was chosen because boats launched from Bird Island Basin generally stay in the channel, but occasionally some may cut diagonally from the launching ramp to the waterway. Distance from shore to the national seashore boundary is approximately 0.75 mile. Depth of the boat channel is assumed to be 6 feet, and the average depth of the bordering Laguna Madre is approximately 2.5 feet. Width of the boat channel is assumed to be 100 feet. Total estimated volume of the Bird Island Basin area is 2,455 acre-feet.
    - Area 2 — Gulf of Mexico shoreline: This area includes the waters adjacent to the national seashore from the 5-mile marker south to the end of the national seashore. Shoreline waters of the national seashore extend out to the 12-foot depth (an average of 0.25-mile offshore; these waters have an estimated average depth of 6 feet). The portion of the gulf shoreline open to boats and personal watercraft extends approximately 60 miles south from the 5-mile marker. Total estimated volume of the gulf shoreline waters is 52,800 acre-feet.

TABLE 17: ESTIMATED WATER VOLUMES (ACRE-FEET)

Areas	Estimated Area (acres)	Estimated Depths (ft)		Volume (acre-feet)
		Bird Island Basin Boat Channel	Rest of Laguna Madre	
Area 1 — Bird Island Basin Area	970*	6	2.5	2,455
Area 2 — Gulf of Mexico Shoreline Waters (5- to 60-Mile Markers)	8,800		6**	52,800

* Area of the entire Bird Island Basin.

** Average depth from shore to 0.25 mile offshore.

For the purpose of estimating available volumes of water in Padre Island National Seashore, it was assumed that only the waters within the national seashore boundaries would be available for mixing/diluting PWC and motorboat emissions. In actuality, mixing with waters outside the national seashore would provide additional dilution of emissions from personal watercraft and outboard motors.

12. As previously explained, the numbers of personal watercraft and motorboats using the national seashore was assumed to increase by 1.1% per year from 2004 to 2014. This estimated increase was based on daily boat trailer counts for Bird Island Basin over a four-year period (2000–2004). The 1.1% annual increase in boats using Bird Island Basin is applied to personal watercraft and other outboard motorboats using Bird Island Basin and, by extrapolation, Gulf of Mexico waters.

    An 125 boats used Bird Island Basin on a typical high-use day in 2002. It was also estimated that all boats using Bird Island Basin have engines larger than 15 hp. Each boat using Bird Island Basin is typically within national seashore waters for 10 minutes at idle speed and 5 minutes at full throttle. Most boats only use waters in the area of the Bird Island Basin during transit to the Intracoastal Waterway. For waters along the gulf shoreline it is assumed that one boat (an inflatable boat) with a 15-hp engine or smaller uses these waters on a high-use day, and that the boats are typically used for 10 minutes at full throttle to set bait and not for recreational use.

    Substantially fewer personal watercraft use the national seashore. Based on park staff estimates, two personal watercraft use Bird Island Basin on a high-use day, and three use the gulf waters. In Bird Island Basin personal watercraft typically run at idle speed for 10 minutes and full throttle for 5 minutes. Like other motorboat recreationists, PWC users are only in the Bird Island Basin during transit to the Intracoastal Waterway. Along the gulf shoreline, it is assumed that two of the three personal watercraft would be typically used for recreation for three hours a day at full throttle, and the third watercraft would be used by fishermen to set bait for 10 minutes a day at full throttle (Echols, pers. comm., 2002). All personal watercraft are assumed to have engines larger than 15 hp.

    For the purpose of estimating impacts to water quality from personal watercraft and other outboard motorboats, it is assumed that all vessels are operating at full throttle. This is a more conservative approach than the use patterns described above, since PWC and outboard engines discharge gasoline and its constituents at a substantially lower rate at idle speed than at full throttle (North American Lake Management Society 2002).

    Use of areas 1 and 2 by personal watercraft and motorboats on a high-use day in 2004 and 2014 is shown in Table 18.

TABLE 18: DISTRIBUTION OF PWC AND MOTORBOAT USE IN 2004 AND 2014

	Personal Watercraft		Motorboats			
	Greater than 15 hp		Greater than 15 hp		15 hp or Less	
	2004	2014	2004	2014	2004	2014
Area 1 — Bird Island Basin Area	2	3	128	143	0	0
Area 2 — Gulf of Mexico within the National Seashore (5- to 60-Mile Markers)	3	4	0	0	1	2
Totals	**5**	**7**	**128**	**143**	**1**	**2**

Note: Use is predicted to increase by 1.1% per year from 2004 to 2014. Estimated 2014 numbers are rounded up to the nearest whole number.

For the purpose of evaluating impacts to water quality in 2004, it is assumed that the overall emission rates of the personal watercraft and other outboard motorboats operating within the national seashore have been reduced by 15% from that of two-stroke, carbureted engines. Any inboard or stern-drive motorboats are not included because they have four-stroke engines.

13. Boating activity, and therefore pollutant loads, would be distributed over an entire day (from early morning to dusk), although for the purpose of calculating impacts, it is assumed that all personal watercraft and other motorboats operate for the periods of time described above during the same time period in a single high-use day.
14. For a conservative assessment of available volume of water, no lateral mixing of water across the boundaries between national seashore and adjacent waters is assumed. Water and PWC emissions in each area can mix with adjacent waters to some unknown extent, thus reducing the concentrations of PWC emissions within each area. By assuming no mixing across jurisdictional boundaries, the estimated impacts for each alternative are conservative (i.e., actual impacts would be less than those described in this analysis).
15. As discussed above, research indicates that some PAHs have phototoxic effects in oligotrophic lakes that have high light penetration (Oris et al. 1998). Limited data indicate that in these conditions, PAHs may have toxic effects on fish and zooplankton at very low concentrations (less than 1 µg/L). Due to an absence of recent appropriate water quality data, transparency of the water on the gulf and Intracoastal Waterway sides of the national seashore is unknown. It is unlikely that these coastal waters are as transparent as the water in an oligotrophic lake. Also, some PAHs may be degraded via photodegradation or microbial degradation (Fasnacht and Blough 2002; Albers 2002). In the absence of site-specific transparency data and the confounding factors of phototoxic effects and natural degradation, the potential for photo-toxic effects of PAHs is discussed qualitatively in the impact analyses, where appropriate.

IMPACT ANALYSIS AREA

The impact analysis area for water quality includes only waters within the jurisdictional boundary of Padre Island National Seashore. As previously stated, two areas of the national seashore are evaluated:

- Area 1 (970 acres, 2,455 acre-feet) — Laguna Madre in the immediate vicinity of the Bird Island Basin (1 mile north and south of the Bird Island Basin boat channel)
- Area 2 (8,800 acres, 52,800 acre-feet) — the nearshore waters of the Gulf of Mexico that are within the park boundary south of the 5-mile marker

IMPACT TO WATER QUALITY FROM PWC USE

Given the water quality issues and methodology and assumptions described previously, the following impact thresholds were established to describe the relative changes in water quality (both overall, localized, short and long term, and cumulatively) under the various management alternatives.

> *Negligible:* Impacts are chemical, physical, or biological effects that would not be detectable, would be well below water quality standards or criteria, and would be within historical or desired water quality conditions.
>
> *Minor:* Impacts (chemical, physical, or biological effects) would be detectable but would be well below water quality standards or criteria and within historical or desired water quality conditions.
>
> *Moderate:* Impacts (chemical, physical, or biological effects) would be detectable but would be at or below water quality standards or criteria; however, historical baseline or desired water quality conditions would be altered on a short-term basis.
>
> *Major:* Impacts (chemical, physical, or biological effects) would be detectable and would be frequently altered from the historical baseline or desired water quality conditions; and/or chemical, physical, or biological water quality standards or criteria would be slightly and singularly exceeded on a short-term basis.
>
> *Impairment:* Impacts are chemical, physical, or biological effects that would be detectable and that would be substantially and frequently altered from the historical baseline or desired water quality conditions and/or water quality standards, or criteria would be exceeded several times on a short-term and temporary basis. In addition, these adverse, major impacts to park resources and values would
>
> > contribute to deterioration of the park's water quality and aquatic resources to the extent that the park's purpose could not be fulfilled as established in its enabling legislation;
> >
> > affect resources key to the park's natural or cultural integrity or opportunities for enjoyment; or
> >
> > affect the resource whose conservation is identified as a goal in the park's general management plan or other park planning documents.

Impacts of No-Action Alternative — Continue to Prohibit PWC Use

Analysis. As implemented on April 22, 2002, PWC use would continue to be prohibited within Padre Island National Seashore, and no PWC-related water quality impacts would occur.

Cumulative Impacts. Although PWC use would not be permitted in the Bird Island Basin area of Laguna Madre or in the Gulf of Mexico within the national seashore under the no-action alternative, other outboard motorboats and other sources of oil-related contaminants would contribute pollutants in these two areas. In 2004 it is assumed that 128 motorboats used the Bird Island Basin area during a typical high-use day, increasing to 143 motorboats in 2014. In the gulf waters within the seashore, in 2004 it is assumed that one inflatable boat (15 hp or less) was used in 2004, increasing to two such boats in 2014 on a typical high-use day (based on an annual increase of 1.1%; see Table 13). Calculated threshold water volumes needed to dilute outboard motorboat emissions under the no-action alternative are shown in Table 19.

TABLE 19: THRESHOLD WATER VOLUMES NEEDED TO DILUTE MOTORIZED BOAT EMISSIONS, NO-ACTION ALTERNATIVE

	Bird Island Basin Area — Area 1		Gulf of Mexico within National Seashore — Area 2	
	2004	2014	2004	2014
Waters open to motorboat use (acre-feet):	2,455		52,800	
Ecological Benchmarks*				
Benzo(a)pyrene (fuel and exhaust)	38	20	0.4	0.4
Naphthalene	3.7	1.9	<0.1	<0.1
1-methyl naphthalene	76	40	0.8	0.7
Benzene	46	24	0.5	0.5
Human Health Benchmarks**				
Benzo(a)pyrene (fuel and exhaust)	29	16	0.3	0.3
Benzene	91	48	0.9	0.9

* Threshold volumes (acre-feet) below which ecological effects might occur.
** Threshold volumes (acre-feet) below which human health might be impacted.

The calculated threshold volumes needed to dilute pollutants emitted by outboard motorboats would be substantially smaller than the volumes of water available in both areas and in both years evaluated (2004 and 2014). In Bird Island Basin threshold volumes range from 1.9 acre-feet (for naphthalene, ecological effects in 2014) to 91 acre-feet (for benzene, human health effects in 2004). All threshold volumes are less than 4% of the available waters in area 1. In area 2, all threshold volumes are less than 1 acre-foot and represent less than 1% of the available waters along the gulf shoreline in the national seashore. The threshold volumes for 2014 reflect an overall average decrease in emissions of 60% and a 1.1% annual increase in the number of outboard motorboats. Estimated concentrations of all organic contaminants evaluated would be well below the respective water quality benchmarks in 2014 and likely would not be detectable. Even with small impacts of oil-related contaminants from other sources, such as normal oil and gas operations and other marine engines or fueling activities, resulting cumulative impacts under the no-action alternative would be negligible in both areas in 2004 and 2014. A major oil spill or release in the vicinity of the national seashore could result in minor to moderate, short-term, adverse impacts.

Conclusion. With the continued ban on PWC use in the national seashore waters under the no-action alternative, no water quality impacts would result from PWC use.

Cumulative water quality impacts would be negligible in both the Bird Island Basin area of Laguna Madre and the Gulf of Mexico waters within the national seashore in both 2004 and 2014. A major oil spill or release could result in minor to moderate, short-term, adverse impacts on water quality.

The no-action alternative would not result in an impairment of water resources.

Impacts of Alternative A— Reinstate PWC Use As Previously Managed (before April 22, 2002)

Analysis. Under this alternative, PWC use would be reinstated as managed before April 22, 2002. As described above, it is estimated that on a typical high-use day in 2004, two personal watercraft would have used the Bird Island Basin area (area 1) and three personal watercraft would have used the gulf coast area (area 2). In 2014 the number of personal watercraft would increase slightly to three watercraft in area 1 and four watercraft in area 2 (a 1.1% annual increase). The threshold volumes needed to dilute PWC emissions to concentrations below benchmarks under alternative A are shown in Table 20.

TABLE 20: THRESHOLD WATER VOLUMES NEEDED TO DILUTE PWC EMISSIONS, ALTERNATIVE A

	Bird Island Basin Area — Area 1		Gulf of Mexico within National Seashore — Area 2	
	2004	2014	2004	2014
Waters open to PWC use (acre-feet):	2,455		52,800	
Ecological Benchmarks*				
Benzo(a)pyrene (fuel and exhaust)	0.6	0.4	7.3	5.1
Naphthalene	0.1	<0.1	0.7	0.5
1-methyl naphthalene	1.2	0.8	15	10
Benzene	0.7	0.5	8.9	6.2
Human Health Benchmarks**				
Benzo(a)pyrene (fuel and exhaust)	0.5	0.3	5.7	4.0
Benzene	1.4	1.0	18	12

* Threshold volumes (acre-feet) below which ecological effects might occur.
** Threshold volumes (acre-feet) below which human health might be impacted.

The 2004 and 2014 calculated threshold volumes to meet ecological benchmarks range from <0.1 to 15 acre-feet in areas 1 and 2. Under alternative A all ecological threshold volumes would be substantially lower than the available waters in each area. Similarly, the threshold volumes for human health benchmarks for 2004 and 2014 also would be extremely small, ranging from 0.3 to 18 acre-feet. All threshold volumes in 2014 would be smaller than in 2004 due to an overall average 60% decrease in emissions. All impacts to water quality from PWC emissions would be negligible under alternative A.

Cumulative Impacts. As described for the no-action alternative, an estimated 128 motorboats use the Bird Island Basin area and one inflatable boat (with a 15 hp engine or less) used the gulf waters on a high-use day in 2004. By 2014 use is projected to increase to 143 boats in the Bird Island Basin area and two inflatable boats in the gulf waters. Under alternative A, these motorboats would be in addition to personal watercraft — two in Bird Island Basin in 2004, increasing to three in 2014, and three in the gulf waters in 2004, increasing to four in 2014.

TABLE 21: THRESHOLD WATER VOLUMES NEEDED TO DILUTE PWC AND MOTORIZED BOAT EMISSIONS, ALTERNATIVE A

	Bird Island Basin Area — Area 1		Gulf of Mexico within National Seashore — Area 2	
	2004	2014	2004	2014
Waters open to PWC and motorboat use (acre-feet)	2,455		52,800	
Ecological Benchmarks*				
Benzo(a)pyrene (fuel and exhaust)	38	20	7.7	5.5
Naphthalene	3.8	2.0	0.8	0.5
1-methyl naphthalene	77	41	15	11
Benzene	47	25	9.4	6.7
Human Health Benchmarks**				
Benzo(a)pyrene (fuel and exhaust)	30	16	6.0	4.3
Benzene	92	49	18	13

* Threshold volumes (acre-feet) below which ecological effects might occur.
** Threshold volumes (acre-feet) below which human health might be impacted.

The 2004 and 2014 calculated cumulative threshold volumes based on ecological and human health benchmarks in area 1 range from 2.0 to 92 acre-feet, and in area 2 from 0.5 to 18 acre-feet. All threshold volumes are extremely small in relation to the volumes of water available in the two areas, indicating that these pollutant concentrations would be well below both sets of toxicological benchmarks. Consequently, cumulative impacts under alternative A would be negligible and adverse over the short and long term. Additional sources, such as normal oil and gas operations and other

boats/barges, would add only small amounts of these pollutants relative to the size of the waterbodies involved. A major oil spill or release in the vicinity of the national seashore could result in minor to moderate, short-term, adverse impacts.

Conclusion. Water quality impacts through 2014 from PWC use alone would be negligible.

On a cumulative basis impacts from personal watercraft and other outboard motorboats would also be negligible. A major oil spill or release in the vicinity of the national seashore could result in minor to moderate, short-term, adverse impacts.

Alternative A would not result in an impairment of water resources.

Impacts of Alternative B — Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. PWC use would be allowed only in the Bird Island Basin boat channel, not in gulf waters or in Mansfield Channel within the national seashore. It is assumed that the same number of personal watercraft would use Bird Island Basin as under alternative A. The threshold volumes needed to dilute PWC emissions in the Bird Island Basin area are shown in Table 22.

TABLE 22: THRESHOLD WATER VOLUMES NEEDED TO DILUTE PWC EMISSIONS, ALTERNATIVE B

	Bird Island Basin Area — Area 1		Gulf of Mexico within National Seashore — Area 2	
	2004	2014	2004	2014
Waters open to PWC use (acre-feet):	2,455		0*	
Ecological Benchmarks**				
Benzo(a)pyrene (fuel and exhaust)	0.6	0.4	0	0
Naphthalene	0.1	<0.1	0	0
1-methyl naphthalene	1.2	0.8	0	0
Benzene	0.7	0.5	0	0
Human Health Benchmarks***				
Benzo(a)pyrene (fuel and exhaust)	0.5	0.3	0	0
Benzene	1.4	1.0	0	0

* Motorboat use only.
** Threshold volumes (acre-feet) below which ecological effects might occur.
*** Threshold volumes (acre-feet) below which human health might be impacted.

As seen in Table 22, threshold volumes in area 1 would be extremely small (<0.1 to 1.4 acre-feet) compared with the volume of water available in the Bird Island Basin area (2,455 acre-feet). Because personal watercraft would be banned from gulf waters within the national seashore under this alternative, they would not contribute to emissions of organics and no impacts would occur. Overall, impacts to water quality from personal watercraft under alternative B would be negligible.

Cumulative Impacts. Boating activity on an average high-use day would be the same as described under the previous alternatives. In 2004 an estimated 128 motorboats used Bird Island Basin, including to 143 motorboats in 2014. In gulf waters one inflatable boat with a 15 hp engine or less was used in 2004, which is projected to increase to two in 2014. These motorboats would be in addition to the two personal watercraft using Bird Island Basin in 2004 and three personal watercraft in 2014. There would be no contribution to impacts from PWC use in gulf waters under alternative B.

TABLE 23: THRESHOLD WATER VOLUMES NEEDED TO DILUTE PWC AND MOTORIZED BOAT EMISSIONS, ALTERNATIVE B

	Bird Island Basin Area — Area 1		Gulf of Mexico within National Seashore — Area 2	
	2004	2014	2004	2014
Waters open to PWC and motorboat use (acre-feet):	2,455		52,800*	
Ecological Benchmarks**				
Benzo(a)pyrene (fuel and exhaust)	38	20	0.4	0.4
Naphthalene	3.8	2.0	<0.1	<0.1
1-methyl naphthalene	77	41	0.8	0.7
Benzene	47	25	0.5	0.5
Human Health Benchmarks***				
Benzo(a)pyrene (fuel and exhaust)	30	16	0.3	0.3
Benzene	92	49	0.9	0.9

*Motorboat use only.
** Threshold volumes (acre-feet) below which ecological effects might occur.
*** Threshold volumes (acre-feet) below which human health might be impacted.

Threshold volumes for all pollutants in both areas in 2004 and 2014 would be substantially lower than the water volumes available. In Bird Island Basin threshold volumes would range from 2.0 to 92 acre-feet, or less than 4% of the available water. In the gulf coast waters threshold volumes would range from <0.1 to 0.9 acre-feet, or less than 1% of the national seashore waters in the gulf. Even with the potential addition of pollutants from normal oil and gas operations and other boats/barges, cumulative impacts to water quality from personal watercraft and other sources would be negligible in both years evaluated. A major oil spill or release in the vicinity of the national seashore could result in minor to moderate, short-term, adverse impacts.

Conclusion. Continuing the ban on PWC use in Gulf of Mexico waters under alternative B would have no impact on water quality relative to the no-action alternative. Impacts to water quality from PWC use in the Bird Island Basin would be negligible.

Cumulative impacts from PWC and other motorboat use in Bird Island Basin, and from motorboat use in the gulf, would be negligible. A major oil spill or release could create short-term, minor to moderate, adverse impacts.

Implementation of Alternative B would not result in an impairment of water resources.

AIR QUALITY

Personal watercraft emit various compounds that pollute the air. Up to one third of the fuel delivered to the typical two-stroke carbureted PWC engine is unburned and discharged; the lubricating oil is used once and is expelled as part of the exhaust; and the combustion process results in emissions of air pollutants such as volatile organic compounds (VOC), nitrogen oxides (NO_x), particulate matter (PM), and carbon monoxide (CO). Personal watercraft also emit fuel components such as PAHs that are known to cause adverse health effects.

Even though PWC engine exhaust is usually routed below the waterline, a portion of the exhaust gases go into the air. These air pollutants may adversely impact park visitor and employee health as well as sensitive park resources. For example, in the presence of sunlight VOC and NO_x emissions combine to form ozone (O_3), which causes respiratory problems in humans, including coughs, airway irritation, and chest pain during inhalations (EPA 1996c). O_3 is also toxic to sensitive species of vegetation. It causes visible foliar injury, decreases plant growth, and increases plant susceptibility to insects and

disease (EPA 1996c). CO can affect humans as well; it interferes with the oxygen carrying capacity of blood, resulting in lack of oxygen to tissues. NO_x and PM emissions associated with PWC use can degrade visibility (EPA 2000a). NO_x can also contribute to acid deposition effects on plants, water, and soil. However, because emission estimates show that NO_x from personal watercraft are minimal (less than 5 tons per year), acid deposition effects attributable to PWC use are expected to be minimal.

GUIDING REGULATIONS AND POLICIES

Clean Air Act. The Clean Air Act established national ambient air quality standards (NAAQS) to protect the public health and welfare from air pollution. The act also established the prevention of significant deterioration (PSD) of air quality program to protect the air in relatively clean areas. One purpose of this program is to preserve, protect, and enhance air quality in areas of special national or regional natural, recreational, scenic, or historic value (42 USC 7401 et seq.). The program also includes a classification approach for controlling air pollution.

- Class I areas are afforded the greatest degree of air quality protection. Very little deterioration of air quality is allowed in these areas, and the unit manager has an affirmative responsibility to protect visibility and all other class I area air quality related values from the adverse effects of air pollution.
- Class II areas include all national park system areas not designated as class I, and the Clean Air Act allows only moderate air quality deterioration in these areas. In no case, however, may pollution concentrations violate any of the national ambient air quality standards. Padre Island National Seashore is designated a class II area.

Conformity Requirements. National park system areas that do not meet the national standards or whose resources are already being adversely affected by current ambient levels require a greater degree of consideration and scrutiny by NPS managers. Areas that do not meet national standards for any pollutant are designated as nonattainment areas. Section 176 of the Clean Air Act states:

> No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve, any activity which does not conform to an implementation plan [of the State]. . . . [T]he assurance of conformity to such a plan shall be an affirmative responsibility of the head of such department, agency or instrumentality.

Essentially, federal agencies must ensure that any action taken does not interfere with a state's plan to attain and maintain national ambient air quality standards in designated nonattainment and maintenance areas. In making decisions regarding PWC use within a designated nonattainment or maintenance area, park managers should discuss their plans with the appropriate state air pollution control agency to determine the applicability of conformity requirements. Padre Island National Seashore is an attainment area for all pollutants, so the conformity requirements do not apply to this unit.

Applicable PWC and Watercraft Emission Standards. The Environmental Protection Agency issued the gasoline marine engine final rule in August 1996. The rule, which took effect in 1999, affects manufacturers of new outboard engines and the type of inboard engines used in personal watercraft. The agency adopted a phased approach to reduce emissions. The current emission standards were set at levels that are achievable by existing personal watercraft. By 2006, PWC manufacturers will be required to meet a corporate average emission standard that is equivalent to a 75% reduction in HC emissions. (The corporate average standard allows manufacturers to build some engines to emission levels lower than the standard and some engines to emission levels higher than the standard, and to employ a mix of technology types, as long as the overall corporate average is at or

below the standard.) Because the actual reduction in emissions depends on the sale of lower-emitting personal watercraft, the agency estimates that a 52% emission reduction will be achieved by 2011 and a 75% reduction by 2031 (EPA 1996a, 1997).

In August 2002 the Environmental Protection Agency proposed new evaporative emissions standards for gasoline-fueled boats and personal watercraft. (EPA 2002b). These proposed standards would require most new boats produced in 2008 or later to be equipped with low-emission fuel tanks or other evaporative emission controls.

NPS Organic Act and Management Policies. The NPS Organic Act of 1916 (16 USC 1, et seq.) and the NPS *Management Policies 2001* (NPS 2000c) guide the protection of park and wilderness areas. The general mandates of the Organic Act state that the National Park Service will

> promote and regulate the use of . . . national parks . . . by such means and measures as conform to the fundamental purpose of the said parks, . . . 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 (16 USC 1).

Under its *Management Policies 2001* the National Park Service will

> seek to perpetuate the best possible air quality in parks to (1) preserve natural resources and systems; (2) preserve cultural resources; and (3) sustain visitor enjoyment, human health, and scenic vistas (sec. 4.7.1).

The *Management Policies 2001* further state that the National Park Service will assume an aggressive role in promoting and pursuing measures to protect air quality related values from the adverse impacts of air pollution. In cases of doubt as to the impacts of existing or potential air pollution on park resources, the Park Service "will err on the side of protecting air quality and related values for future generations."

The Organic Act and the NPS *Management Policies 2001* apply equally to all areas of the national park system, regardless of Clean Air Act designations. Furthermore, the NPS Organic Act and the *Management Policies 2001* provide additional protection beyond that afforded by the Clean Air Act's national ambient air quality standards alone because the Park Service has documented that specific park air quality related values can be adversely affected at levels below the national standards or by pollutants for which no standard exists.

METHODOLOGY AND ASSUMPTIONS

In order to assess the level of PWC air quality impacts resulting from a given management alternative, the following methods and assumptions were used:

1. The national ambient air quality standards and state/local air quality standards as presented in Table 7 were examined for each pollutant.
2. Air quality designations for the surrounding area were determined. Padre Island National Seashore is in an attainment area for each criteria pollutant. No maintenance plans affect Padre Island.
3. The nearest representative monitoring location to Padre Island National Seashore is a continuous air monitoring (CAM) site on the south side Corpus Christi in Kleberg County (National Seashore CAM Site C314), this site monitors $PM_{2.5}$ and meteorological parameters. Monitoring sites for a broader range of pollutants, including ozone, are within the Corpus

Christi urban area in Nueces County but are not representative of the air quality at the Padre Island National Seashore.

4. Typical use patterns of motorized watercraft use were identified as outlined in the "PWC and Boat Use Trends" section. Registration information (count of vehicles and engine size range information) for Texas from NONROAD2004 was used to determine the number of trips for each Source Classification Code (SCC) and engine size range combination. The rated horsepower, average engine load, deterioration factors, and other relevant parameters for each watercraft type were taken from default assumptions in the EPA NONROAD model (EPA 2005b). This model is used to calculate emissions of criteria pollutants from the operation of nonroad spark-ignition type engines, including personal watercraft. The model allows assumptions to be made regarding the mix of engine types that will be phased in as new engine standards come into effect and increasing numbers of personal watercraft will be the cleaner-burning four-stroke type.
5. Hydrocarbon emissions from internal combustion are characterized in various references and regulations as total hydrocarbons (THC), hydrocarbons (HC), volatile organic compounds (VOC), and reactive organic gases (ROG), as well as other terms. While there are technical differences among some of these terms, the quantitative differences are negligible for purposes of this environmental analysis. The remainder of this discussion describes all hydrocarbon emissions as HC, which is the term used in the EPA regulation for control of emissions from marine engines.
6. PAHs are released during the combustion of fuel, though some PAHs are also found in unburned gasoline. Kado et al. (2000) indicated that changing from two-stroke carbureted engines to two-stroke direct-injection engines may result in increases of airborne particulate-associated PAHs. The same study indicated that four-stroke engines have considerably less PAH emissions than two-stroke engines.* A subsequent study of airborne emissions indicated a potential health risk from toxic pollutants in areas of high concentration of exhaust from many engines, such as in an engine maintenance shop (Kado et al. 2001).
7. Any reductions in emissions resulting from implementing control strategies were taken into account, as were changes in emissions resulting from increased or decreased usage.
8. Studies regarding ozone injury on sensitive plants found in the national seashore were requested, but no studies were available for Padre Island National Seashore. It is unlikely that ozone injury would be at issue because the location is not in an area of increased ambient ozone levels.
9. A calculation referred to as SUM06 (measured in ppm-hours) was used for assessing regional ozone exposure levels. For Padre Island National Seashore, ozone levels were based on the values calculated for the report, "Assessing the Risk of Foliar Injury from Ozone on Vegetation in Parks in the Gulf Coast Network" (NPS 2004a).
10. Visibility impairment was determined from local monitoring data, or from qualitative evidence such as personal observations and photographs.
11. The air quality impacts of the various alternatives were assessed by considering the existing monitored air quality levels as discussed in the "Air Quality" section and the air quality related values present (i.e. visibility and biological resources), and by using the estimated emissions

* It is noted that only one engine of each type, two-stroke carbureted, two-stroke direct injection, and four-stroke, was tested.

based on emission factors from the EPA NONROAD2004 model (discussed above). Estimated reductions in HC emissions as a result of the introduction of cleaner engines would be the same as those described for water quality.

12. For cumulative impacts, the assessment was completed quantitatively with respect to anticipated use of the area by other recreational watercraft, based on emission factors and assumptions in the EPA NONROAD2004 model. Types of craft assessed for quantitative cumulative impacts included outboard and inboard spark-ignition type engines and personal watercraft. Other sources of air pollutants in the area also were considered in the cumulative analysis through a review of the state implementation plan, county records, and the use of best professional judgment.
13. The number of PWC that would have used the park in 2004 and 2014 are estimated in the "PWC and Boat Use Trends" section. It was estimated that 40% of personal watercraft operate in the Bird Island Basin in Laguna Madre, and each watercraft was assumed to undertake one round trip per use event of 15 minutes at full throttle as a conservative basis for estimating emissions. It was estimated that the remaining 60% of personal watercraft would operate on the gulf side of the seashore, with one-third of those watercraft operating at full throttle for 10 minutes, and two-thirds operating at full throttle for three hours.
14. For purposes of the cumulative impacts analysis, all watercraft (personal watercraft and outboard motorboats) from both the Bird Island Basin and the gulf side were included for all alternatives.
15. The air quality analysis is based on annual emissions rates. Estimates of watercraft use were based on park staff observations and statistics from various sources, using the methodology described in the "Water Quality" section.
16. The annual growth rate for all watercraft is assumed to be 1.1% (Echols and Larson, pers. comm., Dec. 9–10, 2002; Echols, pers. comm., Mar. 9, 2005).
17 Cumulative impacts were analyzed quantitatively, with consideration given to boat and PWC air emissions. Although Padre Island National Seashore does maintain vehicular access to some of the park that is open to cars, trucks, and RVs, emissions from these vehicles were not assessed quantitatively; however, they were included in the cumulative analysis. Regional impacts resulting from development outside the park were not considered quantitatively because the localized effects of individual projects would be indistinguishable from ambient background impacts due to the transport distance from the source to the park units.

PWC impact thresholds for air quality are dependent on the type of pollutants produced, the background air quality, and the pollution-sensitive resources (air quality related values) present. Air quality related values include "visibility and those scenic, cultural, biological, and recreation resources of an area that are affected by air quality" (43 FR 15016). Impact thresholds may be qualitative (e.g., photos of degraded visibility) or quantitative (e.g., based on impacts to air quality related values or federal air quality standards, or emissions based), depending on what type of information is appropriate or available.

Because the Environmental Protection Agency has established standards that are regulated by states to protect human health and the environment, two categories for potential airborne pollution impacts from personal watercraft are analyzed: (1) impacts on human health resources, and (2) impacts on air quality related values in the impact analysis area. Thresholds for each impact category (negligible, minor, moderate, and major) are discussed for each impact topic.

IMPACT ANALYSIS AREA

The impact analysis area includes the immediate location of PWC use and adjacent areas within the Padre Island National Seashore boundary. It is assumed that air pollutants would dissipate beyond 100 feet from the shore due to air currents.

IMPACT TO HUMAN HEALTH FROM AIRBORNE POLLUTANTS RELATED TO PWC USE

The following impact thresholds for an attainment area have been defined for analyzing impacts to human health from airborne pollutants — CO, PM_{10}, HC, and NO_x. Sulfur oxides (SO_x) are not included because they are emitted by personal watercraft in very small quantities.

	Activity Analyzed		Current Air Quality
Negligible:	Emissions would be less than 50 tons/year for each pollutant.	**and**	The first highest three-year maximum for each pollutant is less than NAAQS.
Minor:	Emissions would be less than 100 tons/year for each pollutant.	**and**	The first highest three-year maximum for each pollutant is less than NAAQS.
Moderate:	Emissions would be greater than or equal to 100 tons/year for any pollutant.	**or**	The first highest three-year maximum for each pollutant is greater than NAAQS.
Major:	Emissions levels would be greater than or equal to 250 tons/year for any pollutant.	**and**	The first highest three-year maximum for each pollutant is greater than NAAQS.

Impairment: Impacts would have a major adverse effect on park resources and values, and they would

- contribute to deterioration of the park's air quality to the extent the park's purpose could not be fulfilled as established in its enabling legislation; or
- affect resources key to the park's natural or cultural integrity or opportunities for enjoyment; or
- affect the resource whose conservation is identified as a goal in the park's general management plan or other park planning documents.

Both HC and NO_x are ozone precursors in the presence of sunlight and are evaluated separately in lieu of ozone, which is formed as a secondary pollutant. (Note that in attainment areas the Clean Air Act does not require that NO_x be counted as an ozone precursor).

Impacts of No-Action Alternative — Continue to Prohibit PWC Use

Analysis. PWC use would continue to be prohibited in all areas of the national seashore under the no-action alternative. There would be no contribution of CO, PM_{10}, HC, and NO_x emissions from personal watercraft and no air quality impacts from PWC use within national seashore boundaries.

Cumulative Impacts. Regional emissions of all marine vehicles and boating activities under the no-action alternative are assessed in Table 24. Personal watercraft would not contribute to overall

cumulative emissions within the national seashore. The only source of emissions would be motorboats. PWC use would continue to occur outside national seashore boundaries.

TABLE 24: NON-PWC MOTORIZED BOAT EMISSIONS AND HUMAN HEALTH IMPACT LEVELS, NO-ACTION ALTERNATIVE

	CO		PM_{10}		HC		NO_x	
	2004	2014	2004	2014	2004	2014	2004	2014
Annual Emissions (tons/year)	56	64	1.3	1.4	9.7	9.7	2.1	2.4
Impact Level	Minor	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

As described in the "PWC and Boating Use Trends" section, non-PWC annual boat use was estimated at 11,640 vessels in 2004, increasing at approximately 1.1% annually to 12,990 motorboats in 2014. All vessels have engines with a horsepower rating over 15, with the exception of inflatable boats (92 in 2004 and 103 in 2014), which have 15 hp engines or less.

Overall, cumulative impact levels for PM_{10}, HC, and NO_x would be negligible for both 2004 and 2014, while levels for CO would be minor (greater than 50 tons per year and ambient CO levels not exceeding the third highest national ambient air quality standard). Between 2004 and 2014, HC emission increases due to more watercraft would be largely offset by emission reductions due to boat users switching from the more polluting two-stroke engines to either direct injection two-stroke or four-stroke engines. Additional cumulative emissions reductions are likely as the EPA regulations targeted at improving motorized watercraft engine performance become effective. Due to the relative remoteness and exposure of the location from major industrial and commercial development, other sources of air pollution would contribute very little to cumulative air pollution impacts.

Conclusion. Continuing the ban on personal watercraft at Padre Island National Seashore would have no impacts on human health for PWC-related emissions for CO, PM_{10}, HC, and NO_x through 2014.

Cumulative impacts to human health from airborne pollutants through 2014 would be negligible and adverse for HC, PM_{10}, and NO_x and minor for CO. Slightly increased NO_x emissions in 2014 would result from increased boating activity and the conversion to newer engines. However, with improved emission controls, future emissions of CO and HC would continue to decline, which would also contribute to reduced impacts to regional ozone levels in 2014. All impacts would be long term. The risk from PAHs would be negligible through 2014.

Implementation of this alternative would not result in an impairment of air quality.

Impacts of Alternative A — Reinstate PWC Use As Previously Managed (before April 22, 2002)

Analysis. Under this alternative PWC use, which was banned as of April 22, 2002, would be reinstated and allowed in the same areas as prior to the ban, in the Bird Island Basin and on the gulf side of the island. The number of personal watercraft is estimated to total 256 in 2004 and 286 in 2014, based on a 1.1% annual increase. The impacts on air quality of reinstating PWC use within the national seashore are presented in Table 25.

TABLE 25: PWC EMISSIONS AND HUMAN HEALTH IMPACT LEVELS, ALTERNATIVE A

	CO		PM_{10}		HC		NO_x	
	2004	2014	2004	2014	2004	2014	2004	2014
Annual Emissions (tons/year)	7.3	8.1	0.02	0.01	0.65	0.59	0.15	0.17
Impact Level	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Adverse impacts related to PWC use in 2004 would be negligible for CO, PM_{10}, HC, and NO_x. As a result of cleaner engines and increased PWC users, impacts to human health from PWC air pollutants in 2014 would remain negligible for CO, PM_{10}, HC, and NO_x, even though the number of personal watercraft would increase.

As carbureted, two-stroke engines were replaced by cleaner engines, PAH emissions could increase due to two-stroke, direct-injection engines (Kado et al. 2000). However, these increases would be offset by the reduction in PAHs that would occur with conversion to four-stroke engines. The human health risk from PAHs would be negligible in 2004 and 2014.

Cumulative Impacts. Air emissions for personal watercraft along with other motorized watercraft are shown in Table 26. Other watercraft at Padre Island National Seashore would operate as discussed in the no-action alternative.

TABLE 26: PWC AND MOTORIZED BOAT EMISSIONS AND HUMAN HEALTH IMPACT LEVELS, ALTERNATIVE A

	CO		PM_{10}		HC		NO_x	
	2004	2014	2004	2014	2004	2014	2004	2014
Annual Emissions (tons/year)	64	72	1.3	1.4	10	10	2.2	2.5
Impact Level	Minor	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Overall, cumulative impact levels for PM_{10}, HC, and NO_x would be negligible for both 2004 and 2014, while impacts from CO would be minor as emissions would exceed 50 tons per year. By 2014 HC emissions would increase due to more watercraft, which would be offset by emission reductions due to boat users switching from the more polluting two-stroke engines to either direct injection two-stroke or four-stroke engines. Additional reductions in emissions are likely with the implementation of EPA regulations targeted at improving all motorized watercraft engine performance. Due to the relative remoteness and exposure of the location from major industrial and commercial development, other sources of air pollution would contribute very little to cumulative air pollution impacts.

Conclusion. Reinstating PWC use at Padre Island National Seashore would result in negligible adverse impacts to human health from CO, PM_{10}, HC, and NO_x in 2004, as well as from PAHs. In 2014 CO and NO_x emissions would increase and HC and PM_{10} emissions would decrease, although impact levels for these pollutants would remain negligible, the same as in 2004.

Cumulative emission impacts from all boating would be negligible for PM_{10}, NO_x, and HC and minor for CO through 2014.

This alternative would not result in impairment of air quality.

Impacts of Alternative B— Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. Under this alternative PWC use would be reinstated in the Bird Island Basin boat channel area but not on the gulf side of the national seashore. While PWC numbers in 2004 and 2014 would reflect a predicted 1.1% annual increase, the total number of personal watercraft would be reduced by 60% compared to alternative A. The pattern of PWC use in Bird Island Basin would be one 15-minute round trip. Impacts on air quality are presented in Table 27.

TABLE 27: PWC EMISSIONS AND HUMAN HEALTH IMPACT LEVELS, ALTERNATIVE B

	CO		PM_{10}		HC		NO_x	
	2004	2014	2004	2014	2004	2014	2004	2014
Annual Emissions (tons/year)	0.55	0.61	0.001	0.001	0.05	0.04	0.01	0.01
Impact Level	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Adverse impacts related to PWC use in 2004 would be negligible for CO, PM_{10}, HC, and NO_x. As a result of cleaner engines, impacts to human health in 2014 would remain negligible for CO, PM_{10}, HC, and NO_x, even though the number of personal watercraft would increase.

As carbureted, two-stroke engines were converted to cleaner engines, some increase in PAH emissions could occur related to two-stroke direct-injection engines (Kado et al. 2000). However, these increases would be offset by the reduction in PAHs that would occur with the conversion to four-stroke engines. The human health risk from PAHs would be negligible in 2004 and 2014.

Cumulative Impacts. As described for alternative A, other motorized watercraft emissions were assessed quantitatively in combination with PWC emissions, taking into consideration regional and local air pollution sources and a 1.1% annual increase in all boat numbers (see Table 28).

TABLE 28: PWC AND MOTORIZED BOAT EMISSIONS AND HUMAN HEALTH IMPACT LEVELS, ALTERNATIVE B

	CO		PM_{10}		HC		NO_x	
	2004	2014	2004	2014	2004	2014	2004	2014
Annual Emissions (tons/year)	57	64	1.3	1.4	9.7	9.8	2.1	2.4
Impact Level	Minor	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Cumulative CO impact levels would be minor in both 2004 and 2014. Emission rates of HC, PM_{10} and NO_x would increase slightly from 2004 to 2014 but would remain negligible in both years. This alternative would maintain existing air quality conditions. Additional reductions would occur following the anticipated implementation of EPA standards designed to cover a wider range of engine types. The relative remoteness of this location and its coastal situation with prevailing onshore winds mean that there would be minimal contribution from other industrial or commercial sources of pollutants.

Conclusion. Allowing PWC use in the Bird Island Basin area only would result in negligible impacts to air quality through 2014, and emissions would be reduced slightly compared to alternative A because PWC use would be restricted to this one location in the national seashore. The risk from PAHs would also be negligible through 2014.

Cumulative emission levels for all motorized watercraft through 2014 would be minor for CO and negligible for PM_{10}, HC, and NO_x.

This alternative would not result in impairment of air quality.

IMPACT TO AIR QUALITY RELATED VALUES FROM PWC POLLUTANTS

Impacts on environmental resources and values include visibility and biological resources (specifically, ozone effects on plants) that may be affected by airborne pollutants emitted from personal watercraft and other sources. These pollutants include ozone, nitrogen oxides, and particulate matter.

$PM_{2.5}$ as a fraction of particulate matter is evaluated for visibility impairment. To assess the impact of ozone on plants, the five-year ozone index value was used. This value is represented as SUM06 ozone

measured in ppm-hours. The SUM06 values represent the overall condition of the area due to regional emissions of ozone precursor chemicals, and consequent formation of ozone. Local park-specific data were used to assess area specific ozone effects, when available.

	Activity Analyzed		Current Air Quality
Negligible:	Emissions would be less than 50 tons/year for each pollutant.	**and**	There are no perceptible visibility impacts (photos or anecdotal evidence); **and** there is no observed ozone injury on plants; **and** SUM06 ozone is less than 12 ppm-hrs.
Minor:	Emissions would be less than 100 tons/year for each pollutant.	**and**	SUM06 ozone is less than 15 ppm-hrs.
Moderate:	Emissions would be greater than 100 tons/year for any pollutant. **or** Visibility impacts from cumulative PWC emissions would be likely (based on past visual observations).	**or**	Ozone injury symptoms are identifiable on plants, **and** SUM06 ozone is less than 25 ppm-hrs.
Major:	Emissions would be equal to or greater than 250 tons/year for any pollutant. **or** Visibility impacts from cumulative PWC emissions would be likely (based on modeling or monitoring).	**and**	Ozone injury symptoms are identifiable on plants. **or** SUM06 ozone is greater than 25 ppm-hrs.

Impairment: Air quality related impacts would have a major adverse effect on park resources and values. In addition, impacts would

contribute to deterioration of the park's air quality to the extent the park's purpose could not be fulfilled as established in its enabling legislation; or

affect resources key to the park's natural or cultural integrity or opportunities for enjoyment; or

affect the resource whose conservation is identified as a goal in the park's general management plan or other park planning documents.

According to the Gulf Coast Network in their report, "Assessing the Risk of Foliar Injury from Ozone on Vegetation in Parks in the Gulf Coast Network," the ozone level for Padre Island National Seashore is in the range of 5 to 14 ppm-hr, and the risk of foliar ozone injury to plants is low (NPS 2004a). The ozone values were estimated by kriging, a statistical interpolation process that uses ozone data from nearby monitoring sites to estimate data for the point of interest (NPS 2004a).

Impacts of the No-Action Alternative — Continue to Prohibit PWC Use

Analysis. PWC use would be continue to be banned. Impact levels for visibility in both 2004 and 2014 are predicted to be negligible, as emissions of $PM_{2.5}$ from personal watercraft within the national seashore would be zero.

Cumulative Impacts. The cumulative impact analysis includes effects from other motorized watercraft use, taking into consideration national use trends, as well as current and future emission levels. $PM_{2.5}$ emissions would be below 50 tons/year for 2004 and 2014, resulting in negligible impacts to visibility from all motorized watercraft (see Table 29). There would likely be a minor cumulative adverse impact for ozone exposure in 2004 based on background data, which indicate that SUM06 ozone values would be in the range of 5 to 14 ppm-hrs. Vegetation injury is not documented or predicted from ozone exposure in the area. Taking into account these factors, air quality impact level for ozone exposure would be minor and adverse in 2004 and 2014, and overall air quality related impacts are predicted to be minor.

TABLE 29: AIR QUALITY RELATED IMPACTS FROM PWC AND OTHER WATERCRAFT EMISSIONS, NO-ACTION ALTERNATIVE

Air Quality Related	Emission Level (tons/year)/ Local Ozone Data		Visibility Threshold / SUM06 Index Value*		Impact Level	
Value (indicator)	2004	2014	2004	2014	2004	2014
Visibility ($PM_{2.5}$)	1.3	1.4	No perceptible visibility impacts	No perceptible visibility impacts	Negligible	Negligible
Ozone injury to plants (injury symptoms and ozone monitoring data)	No park-specific effects documented	No park-specific effects predicted	SUM06 index value: 5–14 ppm-hrs	Similar to 2004	Minor	Minor

* NPS 2004a.

Conclusion. Under the no-action alternative there would be no impacts to air quality related values from PWC use through 2014.

On a cumulative basis and considering the combined predicted effects on visibility and vegetation, there would be an overall minor impact level to air quality related values from all motorized watercraft emissions through 2014.

This alternative would not impair air quality related values.

Impacts of Alternative A — Reinstate PWC Use As Previously Managed (before April 22, 2002)

Analysis. Under this alternative PWC use would be reinstated and managed as it was before April 22, 2002. PWC numbers in 2004 and 2014 were based on use in 2002 with a predicted 1.1% annual increase. Personal watercraft would be allowed to use both the Bird Island Basin and the gulf side of the national seashore. The impacts of PWC use within the national seashore are presented in Table 30.

TABLE 30: AIR QUALITY RELATED IMPACTS FROM PWC EMISSIONS, ALTERNATIVE A

Air Quality Related	Emission Level (tons/year)/ Local Ozone Data		Visibility Threshold / SUM06 Index Value*		Impact Level	
Value (indicator)	2004	2014	2004	2014	2004	2014
Visibility ($PM_{2.5}$)	0.02	0.01	No perceptible visibility impacts	No perceptible visibility impacts	Negligible	Negligible
Ozone injury to plants (injury symptoms and ozone monitoring data)	No park specific effects documented	No park specific effects predicted	SUM06 index value: 5–14 ppm-hrs	Similar to 2004	Minor	Minor

* NPS 2004a.

Impact levels for visibility in both 2004 and 2014 would be negligible, as emissions of $PM_{2.5}$ would be less than 50 tons/year. The background air quality as indicated by SUM06 ozone data show ozone to be between 5 and 14 ppm-hrs, which indicates a minor regional impact level. Vegetation injury is not documented or predicted from ozone exposure in the area. Taking into account these factors, air quality impact levels for ozone exposure would be minor in 2004 and 2014 and overall air quality related impacts are predicted to be minor.

Cumulative Impacts. The cumulative impact analysis includes other motorized watercraft use, taking into consideration national use trends, as well as current and future emission levels. There would be a negligible impact to visibility from all PWC and motorized boat use, as $PM_{2.5}$ emissions would be below 50 tons/year for 2004 and 2014 (see Table 31). There would likely be minor cumulative adverse impact levels for ozone exposure for 2004 based on SUM06 ozone values, which are predicted to be in the range of 5 to 14 ppm-hrs, and no perceptible vegetation effects.

TABLE 31: AIR QUALITY RELATED IMPACTS FROM PWC AND OTHER WATERCRAFT EMISSIONS, ALTERNATIVE A

Air Quality Related Value (indicator)	Emission Level (tons/year)/ Local Ozone Data		Visibility Threshold / SUM06 Index Value*		Impact Level	
	2004	2014	2004	2014	2004	2014
Visibility ($PM_{2.5}$)	1.3	1.4	No perceptible visibility impacts	No perceptible visibility impacts	Negligible	Negligible
Ozone injury to plants (injury symptoms and ozone monitoring data)	No park-specific effects documented	No park-specific effects predicted	SUM06 index value: 5–14 ppm-hrs	Similar to 2004	Minor	Minor

* NPS 2004a.

Conclusion. Under alternative A there would be negligible impacts to visibility from PWC use through 2014, and minor adverse impacts from ozone exposure through 2014, based on SUM06 index values. The overall impact to air quality related values from PWC use would be minor.

On a cumulative basis there would be an overall minor impact to air quality related values from all motorized watercraft emissions through 2014.

This alternative would not result in the impairment of air quality related values.

Impacts of Alternative B — Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. Under this alternative PWC use would be reinstated only in the Bird Island Basin boat channel area but not on the gulf side of the national seashore. PWC numbers reflect a predicted 1.1% annual increase, using 2002 as the base year. The impacts of PWC use in the Bird Island Basin are presented in Table 32.

TABLE 32: AIR QUALITY RELATED IMPACTS FROM PWC EMISSIONS, ALTERNATIVE B

Air Quality Related Value (indicator)	Emission Level (tons/year)/ Local Ozone Data		Visibility Threshold / SUM06 Index Value*		Impact Level	
	2004	2014	2004	2014	2004	2014
Visibility ($PM_{2.5}$)	0.001	0.001	No perceptible visibility impacts	No perceptible visibility impacts	Negligible	Negligible
Ozone injury to plants (injury symptoms and ozone monitoring data)	No park-specific effects documented	No park-specific effects anticipated	SUM06 index value: 5–14 ppm-hrs	Similar to 2004	Minor	Minor

* NPS 2004a.

Impacts on visibility from PWC use would be negligible in 2004 and 2014, and ozone impacts would be minor, based on a predicted SUM06 values in the range of 5 to 14 ppm-hrs.

Cumulative Impacts. The cumulative impact analysis includes other motorized watercraft use, taking into consideration national use trends, as well as current and future emission levels. There would be negligible impact levels to visibility from personal watercraft and from all motorized boats, as $PM_{2.5}$ emissions would be below 50 tons/year for 2004 and 2014 (see Table 33). There would likely be minor cumulative adverse impact levels for ozone exposure in 2004 and 2014 based on SUM06 ozone values in the range predicted to be in the range of 5 to 14 ppm-hours; no perceptible vegetation effects have been identified.

TABLE 33: AIR QUALITY RELATED IMPACTS FROM PWC EMISSIONS AND MOTORIZED BOATS, ALTERNATIVE B

Air Quality Related Value (indicator)	Emission Level (tons/year)/ Local Ozone Data		Visibility Threshold / SUM06 Index Value*		Impact Level	
	2004	2014	2004	2014	2004	2014
Visibility ($PM_{2.5}$)	1.3	1.4	No perceptible visibility impacts	No perceptible visibility impacts	Negligible	Negligible
Ozone injury to plants (injury symptoms and ozone monitoring data)	No park-specific effects documented	Unknown	SUM06 index value: 5–14 ppm-hrs	Similar to 2004	Minor	Minor

* NPS Air Resources Division.

Conclusion. Under alternative B there would be a negligible impact to visibility from personal watercraft through 2014 and a minor adverse impact from ozone exposure through 2014. The overall impact to air quality related values from PWC use would be minor.

On a cumulative basis there would be a negligible impact to visibility and a minor impact from ozone exposure through 2014.

This alternative would not impair air quality related values.

SOUNDSCAPES

The primary soundscape issue relative to PWC use at Padre Island National Seashore is that other visitors, especially those who visit the park for its solitude and remoteness, may perceive PWC sound as an intrusion or nuisance, thereby disrupting their experiences. This disruption is generally short term because PWC users travel along the shore. However, if PWC use increased and concentrated at populated beach areas, related noise could become more of an issue, particularly during certain times of the day. Additionally, visitor sensitivity to PWC noise varies from down-island users (more sensitive) to boaters in popular areas of the park (less sensitive).

GUIDING REGULATIONS AND POLICIES

The national park system includes some of the quietest places on earth, as well as a rich variety of sounds intrinsic to park environments. These intrinsic sounds are recognized and valued as a park resource in keeping with the NPS mission (NPS *Management Policies 2001,* sec. 1.4.6; 2000c), and are referred to as the park's natural soundscape. The natural soundscape, sometimes called natural quiet, is the aggregate of all the natural sounds that occur in parks, absent human-caused sound, together with the physical capacity for transmitting natural sounds (NPS *Management Policies 2001,* sec. 4.9; 2000c). It includes all of the sounds of nature, including such "non-quiet" sounds as birds calling, waterfalls, thunder, and waves breaking against the shore. Some natural sounds are also part of

the biological or other physical resource components of parks (e.g., animal communication, sounds produced by wind in trees, thunder, and running water).

The NPS *Management Policies 2001* require the restoration of degraded soundscapes to the natural condition whenever possible, and the protection of natural soundscapes from degradation due to noise (undesirable human-caused sound) (2000c, sec. 4.9). The National Park Service is specifically directed to "take action to prevent or minimize all noise that, through frequency, magnitude, or duration, adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified as being acceptable to, or appropriate for, visitor uses at the sites being monitored" (2000c, sec. 4.9). Overriding all of this is the fundamental purpose of the national park system, established in law, which is to conserve park resources and values (16 USC 1 et seq.). NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values (2000c, sec 1.4.3).

Noise can adversely affect park resources, including but not limited to natural soundscapes. It can directly impact resources by modifying or intruding on the natural soundscape, and indirectly impact them by interfering with sounds important for animal communication, navigation, mating, nurturing, predation, and foraging functions.

Noise can also adversely impact park visitor experiences. The term "visitor experience" can be defined as the opportunity for visitors to experience a park's resources and values in a manner appropriate to the park's purpose and significance, and appropriate to the resource protection goals for a specific area or management zone within that park. In other words, visitor experience is primarily a resource-based opportunity appropriate to a given park or area within a park, rather than a visitor-based desire. Noise impacts to visitor experience can be especially adverse when management objectives for visitor experience include solitude, serenity, tranquility, contemplation, or a completely natural or historical environment. Management objectives (also called desired conditions) for resource protection and visitor experience are derived through well-established public planning processes from law, policy, regulations, and management direction applicable to the entire national park system and to each specific park unit.

Visitor uses of parks will only be allowed if they are appropriate to the purpose for which a park was established, and if they can be sustained without causing unacceptable impacts to park resources or values (2000c, sec. 8.1 and 8.2). While the fundamental purpose of all parks also includes providing for the "enjoyment" of park resources and values by the people of the United States, enjoyment can only be provided in ways that leave the resources and values unimpaired for the enjoyment of future generations (NPS 2000c, sec. 1.4.3). Unless mandated by statute, the National Park Service will not allow visitors to conduct activities that, among other things, unreasonably interfere with "the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park" (2000c, sec. 8.2). While many visitor activities are allowed or even encouraged in parks consistent with the above policies, virtually <u>all</u> visitor activities are limited or restricted in some way (e.g., through carrying capacity determinations, implementation plans, or visitor use management plans), and on a park- or area-specific basis, some visitor activities are not allowed at all.

The degree to which a given activity (e.g., PWC use) is consistent with, or moves the condition of a resource or a visitor experience toward or away from a desired condition, is one measure of the impact of the activity.

The federal regulation pertaining to noise abatement for boating and water use activities (36 CFR 3.7) prohibits operating a vessel on inland waters "so as to exceed a noise level of 82 decibels measured at a distance of 82 feet (25 meters) from the vessel" and specifies that testing procedures to determine such noise levels should be in accordance with or exceed those established by the Society of Automotive Engineers (SAE) in "Exterior Sound Level Measurement Procedure for Pleasure Motorboats" (J34). This SAE procedure specifies that sound level measurements be taken 25 meters perpendicular to the line of travel of the vessel at full throttle (SAE 2001). It is important to note that this NPS regulation and the SAE procedure were developed for enforcement purposes, not impact assessment purposes. The level in the regulation does not imply that there are no impacts to park resources or visitor experiences at levels below 82 dB; it just indicates that noise levels from vessels legally operating on NPS waters will be no "louder" than 82 dB. As explained elsewhere in this document, a single decibel value does not provide much information for impact assessment purposes.

Natural sounds at Padre Island National Seashore include wind and waves, and sources of noise besides motorcraft include recreational activities, vehicular traffic, and oil and gas production.

In addition to NPS policies, Texas has adopted legislation that regulates PWC operation. The following elements of Texas PWC regulations have impacts on soundscapes in the national seashore:

- Timing restrictions — Personal watercraft cannot be used between sunset and sunrise.
- Location restrictions — Personal watercraft cannot operate within 50 feet of another vessel, platform, person, object, or shore except at headway speed without creating a swell or wake.

METHODOLOGY AND ASSUMPTIONS

The methodology used to assess PWC-related noise impacts in this document is consistent with NPS *Management Policies 2001* (2000c)*, Director's Order #47: Soundscape Preservation and Noise Management* (NPS 2000b)*,* and the methodology being developed for the reference manual for *Director's Order #47*. Specific factors at Padre Island related to context, time, and intensity are discussed below and are then integrated into a discussion of the impact thresholds used in this analysis.

Context: Existing background noise levels at Padre Island National Seashore are influenced by wave action, wind, oil and gas production, visitor activities, other boats, and vehicle traffic. Measured sound levels range from 30 dBA to 63 dBA (see the "Affected Environment" chapter). These levels are considered relatively quiet.

Soundscape disturbances in Padre Island National Seashore occur closest to the beaches in areas near waves, swimmers, and vehicles. Texas regulations mandate that PWC users must operate at such speed as to not cause a swell or wake when within 50 feet of the shoreline. Disturbances are most likely to occur when PWC users do not follow state regulations.

Time Factors: *Time Periods of Interest* — Prior to the ban on PWC use that started on April 22, 2002, personal watercraft were used primarily during midday in the summer. Use was lower in spring and fall, and decreased to almost nothing in winter. State law restricts use to the hours between sunrise and sunset. Use generally stopped during periods of inclement weather (e.g., cold and thunderstorms).

Time periods of greater sensitivity to noise impacts include sunset, sunrise, and night time when visitors are in camp, and when wildlife may be more active.

Duration and Frequency of Occurrence of Noise Impacts — In areas of PWC use at Bird Island Basin, noise was occasional, usually lasting a few minutes until the PWC user left the

shoreline. Along the gulf shore, noise was also occasional due to limited PWC use, increasing at times of concentrated recreational use. An estimated five PWC operators use the park on a high-use summer day. The majority of personal watercraft were observed along the gulf side of the park and were used for an average of three hours each period of recreational use. Very few watercraft used Bird Island Basin, and use was generally limited to 5–10 minutes within park waters.

Intensity: Some literature states that all recently manufactured watercraft emit fewer than 80 dB at 50 feet from the vessel, while other sources attribute levels as high as 102 dB without specifying distance.

Noise limits established by the National Park Service are 82 dB at 82 feet. PWC noise travels in relationship to the speed of the craft, the distance from shoreline, and other influences. Outdoor noise levels usually decrease with increasing distance from the source because of geometrical spreading of the noise over a bigger surface and absorption of the noise by the atmosphere and the ground (Brüer & Kjaer 2002). According to Komanoff and Shaw (2000), PWC noise dissipates by 5 dBA across water for each doubling of distance from a 20-foot circle around the source and by 6 dBA across land. A PWC engine in the water produces 80 dB of sound within a 20-foot radius, and 73 dB within a 50-foot radius (Komanoff and Shaw 2000). This is close to estimates provided by the Personal Watercraft Industry Association (PWIA 2002a), which state that one PWC operating 50 feet from an on-shore observer is heard at 71 dBA, and two would be heard at 74 dBA.

The National Park Service contracted for noise measurements of personal watercraft and other motorized vessels in 2001 at Glen Canyon National Recreation Area (Harris Miller Miller & Hanson 2002). The results show that maximum PWC noise levels at 50 feet ranged from 68 to 76 dBA. Noise levels for other motorboat types measured during that study ranged from 65 to 86 dBA at 50 feet. However, PWC-generated noise may be more disturbing due to rapid changes in acceleration and direction of noise than noise from a constant source at 90 dB (EPA 1974, cited in Izaak Walton League 1999).

Vegetation can also decrease noise. According to the U.S. Department of Transportation (2000), vegetation must be so high, wide, and dense that it cannot be seen through, and must be at least 61 meters (186 feet) wide to reduce noise by 10 dB. Padre Island has shoreline vegetation at the dunes line, but not along the beach where visitors are concentrated; therefore, vegetation is not an attenuating factor. Based on Komanoff and Shaw's more conservative projections, PWC noise levels at Padre Island would reach approximately 39 dBA (which is quieter than the sound of bird calls) at 3,200 feet (slightly less than 0.75 mile) from the source of the sound.

In response to public complaints, the PWC industry has employed new technologies to reduce sound by about 50% to 70% on 1999 and newer models (Sea-Doo® 2000; Hayes 2002). Additionally, by 2006 the EPA emission standards will reduce PWC noise, in association with improvements to engine technology (EPA 1996b).

Context, time, and intensity together determine the level of impact for an activity. For example, noise for a certain period and intensity would be a greater impact in a highly sensitive context, and a given intensity would result in a greater impact if it occurred more often, or for longer duration. It is usually necessary to evaluate all three factors together to determine the level of noise impact. In some cases an analysis of one or more factors may indicate one impact level, while an analysis of another factor may indicate a different impact level, according to the criteria below. In such cases, best professional judg-

ment based on a documented rationale must be used to determine which impact level best applies to the situation being evaluated.

To estimate the relative impacts of PWC use at Padre Island, the following methodology was applied:

1. National literature was used to estimate the average decibel levels of personal watercraft.
2. Areas of shoreline use by other visitors were identified in relation to where PWC users launch and operate offshore. Personal observation from park staff and monthly use reports were used to identify these areas, as well as to determine the number of personal watercraft and the time of use.
3. Other considerations, such as topography and prevailing winds, were then used to identify areas where PWC noise levels could be exacerbated or minimized.

Sound levels generated by motorized craft using the national seashore are expected to affect recreational users differently. For example, visitors participating in less sound-intrusive activities, such as camping, would likely be more adversely affected by PWC noise than another PWC or motorboat user. Therefore, impacts to soundscapes must take into account the effect of noise levels on different types of recreational users within the impact analysis area. The following is a list of other considerations for evaluating sound impacts:

- The estimated typical maximum number of personal watercraft that operated in 2004 was two at Bird Island Basin and three on the gulf side of the seashore. Personal watercraft would be in operation for only a portion of each day (approximately 5 to 10 minutes in Bird Island Basin and three hours average along the gulf shore for recreational users).
- PWC operators within the Bird Island Basin boat channel would be required to travel at a flat-wake speed until they reached the second set of buoys; noise levels from this activity would be low and for only 5 to 10 minutes. Flat-wake restrictions also exist where PWC use would be permitted along the gulf shoreline.
- Ambient noise levels at most locations include wind, waves, other visitors, vehicles, and other motorboats (only within Laguna Madre). It is estimated that approximately 128 motorboats were in operation on a high-use day in Bird Island Basin and one on the gulf side in 2004. These numbers would be assumed to increase to 143 and two, respectively, in 2014.

All of these factors combine to lessen the overall impact of noise from PWC use.

IMPACT ANALYSIS AREA

The impact analysis area for soundscapes is the Bird Island Basin launch area and the gulf shoreline, extending inland 0.75 mile. This is based on a determination that a visitor would have to be approximately 0.75 mile from the shore to experience natural quiet when a PWC user was passing at full throttle.

IMPACT TO VISITORS FROM NOISE GENERATED BY PERSONAL WATERCRAFT

After estimating the number of personal watercraft, the range of relative noise generated by them, and the potential areas where noise concentrations and effects on other visitors may be of concern, the following thresholds were used as indicators of the magnitude of impact for each of the PWC management alternatives:

Negligible: Natural sounds would prevail; motorized noise would be very infrequent or absent, and mostly immeasurable.

Minor: Natural sounds would predominate in areas where management objectives call for natural processes to predominate, with motorized noise infrequent at low levels. In areas where motorized noise is consistent with park purpose and objectives, motorized noise could be heard frequently throughout the day at moderate levels, or infrequently at higher levels, and natural sounds could be heard occasionally.

Moderate: In areas where management objectives call for natural processes to predominate, natural sounds would predominate, but motorized noise could occasionally be present at low to moderate levels. In areas where motorized noise is consistent with park purpose and objectives, motorized noise would predominate during daylight hours and would not be overly disruptive to noise-sensitive visitor activities in the area; in such areas, natural sounds could still be heard occasionally.

Major: In areas where management objectives call for natural processes to predominate, natural sounds would be impacted by human noise sources frequently or for extended periods of time at moderate intensity levels (but no more than occasionally at high levels). In areas where motorized noise is consistent with park purpose and zoning, the natural soundscape would be impacted most of the day by motorized noise at low to moderate intensity levels, or more than occasionally at high levels; motorized noise would disrupt conversation for long periods of time and/or make the enjoyment of other activities in the area difficult; natural sounds would rarely be heard during the day.

Impairment: The level of noise associated with PWC use would be heard consistently and would be readily perceived by other visitors throughout the day, especially in areas where such noise would potentially conflict with the intended use of that area. In addition, these major, adverse impacts to park resources and values would

contribute to deterioration of the park's soundscape to the extent that the park's purpose could not be fulfilled as established in its enabling legislation;

affect resources key to the park's natural or cultural integrity or opportunities for enjoyment; or

affect the resource whose conservation is identified as a goal in the park's general management plan or other park planning documents.

Impacts of the No-Action Alternative — Continue to Prohibit PWC Use

Analysis. Continuing to ban PWC use would result in no impacts on shoreline visitors in park areas because there would be no noise from personal watercraft.

Cumulative Impacts. Noise sources within Padre Island National Seashore include wave action, wind, boats, oil and gas operations, vehicles driving on the beach, and other visitor activities. While there would be no contribution to noise levels from PWC use, other motorized boating activities would continue to cause minor adverse noise impacts throughout the day. The highest level of impact from boating activities would occur near the Bird Island Basin boat launch.

Numerous variables affect the perceived noise levels of other boats, including the number of boats and their proximity to other park users. Additionally, motorboat activity is an expected occurrence at Bird Island Basin and is generally acceptable to park visitors. The park's proposed implementation of non-propeller areas, motorized boating areas, non-motorized boating areas, and kayak trails would help concentrate motorized noise in one location, while creating zones of relative quiet for users of non-motorized watercraft, reducing noise impacts on natural soundscapes. On a cumulative basis boating noise would continue to have a negligible to minor adverse impact because it would be heard

occasionally throughout the day. Noise would be temporary, occurring during the period of activity, but impacts would be short and long term because they would continue in the foreseeable future.

Other actions that would affect soundscapes within the national seashore include existing and expanded oil and gas operations. Additional oil and gas operations are planned by BNP Petroleum Corporation within the first 13 miles of South Beach along the Gulf of Mexico shoreline. Although the drilling wells would be located 900 feet west of the beach, visitors would be subjected to approximately 13 oil and gas trucks driving along the beach each day (NPS 2002b). This increased vehicular activity would increase noise levels and detract from the environment of isolation and solitude that many visitors expect at down-island locations.

Conclusion. Continuing to prohibit PWC use at Padre Island would have no impact on park soundscapes.

Cumulative noise impacts from motorboats and other visitor activities would be adverse and negligible to minor over the short and long term, particularly near the Bird Island Basin boat launch and the gulf beaches, but there would be no contribution to noise from PWC use within Padre Island.

This alternative would not result in an impairment of soundscapes.

Impacts of Alternative A — Reinstate PWC Use as Previously Managed (before April 22, 2002)

Analysis. As stated in the assumptions, approximately five personal watercraft used the park on a high-use day in 2004; this number would increase to seven by 2014, assuming a 1.1% annual increase. PWC use has historically been most common on the gulf side below the 5-mile marker (approximately 60% of total PWC use within the park), and less common in Bird Island Basin (approximately 40% of total PWC use within the park).

Along the gulf shoreline, waves, wind, and vehicle traffic compete with PWC noise. No flat-wake restrictions exist along the gulf shoreline, and PWC use would generally be confined to the surf zone; therefore, noise could negatively impact visitors fishing, camping, or sunbathing along the shoreline. The noise from PWC use along the gulf beaches, particularly during high-speed maneuvers such as jumping waves and other nearshore maneuvers, could be perceived by other visitors as irritating and intrusive. However, in most cases personal watercraft would be dispersed along the shoreline and would operate for short periods of time. Locations having minor adverse impacts would be areas of concentrated use (e.g., at Big Shell and Little Shell beaches), where PWC sounds occur along with noise from wind, waves, other visitors, and automobiles.

At 50 feet from the shoreline personal watercraft generate less than 75 dB, with two personal watercraft generating a total 78 dB (Komanoff and Shaw 2000), which is below the noise limit established by the Park Service (82 dB at 82 feet). At 200 feet from the shoreline the sound level would decrease to just under 68 dB, which is an acceptable level of sound for national seashores per federal noise abatement measures (FHWA 2000).

At Bird Island Basin, waves, wind, and motorboats provide other sources of noise that can be louder than PWC-generated noise. The flat-wake restriction in the Bird Island Basin boat channel (to the second set of buoys) would reduce PWC-generated noise in the immediate vicinity of the shoreline. Park staff estimate that each PWC user would remain in this area for a total of 10 minutes at idle speeds and 5 minutes at full throttle while they were traveling to the Intracoastal Waterway. Due to the small number of personal watercraft and their short time in the Bird Island Basin area, PWC noise would have a negligible to minor adverse impact in this location.

Visitors who camp along the gulf shoreline, including the 55-mile down-island portion of the seashore, may be more sensitive to sound levels and PWC activity. PWC use would generally have negligible adverse impacts to the soundscape because noise would be generated only during daytime hours, when many campers would likely be participating in activities at other locations. Non-boaters who remained at campsites during the day could be negatively impacted by PWC noise.

Some four-stroke PWC models are reported to be quieter than their two-stroke counterparts (Sea-Doo® 2001b; Yamaha Motor 2001); some reports use 5 dBA as the reduction in noise levels that can be obtained with the new equipment (Komanoff and Shaw 2000). Over the long term, the use of new PWC models would help lessen noise levels.

Overall, noise from personal watercraft would result in short-term, negligible to moderate, adverse impacts at certain locations on days when use was relatively heavy. Impacts would be negligible when use was infrequent and distanced from other park users. Negligible to minor impacts could occur at Bird Island Basin where other boat use and associated noises are common. Minor to moderate impacts could occur in areas of concentrated use, where the level of noise could be relatively high. This would occur mainly where PWC use would conflict with other quieter uses, particularly down-island where visitors expect more opportunities for solitude. Over the long term, impacts could be reduced as a result of new technologies to reduce sound levels.

Cumulative Impacts. In addition to noise from personal watercraft, other noise sources within Padre Island National Seashore include wave action on the shore, wind, other boats, oil and gas operations, vehicles driving on the beach, and other visitor activities, as described for the no-action alternative. Other motorized boating activities at Bird Island Basin are capable of generating noise levels higher than personal watercraft due to a higher number of boats and their ability to operate within the entire Laguna Madre. Many motorboats can generate higher sound levels than personal watercraft, but they are generally not perceived to be as annoying due to their more typical steady rate of speed and direction.

The gulf beaches had the highest ambient noise levels in the park due to wind, waves, other visitors, and automobiles driving on the beach. Proposed oil and gas operations (as described in the no-action alternative) and the resulting increase in vehicular traffic within the first 13 miles of South Beach would contribute additional noise along the gulf beaches. These sources of noise, coupled with the addition of PWC noise, would have a minor to moderate adverse impact on visitors expecting solitude and open wildness, particularly down-island.

Numerous variables affect the perceived noise levels of other boats, just as they do for personal watercraft, including the number of boats and their proximity to other park users. Additionally, motorboat activity is an expected occurrence at Bird Island Basin and is generally more acceptable to park visitors. As noted under the no-action alternative, the park is proposing implementation of non-propeller areas, motorized boating areas, non-motorized boating areas, and kayak trails. Such restrictions would provide a beneficial impact to soundscapes. On a cumulative basis PWC and boating noise would continue to have negligible to minor adverse impacts because it would be heard occasionally throughout the day. All impacts would be temporary, since noise incidents would usually be of limited duration, but motorized use would occur over the short and long term.

Conclusion. Noise generated by PWC use would have adverse, negligible to moderate impacts over the short and long term, depending on the location within the park. Impact levels would be related to the number of personal watercraft operating in concentrated areas, as well as the sensitivity of other

visitors. Over the long term PWC noise levels would be reduced with the introduction of newer engine technologies.

Cumulative noise impacts from personal watercraft, motorboats, oil and gas operations, and other visitors would be adverse and negligible to moderate in some locations over the short and long term because these sounds would be heard occasionally throughout the day. For the most part, natural sounds would still predominate at most locations within the national seashore.

This alternative would not result in an impairment of soundscapes.

Impacts of Alternative B — Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. PWC use would be allowed only in the Bird Island Basin boat channel for direct access to the Intracoastal Waterway, as allowed prior to the April 22, 2002, ban. PWC use would not be permitted along the gulf shore. Impacts would be similar to those described in alternative A related to the Bird Island Basin area. Due to the small number of PWC users, the short amount of time they were in the Bird Island Basin area, and other types of visitor activities at this location (especially heavy boat use), noise from personal watercraft would have a short- and long-term, negligible to minor, adverse impact.

Cumulative Impacts. Cumulative impacts at Bird Island Basin would be similar to those described under alternative A for the Bird Island Basin area only. Other noise sources at Bird Island Basin include wave action on the shore, wind, other boats, and other visitor activities. Other motorized boating activities at Bird Island Basin are capable of generating noise levels higher than personal watercraft due to their number and ability to operate within the entire Laguna Madre. Many motorboats can generate higher sound levels than personal watercraft, but they are generally not perceived to be as annoying due to their more typical steady rate of speed and direction.

Numerous variables affect the perceived noise levels of other boats, just as they do for personal watercraft, including the number of boats and their proximity to other park users. Additionally, motorboat activity is an expected occurrence at Bird Island Basin and is generally more acceptable to park visitors. Implementation of proposed non-propeller areas, motorized boating areas, non-motorized boating areas, and kayak trails would provide a beneficial impact to soundscapes. The cumulative effect of PWC and boating noise would have a negligible to minor adverse impact because it would be heard occasionally throughout the day. All impacts would be temporary, since noise (especially from PWC) would usually be of limited duration, but they would occur over the short and long term.

Conclusion. Noise generated by PWC use would have adverse, short- and long-term, negligible to minor impacts in Bird Island Basin. Impact levels would be related to the number of personal watercraft operating in the area, as well as the sensitivity of other visitors. Over the long term PWC noise levels would be reduced with the introduction of newer engine technologies.

Cumulative noise impacts from personal watercraft, motorboats, and other visitors would be adverse and negligible to minor in Bird Island Basin over the short and long term because these sounds would be heard occasionally throughout the day. For the most part, natural sounds would still predominate at most locations within the national seashore.

This alternative would not result in an impairment of soundscapes.

SHORELINE AND SUBMERGED AQUATIC VEGETATION

Personal watercraft are able to access areas that other types of watercraft may not, which may cause direct disturbance to vegetation. Indirect impact to shoreline vegetation may occur through trampling if operators disembark and engage in activities on shore. In addition, PWC-created wakes may affect shorelines through erosion by wave action.

Personal watercraft are very maneuverable and can operate well in waters less than a foot deep. Since most PWC rides begin in shallow water, the process of getting started from a standstill results in a substantial amount of water being directed downward at high velocity, potentially disturbing the sediment and submerged aquatic vegetation (SAV) in shallow water areas. Disturbance of SAV beds diminishes their ecological value and productivity, affecting the entire ecosystem. As PWC users frequently operate in shallow areas in a repetitive manner, impacts on submerged aquatic vegetation can be severe. Potential direct impacts of PWC use include damage to plants through collision, the uprooting of submerged vegetation, and the alteration of natural sediments. Potential indirect impacts of PWC use include adverse effects on the growth and health of SAV beds as a result of increased turbidity, decreased available sunlight, and deposition of suspended sediment on plants.

GUIDING REGULATIONS AND POLICIES

According to NPS *Management Policies 2001,* natural shoreline processes, such as erosion, deposition, overwash, and shoreline migration (such as those found at Padre Island National Seashore), should continue without interference. Where the nature or rate of natural shoreline processes has been altered, the National Park Service is directed to identify alternatives for mitigating the effects of such activities or structures and for restoring natural conditions (NPS 2000c, sec. 4.8.1.1). The National Park Service must also comply with the provisions of Executive Order 11990, "Protection of Wetlands," which requires federal agencies to avoid short- and long-term adverse impacts associated with the destruction or modification of wetlands (which include submerged aquatic vegetation) whenever possible. The state also has a coastal management plan prepared in accordance with the Coastal Zone Management Act of 1972.

METHODOLOGY AND ASSUMPTIONS

PWC use has the potential to impact shoreline vegetation and submerged aquatic vegetation as a result of operation in shallow waters or adjacent to wetland habitats. Direct impacts resulting from collision or mechanical removal can occur. Potential indirect impacts include the deposition of suspended sediments on aquatic or submerged vegetation or modification of substrates. Impacts on shoreline vegetation associated with foot traffic adjacent to landing zones can also occur.

Primary steps in assessing impacts on shoreline vegetation and submerged aquatic vegetation were to determine (1) occurrence and location of vegetation in areas likely to be affected by management actions described in the alternatives, (2) current and future PWC use and distribution by alternative, (3) habitat impact or alteration caused by the alternatives, and (4) disturbance potential of the actions and the potential to affect shoreline or aquatic vegetation as a result of PWC activities. The information contained in this analysis was obtained from park staff and experts in the field, and by conducting literature review.

Potential impacts to submerged aquatic vegetation and to the shoreline itself (erosion that can affect shoreline communities) were evaluated based on the pattern of motorized watercraft use in Padre Island National Seashore, the nature of the shoreline and vegetation present, and the professional judgment and observations of the project team and members of the park staff. To assess the magnitude

of impacts from PWC use on shorelines and submerged aquatic vegetation, the following assumptions were made:

1. Most PWC users would operate their craft in a lawful manner and abide by state laws and the regulations.
2. PWC users would not land on any mudflats or other shorelines of the Laguna Madre except at docks and launch areas.
3. PWC use at Bird Island Basin would be very minimal, with only two PWC users on a typical high-use day.

IMPACT ANALYSIS AREA

The impact analysis area consists of the general Bird Island Basin area within park waters, where both personal watercraft and other motorized craft launch and return. The gulf coast is not included in the analysis because no SAV beds or other shoreline vegetation that could be affected by PWC use exists along the gulf beach, and wakes from boats or personal watercraft would be inconsequential in relation to erosional forces of winds and waves on the gulf coast.

IMPACT TO SHORELINE AND SUBMERGED AQUATIC VEGETATION FROM PWC USE

The following impact thresholds were established to describe the relative changes in shoreline vegetation under the various alternatives being considered:

Negligible: No shoreline vegetation or submerged aquatic vegetation communities are present in areas likely to be accessed by PWC; no impacts or impacts with only temporary effects are expected.

Minor: Shoreline vegetation or submerged aquatic vegetation communities are present, but only in low numbers. Occasional impacts on species or communities are expected, but with no impacts or limited impacts on the continued existence of the species or viable functioning communities within the national seashore.

Moderate: Shoreline vegetation or submerged aquatic vegetation communities are present in areas accessible by personal watercraft. Direct loss of vegetation or other effects are expected on an occasional basis, but are not expected to threaten the continued existence of the species or viable functioning communities in the national seashore.

Major: Shoreline vegetation or submerged aquatic vegetation communities are present in relatively high numbers in areas accessible by personal watercraft. Direct loss of vegetation or other effects are expected on a regular basis and could threaten continued survival of species or communities of species in the park.

Impairment: PWC use would contribute substantially to the deterioration of the shoreline or shallow water environment to the extent that the park's shoreline or submerged vegetation would no longer function as a natural system. In addition, these adverse major impacts on park resources and values would:

contribute to deterioration of these resources to the extent that the park's purpose could not be fulfilled as established in its enabling legislation;

affect resources key to the park's natural or cultural integrity or opportunities for enjoyment; or

affect the resource whose conservation is identified as a goal in the park's general management plan or other park planning documents.

Impacts of the No-Action Alternative — Continue to Prohibit PWC Use

Analysis. A continuation of the ban on PWC use within the national seashore would eliminate any potential impacts to shorelines or submerged aquatic vegetation through 2014.

Cumulative Impacts. Cumulative impacts to submerged aquatic vegetation would include those associated with use of boats and other recreational uses that could enter the shallow Laguna Madre waters, as well as dredging, oil and gas development. Wakes from other boats and natural heavy wave action during storms could cause shoreline erosion or stir up sediments, as can dredging activities. This can decrease sunlight penetration, coat submerged plant leaves with fine sediments, and reduce productivity. Propellers on boats that cross over SAV beds in shallow waters can cause propeller scarring that destroys leaves and belowground roots and rhizomes. Such scars can last several years if wave action leads to erosion and scour in the channel (Eleuterius 1987).

The park is currently re-marking the national seashore boundary to ensure that park visitors know when they have entered the park, which may aid in protecting submerged aquatic vegetation. Oil and gas operations can leak oils that can adversely affect submerged aquatic vegetation. Windsurfers who fall off their boards and stand in SAV beds would cause temporary disturbance in limited areas. There is some evidence that freshwater or nutrient inputs from wastewater discharges and other sources (e.g., leaky septic tanks) may be affecting seagrass species composition in the upper Laguna Madre near the mainland. In addition, effluent from the Whitecap Treatment Plant appears to be causing increased algal growth on seagrasses along the edge of the channel where effluent is discharged (NPS 2004b).

All of these effects on submerged aquatic vegetation would be mostly short term, localized, minor, and adverse, with the exception of propeller scarring, which can result in adverse, localized, long-term, minor impacts. Impacts to shorelines from boat wakes would be negligible to minor and adverse because most shoreline dynamics are controlled by winds and natural wave action during storm events. No perceptible changes to shorelines or to submerged aquatic vegetation community size, integrity, or continuity would be expected now or by 2014.

Conclusion. There would be no PWC-related impacts on shorelines and submerged aquatic vegetation.

Cumulative impacts from other uses in the Laguna Madre would be adverse, localized, short and long term, and negligible to minor except in areas of propeller scarring, potentially resulting in adverse, localized, long-term, minor impacts. The ban on PWC use would result in no overall vegetation impacts. There would be no perceptible changes to shoreline or submerged aquatic vegetation community size, integrity, or continuity through 2014.

This alternative would not result in an impairment of shoreline or submerged aquatic vegetation.

Impacts of Alternative A — Reinstate PWC Use as Previously Managed (before April 22, 2002)

Analysis. PWC use would be reinstated at Bird Island Basin and in the gulf coast. As previously mentioned, Bird Island Basin is the only area of concern for submerged aquatic vegetation and

shoreline vegetation. PWC users would be required to stay within the dredged channel leading to the Intracoastal Waterway. While most PWC users observe the requirements, there have been reports of PWC users crossing from the launch to the Laguna Madre and traveling over the SAV beds located on either side of the channel. Personal watercraft have also occasionally been observed in other areas of the Laguna Madre within park boundaries. Such activity could result in the sediments being stirred up and wake formation near the shoreline. If PWC users stopped and then quickly accelerated over an SAV bed, some scouring from jet wash could occur in these areas. Overall, because so few PWC users would be expected in the Bird Island Basin area, there would be localized, adverse, direct and indirect, negligible impacts to shoreline and submerged aquatic vegetation over the short and long term, with no perceptible changes in SAV community size, integrity, or continuity.

Cumulative Impacts. PWC use at Bird Island Basin would contribute very slightly to cumulative impacts to submerged aquatic vegetation and shoreline vegetation. The types of impacts and their sources would be the same as those described under the no-action alternative. Overall, cumulative impacts would be localized, adverse, short term, and negligible to minor, with adverse, localized, long-term impacts where submerged aquatic vegetation was scarred or damaged by propellers because recovery takes several years. Over a 10-year period, slight additional impacts would be expected due to the increase in boating and potential increase in oil and gas exploration in nearby areas; however, the cumulative impact intensity levels are expected to remain about the same.

Conclusion. PWC use would have adverse, localized, negligible impacts to shoreline or submerged aquatic vegetation over the short and long term. There would be no perceptible changes to submerged aquatic vegetation community size, integrity, or continuity, through 2014.

On a cumulative basis other activities would have much more effect on shoreline and submerged aquatic vegetation than would PWC use. Adverse impacts would be localized and negligible to minor over the short and long term except in areas of propeller scarring, where potential impacts could be adverse, localized, long term, and minor. Only minor additional adverse impacts would be expected in the future from a projected increase in boat numbers over time. There would be no perceptible changes to submerged aquatic vegetation community size, integrity, or continuity through 2014.

This alternative would not result in an impairment of shoreline or submerged aquatic vegetation.

Impacts of Alternative B — Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. Alternative B would restrict PWC use to the Bird Island Basin area; therefore, PWC impacts to shoreline and submerged aquatic vegetation would be the same as those described for alternative A, because the alternative A analysis did not include the gulf beaches, where no submerged aquatic vegetation exists.

Cumulative Impacts. On a cumulative basis impacts would be similar to those described under alternative A. Other activities would have much more effect on shoreline vegetation and submerged aquatic vegetation than PWC use. Impacts would be negligible to minor except in areas of propeller scarring, where adverse impacts could be localized, long term, and minor. Only minor additional impacts would be expected in the future from projected increases in boat numbers. There would be no perceptible changes to submerged aquatic vegetation community size, integrity, or continuity through 2014.

Conclusion. PWC use and activities would have adverse, localized, negligible impacts to shoreline vegetation and submerged aquatic vegetation over the short and long term. There would be no

perceptible changes to submerged aquatic vegetation community size, integrity, or continuity through 2014.

On a cumulative basis other activities would have much more effect on shoreline and submerged aquatic vegetation than would PWC use. Adverse impacts would be localized and negligible to minor over the short and long term except in areas of propeller scarring, where potential impacts could be adverse, localized, long term, and minor. Only minor additional adverse impacts would be expected in the future from a projected increase in boat numbers over time. There would be no perceptible changes to submerged aquatic vegetation community size, integrity, or continuity through 2014.

This alternative would not result in an impairment of shoreline or submerged aquatic vegetation.

WILDLIFE AND WILDLIFE HABITAT

Some research suggests that PWC use affects wildlife by interrupting normal activities, causing alarm or flight or the avoidance or degradation of habitat, and adversely affecting reproductive success. This is thought to be a result of a combination of PWC speed, noise, and ability to access sensitive areas, especially shallow-water depths.

Waterfowl and nesting birds are the most vulnerable to PWC use. Fleeing a disturbance created by PWC users may force birds to abandon eggs during crucial embryo development stages, prevent nest defense from predators, or contribute to stress and associated behavior changes.

Impacts to turtles and other listed threatened or endangered species are addressed below under "Threatened, Endangered, or Special Concern Species."

GUIDING REGULATIONS AND POLICIES

The NPS Organic Act of 1916, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the agency to mean that native animal life should be protected and perpetuated as part of a park's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible; otherwise they are protected from harvest, harassment, or harm by human activities. According to NPS *Management Policies 2001*, the restoration of native species is a high priority (sec. 4.1, 2000c). Management goals for wildlife include maintaining components and processes of naturally evolving national seashore ecosystems, including natural abundance, diversity, and the ecological integrity of plants and animals.

There are no additional federal, state, or local regulations or policies for wildlife and wildlife habitat at Padre Island National Seashore.

According to the "Superintendent's Compendium" (NPS 2003a), North Bird Island, South Bird Island, and all Intracoastal Waterway dredge spoil islands within the park are closed to public entry and use from February 1 to August 31 in order to protect sensitive rookery nesting sites. Waterfowl hunting is permitted on Laguna Madre waters during seasons and times established by the state of Texas and federal agencies.

METHODOLOGY AND ASSUMPTIONS

Potential impacts on wildlife and wildlife habitat were evaluated based on the pattern of PWC use in Padre Island National Seashore, the nature of habitats and species present, and the professional

judgment of the project team and members of the national seashore staff. Information on wildlife in Padre Island National Seashore was obtained from the NPS staff biologist and recent environmental assessments conducted at the park (NPS 2002b).

Primary steps in assessing impacts on wildlife and wildlife habitat were to determine (1) the potential for species to occur in habitats that would be affected by the alternatives, (2) current and future PWC use and distribution by alternative, (3) habitat impact or alteration caused by the alternatives, and (4) disturbance potential of the actions and the potential of PWC activities to affect wildlife or wildlife habitat as a result.

For the purposes of this analysis, it was assumed that most personal watercraft would be operated in a lawful manner (i.e., 50 feet from shore unless landing or launching and no operation between sundown and sunrise). At Bird Island Basin there would be a maximum of two PWC users on a typical high-use day, averaging 15 minutes of operation within park waters. On the gulf shore there would be three PWC users on a high-use day, most entering and leaving the surf only briefly to carry bait, and others running along the surf for recreational purposes, with a total operating time of three hours each. Impacts in 2014 would be similar to those occurring in 2004 because PWC use is projected to increase only slightly over the 10-year period (1.1% increase per year).

IMPACT ANALYSIS AREA

The impact analysis area includes the Bird Island Basin area within park waters, where PWC and motorboat users launch and return to the park, plus the gulf beach and nearshore waters south of the 5-mile marker.

IMPACT OF PWC USE AND NOISE ON WILDLIFE AND HABITAT

The following thresholds were used to determine the magnitude of effects on wildlife and wildlife habitat (special concern species are discussed below under "Threatened, Endangered, or Special Concern Species"):

> *Negligible:* There would be no observable or measurable impacts on native species, their habitats, or the natural processes sustaining them. Impacts would be of short duration and well within natural fluctuations.
>
> *Minor:* Impacts would be detectable, but they are not expected to be outside the natural range of variability or to have any long-term effects on native species, their habitats, or the natural processes sustaining them. Population numbers, population structure, genetic variability, and other demographic factors for species might have small, short-term changes, but long-term characteristics would remain stable and viable. Occasional responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, or other disruptions that would be within natural variations. Sufficient habitat would remain functional to maintain viability of all species. Impacts would be outside critical reproduction periods for sensitive native species.
>
> *Moderate:* Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or juvenile stages; or mortality or interference with activities necessary for survival can be expected on an occasional basis, but are not expected to threaten the continued existence of the species in the park unit. Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they could be outside the natural range of variability for short periods of time. Population numbers, population

structure, genetic variability, and other demographic factors for species might have short-term changes, but would be expected to rebound to pre-impact numbers and to remain stable and viable in the long-term. Frequent responses to disturbance by some individuals could be expected, with some negative impacts on feeding, reproduction, or other factors affecting short-term population levels. Key ecosystem processes might have short-term disruptions that would be outside natural variation (but would soon return to natural conditions). Sufficient habitat would remain functional to maintain viability of all native species. Some impacts might occur during critical periods of reproduction or in key habitat for sensitive native species.

Major: Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they would be outside the natural range of variability for long periods of time or would be permanent. Population numbers, population structure, genetic variability, and other demographic factors for species might have large, short-term declines, with long-term population numbers significantly depressed. Frequent responses to disturbance by some individuals would be expected, with negative impacts on feeding, reproduction, or other factors resulting in a long-term decrease in population levels. Breeding colonies of native species might relocate to other portions of the park. Key ecosystem processes might be disrupted in the long term or permanently. Loss of habitat might affect the viability of at least some native species.

Impairment: Some of the major impacts described above might be an impairment of park resources if their severity, duration, and timing resulted in the elimination of a native species or substantial population declines in a native species. In addition, these adverse, major impacts on park resources and values would

contribute to deterioration of the park's wildlife resources and values to the extent that the park's purpose could not be fulfilled as established in its enabling legislation;

affect resources key to the park's natural or cultural integrity or opportunities for enjoyment; or

affect the resource whose conservation is identified as a goal in the park's general management plan or other park planning documents.

Impacts of the No-Action Alternative — Continue to Prohibit PWC Use

Analysis. A continuation of the ban on PWC use within the national seashore would eliminate any potential impacts to wildlife or habitats, including direct contact, noise disturbances, or contamination from emissions to air or water.

Cumulative Impacts. Cumulative impacts would include those from other uses of the Laguna Madre and gulf beach areas, including other park visitors and industrial and commercial uses. At Bird Island Basin boaters utilize the channel to access the Intracoastal Waterway, but they also cut across park waters to travel up or down the bay. Approximately 128 motorboats use Bird Island Basin on high-use days, and many other boats can enter the impact analysis area from other launch sites located along the Laguna Madre shoreline. Noise and the physical presence of these vessels cause alarm or flight responses in waterfowl and shorebirds that frequent the area and nest on the rookery islands near the Intracoastal Waterway and the park boundary. The park is re-marking the national seashore boundary to ensure that park visitors know when they have entered the park, which may help protect park resources. Rookery islands are posted to keep visitors from the nesting birds and shoreline from February 1 to August 31, and most boaters do not approach these islands. Impacts of boats and

windsurfers in the Bird Island Basin launch area are mainly limited to indirect, adverse impacts (flight response) to birds as well as fish in the area. No mammals, reptiles, or amphibians frequent this area.

Other activities in the Laguna Madre may also adversely affect wildlife found within the park waters. Oil and gas facilities and pipelines in or near the bay can leak, causing water pollution that may adversely affect fish and waterbirds. Channel dredging and shoreline development temporarily increases water turbidity, which causes fish to avoid the affected areas and may smother nearby spawning beds. Overall, cumulative adverse impacts to wildlife in the Bird Island Basin analysis area would include negligible impacts on fish and fish populations and negligible to minor impacts on benthic invertebrates, waterfowl, and other birds that nest on spoil islands. No perceptible change in wildlife populations or their habitat would be expected.

Along the gulf beach, other uses that affect wildlife include beach activities (RV or vehicle driving, swimming, beach-combing, fishing, etc.), offshore oil and gas operations, and tanker traffic. Beach visitors on foot or in vehicles can disrupt birds that nest on the fringes of the dunes (terns, gulls), causing flight or alarm responses that can result in nest abandonment or a decline in feeding success. Vehicles used by park staff, visitors, and oil and gas operators can run over invertebrate species that live on the beach (e.g., ghost crabs) and compact or rut the beach sands, resulting in short-term localized, negligible to minor adverse impacts. Boat use (such as inflatable boats) can cause temporary disruption of bottlenose dolphins or fish using nearshore waters. Noise from these boats and other recreationists can also disrupt migrating birds that are resting or feeding.

Leaks and spills from offshore oil operations or tankers could be transported by water onto the beach. Impacts would range from minor and relatively short term and localized, as a result of spotty fouling of sand and the small contributions to water pollution, to widespread, moderate, and long term, if a major spill occurred.

Overall, cumulative impacts to wildlife on the gulf beach would be adverse and negligible for fish and negligible to minor for most other species, although impacts from larger offshore oil leaks could be moderate and long term. No perceptible changes to wildlife populations or their habitat are expected.

Conclusion. Prohibiting PWC use at Padre Island National Seashore would eliminate any associated impacts to wildlife and habitat.

Cumulative impacts from other uses would continue and would be adverse, short term, and negligible on fish, and negligible to minor on waterfowl, nesting birds, and other wildlife on both the gulf and bay sides of the park. There would be no perceptible changes in wildlife populations or their habitat community structure. An offshore oil spill or release could have adverse, long-term, moderate impacts.

This alternative would not impair wildlife or wildlife habitat.

Impacts of Alternative A — Reinstate PWC Use as Previously Managed (before April 22, 2002)

Analysis. Under this alternative there would be a maximum of two personal watercraft in Bird Island Basin during a high-use day and three on the gulf side. Most PWC use would occur between mid-May and mid-September, with the watercraft used mainly for access to the Intracoastal Waterway and for recreation on the gulf side.

In Bird Island Basin PWC use at and near the launch area could adversely affect waterfowl and waterbirds that frequent the basin and immediately adjacent shorelines. When a PWC user launches at Bird Island Basin, the watercraft is to be operated at a flat-wake speed until the vessel is well into the

channel, thus allowing waterbirds and waterfowl nearshore to easily move out of the way. Also, personal watercraft are to be operated in the basin area so there would not be a erratic pitch variations due to changes in speed and exposing the engine to air during maneuvers and crossing waves or wakes. Therefore, impacts to wildlife in Bird Island Basin would be adverse, but negligible to minor, but occurring over the short and long term.

Although PWC use is supposed to be limited to boat channels within the national seashore, they have been known to cut across waters and approach nearby populations of colonial waterbirds on several islands that lie within and near the seashore boundary. Personal watercraft can be operated in areas typically too shallow or confining for other motorized boat traffic. If the watercraft are operated too close to these islands, the noise from repeated activity and maneuvers typically conducted by PWC operators could cause flushing and disruption of normal feeding and nesting activities for birds using the rookery islands in and near the park boundary. There can be considerable variation in flushing distances of waterbirds in response to PWC use among individuals within the same species and among different species (Rodgers and Schwikert 2002), but short-term, minor to moderate, adverse impacts could occur in areas immediately around the islands.

Along the gulf shore PWC use would include some recreational use along the surf line plus an occasional shark fishermen using the watercraft to set bait. PWC noise would be sporadic, and its effects would be limited by the presence of other sources of noise, including surf, wind, and other beach users. Impacts to fish using nearshore waters would be negligible, as they would rapidly move away from the noise and presence of the machines. Shorebirds would also avoid personal watercraft. Marine mammals (bottlenose dolphins) using nearshore waters could be affected by PWC noise, which can temporarily disrupt feeding, navigation, or communications of these animals. However, PWC use would be so minor and infrequent that little impact would occur, and dolphins could easily avoid the areas being used and move to offshore or adjacent nearshore waters.

As noted in the "Water Quality" section, PWC use in either Laguna Madre waters or gulf nearshore waters would create pollutant loads that would be well below water quality criteria and ecological benchmarks, so there would likely be no or negligible impacts to fish from water contamination. Also, fish would avoid direct impacts from personal watercraft, and PWC use is not expected to disrupt any spawning areas, given speed restrictions near shorelines.

PWC use as proposed under alternative A would have negligible, adverse impacts to fish, and negligible to minor impacts to waterfowl and other wildlife. There would be no perceptible changes in wildlife populations or their habitat community structure. All impacts to fish, wildlife, and habitat due to PWC use would be temporary but would occur over the short and long term. The intensity or duration of impacts is not expected to increase substantially over the next 10 years, since PWC numbers are not expected to increase more than 1.1% annually, resulting in a total of seven personal watercraft on typical high-use days on both sides of Padre Island.

Cumulative Impacts. Potential cumulative effects on wildlife and wildlife habitat include those described above that are specific to PWC use, plus those described under the no-action alternative that originate from other park visitors and the other users of Laguna Madre and gulf waters. These other sources of impacts include visitors recreating in and near Bird Island Basin, motorboaters, visitors and vehicular traffic on the gulf beach, oil and gas operations, and development along the Laguna Madre shoreline.

Approximately 700,000 people visit Padre Island every year (see Table 11). Wildlife routinely exhibit movement or flight response due to visitor proximity. However, visitor interactions would not

interfere substantially with feeding, reproduction, or other activities necessary for the survival of any wildlife species expected in the Bird Island Basin area or along the gulf beach. Oil and gas operations could leak and release contaminants that affect fish, birds, and invertebrates, especially along the gulf shore. Except in cases of major releases, impacts would be minor and short term.

Overall, visitors (including PWC users) and other users in the Bird Island Basin and along the gulf shore areas would generally have adverse, negligible impacts on fish, and adverse, localized, minor, temporary impacts to wildlife in these areas over the short and long terms. No perceptible changes to wildlife populations or their habitat are expected. Moderate, long-term impacts could result from large oil spills on the gulf side, but would not be expected to occur very frequently and would be subject to intense cleanup and rehabilitation efforts that would reduce impact intensity and duration.

Conclusion. Impacts on wildlife and wildlife habitat from PWC use would generally be adverse, localized, short and long term, and negligible to minor at both Bird Island Basin and along the gulf shore.

On a cumulative basis, all visitor activities and other users would continue to have short- and long-term, minor, adverse effects on wildlife and wildlife habitat, with the potential for adverse, long-term, moderate impacts from an offshore oil spill or release. No perceptible changes to wildlife populations or their habitat are expected.

This alternative would not impair wildlife or wildlife habitat.

Impacts of Alternative B — Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. The effect of PWC use on wildlife would be the same as described under Alternative A for the Bird Island Basin area, resulting in short- and long-term, negligible, adverse impacts to fish, and negligible to minor impacts to waterfowl and other wildlife. There would be no perceptible changes in wildlife populations or their habitat community structure. The intensity or duration of impacts is expected to remain constant over the next 10 years, since PWC numbers are anticipated to increase only slightly over that time (1.1% annual increase).

Cumulative Impacts. The contribution to cumulative impacts from non-PWC sources would be the same as described for alternative A in the Bird Island Basin area. Under alternative B there would be a negligible reduction in overall impacts caused by PWC use due to restrictions on their use on the gulf coast, which would not change the intensity level of cumulative impacts in this assessment. Overall, PWC use and other sources of cumulative impacts would have negligible adverse impacts to fish, and negligible to minor impacts to waterfowl and other wildlife. There would be no perceptible changes in wildlife populations or their habitat community structure. All impacts to fish, wildlife, and habitat due to PWC use would be short and long term and localized, with the exception of the potential for large oil releases or spills. Over the next 10 years, impacts would be negligible since PWC numbers are projected to increase only slightly.

Conclusion. Under alternative B there would be a reduction in overall impacts caused by PWC use because of the restriction on such use on the gulf beaches. Impacts on wildlife and wildlife habitat would be adverse, short and long term, and negligible to minor only in Bird Island Basin.

On a cumulative basis all visitor activities and other uses in the Bird Island Basin area would continue to have adverse, short- and long-term, negligible to minor impacts on wildlife and wildlife habitat, with the potential for adverse, long-term, moderate impacts from an offshore oil spill or release. No perceptible changes to wildlife populations or their habitat are expected.

This alternative would not impair wildlife or wildlife habitat.

THREATENED, ENDANGERED, OR SPECIAL CONCERN SPECIES

GUIDING REGULATIONS AND POLICIES

The Endangered Species Act (16 USC 1531 et seq.) mandates that all federal agencies consider the potential effects of their actions on species listed as threatened or endangered. If the National Park Service determines that an action may adversely affect a federally listed species, consultation with the U.S. Fish and Wildlife Service is required to ensure that the action will not jeopardize the species' continued existence or result in the destruction or adverse modification of critical habitat.

State and federally listed species were identified through discussions with park staff, and the use of recently completed environmental assessments and biological assessments. In addition, the U.S. Fish and Wildlife Service was contacted regarding federal threatened, endangered, and special concern species, as was the Texas Parks and Wildlife Department regarding state species. (Appendix C includes copies of letters received by the time this document was printed.)

This section includes an analysis of the potential impacts to those species listed in the USFWS letter that could be expected to occur in the two areas of the park considered for PWC use. At Padre Island National Seashore it has been determined that none of the alternatives would adversely affect any of the listed species. The completed environmental assessment will be submitted to the U.S. Fish and Wildlife Service for its review. If the agency concurs with the finding of the National Park Service, no further consultation will be required.

Formal consultation would be initiated if the National Park Service determined that actions in the preferred alternative would be likely to adversely affect one or more of the federally listed threatened or endangered species identified in the national seashore. At that point a biological assessment would be prepared to document the potential effects. From the date that formal consultation was initiated, the Fish and Wildlife Service would be allowed 90 days to consult with the agency and 45 days to prepare a biological opinion based on the biological assessment and other scientific sources. The Fish and Wildlife Service would state its opinion as to whether the alternative would be likely to jeopardize the continued existence of the listed species or to result in the destruction or adverse modification of critical habitat. Such an opinion would be the same as a determination of impairment if the impact to listed species and their habitat would be affected to the point that the park's purpose (as stated in the enabling legislation, the *General Management Plan*, or the *Strategic Plan)* could not be fulfilled and resources could not be experienced and enjoyed by future generations.

The NPS *Management Policies 2001* state that potential effects of agency actions will also be considered on state or locally listed species (NPS 2000c). The National Park Service is required to control access to critical habitat of such species, and to perpetuate the natural distribution and abundance of these species and the ecosystems upon which they depend.

Seventeen federally or state listed species at Padre Island National Seashore have the potential to be affected by proposed PWC use and that are assessed in this document — five species of sea turtles, four species of raptors, and eight species of shorebirds or waterbirds.

As mentioned in the Affected Environment chapter, the Migratory Bird Treaty Act provides for the protection of migratory birds, including those not otherwise listed under federal or state endangered species laws. The MBTA makes it unlawful to pursue, hunt, take, capture, or kill; attempt to take,

capture or kill; possess, offer to sell, barter, purchase, or deliver; or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not. Texas state boating laws make it illegal for PWC operators to chase, harass, or disturb wildlife; these regulations would apply to any alternative that would reinstate PWC use, thereby upholding the protections called for in the MBTA.

ASSUMPTIONS AND METHODOLOGIES

For the purposes of this analysis, it was assumed that most personal watercraft would be operated in a lawful manner (i.e., 50 feet from shore unless landing or launching and no operation between sundown and sunrise). At Bird Island Basin there would be a maximum of two PWC users on a typical high-use day and they would spend an average of 15 minutes operating in the park. Along the gulf shore there would be three PWC users on a high-use day, most entering and leaving the surf only briefly to carry bait, and others traveling along the surf for recreational purposes, operating for a maximum of three hours each. Impacts in 2014 would be similar to those occurring in 2004 since PWC use is projected to increase only 1.1% annually over the 10-year period.

Information on wildlife in Padre Island National Seashore was obtained from the NPS natural resources specialist at the park, the U.S. Fish and Wildlife Service and the Texas Parks and Wildlife Department (see appendix C), several recent documents (NPS 2002b, 2002c). PWC and visitor use trends data were taken into account to assess impacts over time.

IMPACT ANALYSIS AREA

The impact analysis area includes the Bird Island Basin area within park waters, where PWC and boats launch and return to the park, plus the gulf beach and nearshore waters south of the 5-mile marker.

IMPACT OF PWC USE ON SUCH SPECIES

The Endangered Species Act defines the terminology used to assess impacts to listed species as follows:

> *No effect:* A proposed action would not affect a listed species or designated critical habitat.
>
> *May affect / not likely to adversely affect:* Effects on special status species would be discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated) or would be completely beneficial.
>
> *May affect / likely to adversely affect:* When an adverse effect to a listed species might occur as a direct or indirect result of proposed actions and the effect either would not be discountable or would be completely beneficial.
>
> *Is likely to jeopardize proposed species / adversely modify proposed critical habitat (impairment):* The appropriate conclusion when the National Park Service or the U.S. Fish and Wildlife Service identifies situations in which PWC use could jeopardize the continued existence of a proposed species or adversely modify critical habitat to a species within or outside park boundaries.
>
> *Impairment:* For the purposes of this analysis, those effects likely to jeopardize proposed species/adversely modify proposed critical habitat would have the potential to impair park resources. At this level, the integrity of park resources would substantially affect natural systems and the ability of future generations to enjoy the resource.

Impacts of the No-Action Alternative — Continue to Prohibit PWC Use

Analysis. No PWC use would be allowed within Padre Island National Seashore, thus eliminating any potential impacts on threatened, endangered, or special concern species.

Cumulative Impacts. While the contribution of PWC use to overall cumulative impacts to federal or state listed animal and plant species would be eliminated, other activities and visitor uses would continue within the Laguna Madre and gulf side portions of the national seashore, including impacts from other recreational users, other motorboats, vehicles (on the gulf side), oil and gas operations, dredging (in Laguna Madre), and development along the Laguna Madre shoreline. The park is currently re-marking the national seashore boundary to ensure that park visitors know when they have entered the park, which may aid in protecting park resources. The following impacts would be expected to affect the listed species that could occur in the Bird Island Basin and gulf shore areas:

- *Sea Turtles (all five listed species)* — Cumulative impacts on all listed sea turtles would continue along the gulf beach as a result of park, visitor, and commercial uses, recreational activities, and park operations. Park staff, 12 oil and gas operators, and numerous visitors operate vehicles on the gulf beaches each year. Vehicle traffic includes park vehicles; private cars, trucks, and RVs; and larger oil and gas trucks. There may be times when turtle eggs, nesting turtles, hatchlings, and stranded turtles could be crushed by these vehicles. Vehicular traffic can also cause rutting and compaction of beach sands, indirectly affecting the turtles by reducing the ability of turtles to build nests or to successfully cross the beach (NPS 2002b). Vibration and noise associated with vehicular movement could frighten turtles and cause nest abandonment or a flight response. Lights and noise from oil well operations could disrupt the migration of sea turtle hatchlings.

  However, current nesting activity does not seem to indicate that compaction or vehicle presence is negatively affecting turtles. Because of the park's programs and public education related to sea turtle protection, most nests are avoided or reported by park visitors and are found and removed from the beach by NPS and USFWS staff.

  Incidental capture in shrimp trawls accounts for most of the sea turtle deaths. However, mandatory use of Turtle Excluder Devices is required on shrimp vessels operating in U.S. gulf waters since 1990. In addition, shrimp-trawling closures in effect from December 1 to May 15 will potentially protect sea turtles in nearshore areas as they migrate to and from nesting areas (NPS 2004b).

  Therefore, cumulative impacts to sea turtles related to vehicle use and other recreational activities on the beach may affect, but are not likely to adversely affect, sea turtles. Oil spills from offshore operations or tankers could cause more widespread and long-term impacts, but mitigation measures involving turtle nest collection, remediation, and clean up of spills would limit the extent of adverse impacts.

- *Eastern Brown Pelican* — The Eastern brown pelican occurs in the park year-round along the gulf beach and Laguna Madre sides of the island, but it is predominantly found on the gulf side. No nesting occurs in the park. Cumulative impacts to the pelican include general disturbance from park visitor noise and presence, vehicle use by visitors and oil and gas operators, and boats used in nearshore waters (the "wet zone").

  Gulf beach visitors and their boats, in addition to park staff and oil and gas operators, could cause flight response in the pelican, especially if activities occur in or near the wet zone where pelicans are most likely to be present. The disturbed birds would likely fly to another suitable

location and continue their pre-disturbance behavior. Vehicles could drop oils, coolants, or other lubricants that could affect water quality, but the leakage would be rapidly diluted by water and wave action and would result in only negligible impacts to pelicans using the nearshore gulf waters. Although pelicans are not as common on the Laguna Madre side, impacts relating to visitor use at the Bird Island Basin launch would be similar, with displacement of birds to other undisturbed areas. Oil spills from oil and gas operations or tankers could result in more widespread and intense impacts to pelicans exposed to oily waters, depending on the magnitude of the spill and success of cleanup efforts. Therefore, cumulative activities may affect, but are not likely to adversely affect, this bird.

- *Interior Least Tern* — The interior least tern is found in the national seashore during summer when park visitation and recreational use are at their peaks. It is primarily a colonial nester on the Laguna Madre spoil islands, although three nests have been documented on the gulf side. Cumulative impacts would occur from disturbance due to human activity, boat use, and dredging in the Laguna Madre; vehicle use and visitor activity along the gulf beaches; and oil and gas operators traveling along the beach and in the Laguna Madre. The rookery islands are closed by means of signs to visitor use from February 1 to August 31, and visitors and boats generally pass them by and avoid direct adverse impacts to nesting birds. However, noise from passing boat engines could result in flight and alarm responses. Overall, the activities and noise from park visitors may affect, but are not likely to adversely affect, this species.
- *Black Tern* — The black tern is a summer resident and spring/fall migrant, found mostly in and near the Laguna Madre. It does not nest in the park, so cumulative adverse impacts from visitor use, boat noise, dredging, and oil and gas operations would be limited to flight/alarm responses that could disrupt feeding or resting birds. Impacts may affect, but are not likely to adversely affect, this species.
- *Sooty Tern* — The sooty tern is very rare; two nests have been documented on the Laguna Madre rookery islands, and sooty terns have been seen resting on the gulf side. Impacts would be similar to those described for the interior least tern. Impacts may affect, but are not likely to adversely affect, this species.
- *Piping Plover* — The piping plover is a winter resident and fall/spring migrant, found on both sides of the island feeding on wind-tide flats and beach intertidal zones. Highest numbers occur in late fall to winter; no nesting occurs in the park. Cumulative impacts from all sources would be similar to those described above for the black tern, limited to flight/alarm responses that could occur from the presence of humans and boats, oil and gas equipment, and barges. Impacts may affect, but are not likely to adversely affect, this bird.
- *Reddish Egret, White-faced Ibis, Wood Stork* — The reddish egret, white-faced ibis, and wood stork are associated primarily with the Laguna Madre area (a few reddish egrets have been seen on gulf side). They are present during summer, when human activity and noise levels are typically high. Egrets nest on the Laguna Madre colonial islands and feed in shallows and on mud flats of the bay. The white-faced ibis has nested on these islands in the past and is a spring/summer migrant. The wood stork does not nest in the park, but does forage over Laguna Madre wetlands during its summer and fall migrations. Cumulative impacts to these birds could occur from the high number of visitors to the Laguna Madre portion of the park in the summer. Recreationists, plus other Laguna Madre users, could disrupt feeding and even nesting activities if the noise levels were sufficiently high and the activities occurred near nesting birds. Most impacts would be limited to disturbance from boat engine noise and visitors who pass near feeding or nesting birds. The rookery islands are posted and are off-limits to vessels and visitors, reducing impacts to these sensitive areas. However, noise from

boat motors can travel to these areas and could result in alarm or flight responses, disrupting normal nesting, feeding, or resting activities. However, since visitors and boats do not land on these islands or pass immediately adjacent to the shorelines, the birds typically return to their nests or their normal behaviors following the disruption.

Other sources of disturbance include periodic dredging along the Intracoastal Waterway and continued development of the Laguna Madre shoreline outside the national seashore, resulting in reduced habitat and additional recreational users in Laguna Madre. Overall, activities and noise from visitors and other users may affect, but are not likely to adversely affect, these species.

- *Peregrine Falcon, Northern Aplomado Falcon, White-tailed Hawk* — Cumulative impacts to the peregrine falcon, the northern aplomado falcon, and the white-tailed hawk would be similar, since they are all migrants or visitors to the park and generally do not occur during summer. The peregrine falcon is a fall and spring migrant, seen mostly on the gulf side perching on the foredunes, but does forage and rest on the Laguna Madre shoreline. The northern aplomado falcon is seen rarely along the beach and only in winter or early spring. The white-tailed hawk is mostly a winter transient over Laguna Madre wind tidal flats. Compared to the high-use summer months, fewer visitors and park staff are present when these birds may occur. The falcons do not nest in the park, and a single white-tailed hawk nest was documented in an inland grassland habitat. Therefore, most impacts to these birds would arise from the occasional visitors, boats, park staff, and oil and gas operators that are present during the fall and winter months who approach the gulf foredunes or Laguna Madre mudflats. Such activities could cause resting birds to take flight, which may affect, but are not likely to adversely affect, these species.
- *Bald Eagle* — Bald eagles may pass over the park in the winter months only, and none has been seen in the park in recent years. Any activities by visitors, boats, dredging, or development along the Laguna Madre shoreline could potentially disrupt feeding or resting activities of birds flying over the bay. Activities may affect, but are not likely to adversely affect, this species.

Conclusion. Because PWC users would no longer have access to Padre Island National Seashore, there would be no impacts on federal or state listed species.

On a cumulative basis, the activities of other visitors and users of the Laguna Madre and gulf sides of Padre Island, including other boaters, may affect, but are not likely to adversely affect, federal or state listed species. This is because many of these species are present only seasonally, do not nest in the park, or are subject to protective measures in place to minimize impacts such as posted areas, nest patrols (sea turtles), and public information. There would be no PWC contribution to overall cumulative impacts to federal or state listed species.

This alternative would not result in an impairment of threatened, endangered, or special concern species.

Impacts of Alternative A — Reinstate PWC Use as Previously Managed (before April 22, 2002)

Analysis. This alternative would allow PWC use within the national seashore at two separate areas: Bird Island Basin and the gulf coast south of the 5-mile marker. In 2004 there were a maximum of two PWC users on a high-use day in Bird Island Basin, and three along the gulf shoreline. Use is expected to increase by 1.1% annually, so no substantial increase is projected by 2014. PWC users within 50

feet of the shoreline would be required to operate at flat-wake speeds, and PWC users in Bird Island Basin must stay within the channels and the Intracoastal Waterway.

- *Sea Turtles (all five listed species)* — PWC users under alternative A could access the gulf beach, which would result in only minimal additional impacts to those caused by other beach users. However, PWC recreationists are different from other users on the gulf side in that they operate at high speeds along the surf line for recreational purposes. Because peak PWC use occurs during the same months as turtle nesting, use could disrupt turtles trying to reach the beach, and individual watercraft could even collide with turtles in the surf zone. Although inflatable boats are also used on the gulf, they are used for just a few minutes, perpendicular to the coast, to set bait. PWC use would create more opportunity for impacts to turtles in nearshore waters because the watercraft are operated across and along the surf for up to an estimated three hours at a time. However, a maximum of only three personal watercraft were present on a high-use day in 2004, increasing to four by 2014, so the potential for impacts would be negligible. Impacts from PWC use may affect, but are not likely to adversely affect, these species if PWC use occurred during prime turtle nesting times adjacent to nesting areas.
- *Brown Pelican* — PWC use along the gulf beach can cause flight and alarm response in brown pelicans using the wet zone, especially if the bird is harassed or chased by PWC recreationists. Although this behavior has not been documented at Padre Island, it could occur. However, disturbed pelicans would likely fly to another suitable location, and impacts may affect, but are not likely to adversely affect, this species.
- *Interior Least Tern, Black Tern, Sooty Tern, and Piping Plover* — PWC impacts to the interior least tern, black tern, sooty tern, and piping plover would occur from PWC being used too close to rookery islands in the Laguna Madre or very close to the feeding grounds along the Laguna Madre shoreline. PWC use could impact those birds, especially interior least terns and possibly sooty terns, that nest on the rookery islands. Because personal watercraft can access shallow areas, they have the potential to travel close to these islands (although access to the islands is not permitted from February 1 to August 31). Birds could also be disturbed by PWC users repeatedly doing stunts or maneuvers near the islands (even as far as 50 feet away) due to the machine's constant presence in one area, loudness, and change in pitch. Impacts from this type of activity may affect, but are not likely to adversely affect, this species. On the gulf side PWC users comprise a very small number of beachgoers, and impacts to terns nesting on the gulf side would be similar to those from other visitors using the beaches. PWC use may affect, but is not likely to adversely affect, these species.
- *Reddish Egret, White-faced Ibis, Wood Stork* — The reddish egret, white-faced ibis, and wood stork are present in Laguna Madre during summer when visitor use is heaviest. The egret nests on the rookery islands, and the same concern regarding PWC users repeatedly performing stunts (as described above for the tern) would apply to these birds as well. The ibis and stork are not known to currently nest in the park. Most impacts from PWC use would involve flight and alarm responses and would occur away from the Bird Island Basin launch site, where human presence and overall noise and disturbance near the docks preclude the use of the area by these species. Impacts may affect, but are not likely to adversely affect, these species.
- *Peregrine Falcon, Northern Aplomado Falcon, White-tailed Hawk, and Bald Eagle* – PWC impacts to the peregrine falcon, northern aplomado falcon, white-tailed hawk, and bald eagle would be very minimal, since they do not nest in the park and are found there primarily in fall and winter, the off-season for PWC use. Therefore, impacts would be limited to occasional flight or alarm response in raptors flying over the areas of PWC use or using wind-tidal flats near PWC use areas. PWC use may affect, but is not likely to adversely affect, these species.

Overall, PWC use at the national seashore would have no effect or would not likely adversely affect listed species because the identified species are present only seasonally (often in winter months), do not nest in the park, or can readily avoid PWC. Since several bird species are migratory residents, off-season PWC use could affect, but is not likely to adversely affect, the birds occasionally feeding in the area. While some adverse effects, such as a stress or flight response, could result from PWC use, the duration and intensity of these impacts would cause only short-term effects. Impacts to sea turtles may affect, but are not likely to adversely affect, turtles approaching the beach, since collisions would be rare and PWC numbers would be low, even on high-use summer days.

Cumulative Impacts. Cumulative impacts to the listed species discussed above include impacts from additional human presence and other water-based recreational activities (boating, swimming), plus additional disturbance from oil and gas operations, dredging, and other development along the Laguna Madre shoreline. These impacts would be the same as those described for the no-action alternative, with the minor addition of PWC-related impacts. No other major foreseeable future actions or factors, including other sources of water pollution, would contribute more than very minor adverse impacts to any of the species.

Overall, cumulative effects from all park visitor activities may affect, but are not likely to adversely affect these species, because the identified species are either not present when or where the activities occur, do not nest in the park, or are subject to protective measures to minimize impacts.

Conclusion. PWC use at Padre Island at Bird Island Basin and the gulf shore may affect, but is not likely to adversely affect any federal or state listed species, since so few PWC would be expected. Also, the identified species are often not present as permanent residents, can readily avoid personal watercraft, or are protected by actions of park staff.

Cumulative effects from all park visitor activities also would not likely adversely affect these species, since many of the identified species are present only seasonally, do not nest in the park, or can readily avoid PWC and other disturbances.

This alternative would not impair threatened, endangered, or special concern species.

Impacts of Alternative B — Reinstate PWC Use in the Bird Island Basin Channel Only

Analysis. Under alternative B, PWC use would not be permitted on the gulf shoreline, and use would be limited to Bird Island Basin (channel and launch). Impacts would be the same as those described for alternative B for the Bird Island Basin area and include those affecting listed shorebirds and waterbirds that nest on rookery islands in the area of Bird Island Basin.

Limited PWC use at Bird Island Basin may affect, but is not likely to adversely affect, endangered, threatened or sensitive species because so few PWC are used and they are limited to a very small portion of park waters. No perceptible changes would occur in concerned species' populations or their habitat community structure. All impacts to these species and habitat due to PWC use would be short term. The intensity and duration of impacts are expected to remain relatively constant over the next 10 years, assuming PWC numbers increase by 1.1 percent per year during that period.

Cumulative Impacts. Cumulative effects of PWC users and other visitors would be similar to alternative A except with lessened potential for impacts to shorebirds and turtles during nesting season on the gulf shore and would not likely adversely affect concerned species or their habitat. Cumulative effects from all park visitor activities (including PWC use) would not likely adversely affect these species.

Conclusion. PWC use may affect, but is not likely to adversely affect, any federal or state listed or sensitive species since potential interactions with the few PWC in the Bird Island Basin area would be limited and short term.

Cumulative effects from all park visitor activities would not likely adversely affect these species because many of the identified species are present only seasonally, do not nest in the park, or can readily avoid PWC and other disturbances.

This alternative would not result in an impairment of threatened, endangered, or special concern species.

CULTURAL RESOURCES

GUIDING REGULATIONS AND POLICIES

The National Park Service's primary interest in cultural resources (archeological resources and districts, historic structures and districts, cultural landscapes, ethnographic resources, and museum collections) stems from its responsibilities under the following legislation:

> *The NPS Organic Act* — responsibility to conserve the natural and historic objects within parks unimpaired for the enjoyment of future generations
>
> *National Historic Preservation Act* — responsibility to preserve, conserve, and encourage the continuation of the diverse traditional prehistoric, historic, ethnic, and folk cultural traditions that underlie and are a living expression of our American heritage
>
> *American Indian Religious Freedom Act* — responsibility to protect and preserve for American Indians access to sites, the use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites
>
> *Archeological Resources Protection Act* — responsibility to secure, for the present and future benefit of the American people, the protection of archeological resources and sites that are on public lands
>
> *Native American Graves and Repatriation Act* — responsibility to assign ownership or control of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony that are excavated or discovered on federal lands or tribal lands to lineal descendants or affiliated Indian tribes
>
> *Executive Order 13007, "Indian Sacred Sites"* — responsibility to (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and (2) avoid adversely affecting the physical integrity of such sacred sites

In accordance with the NPS *Management Policies 2001*, NPS managers must be respectful of ethnographic resources and must carefully consider the effects that NPS actions may have on them (NPS 2000c, sec. 5.3.5.3;). Specific guidance for the management of cultural resources is provided in *NPS-28: Cultural Resource Management Guideline* (NPS 1997).

METHODOLOGY AND ASSUMPTIONS

Cultural resources analyzed in this environmental assessment are limited to the marine archeological resources that comprise the Mansfield Cut Underwater Archeological District. No archeological sites are located in or immediately adjacent to the area of PWC use at Bird Island Basin, and PWC wakes are not expected to affect any shoreline sites. Impacts are described in terms of type, context, duration,

and intensity, which is consistent with the regulations of the Council on Environmental Quality. These impact analyses are intended to also comply with the requirements of section 106 of the National Historic Preservation Act. In accordance with the Advisory Council on Historic Preservation's regulations implementing section 106 (36 CFR Part 800, "Protection of Historic Properties"), impacts to cultural resources were identified and evaluated by

1. determining the area of potential effects
2. identifying cultural resources present in the area of potential effects that were either listed on or eligible to be listed on the National Register of Historic Places
3. applying the criteria of adverse effect to affected cultural resources either listed on or eligible to be listed on the national register
4. considering ways to avoid, minimize, or mitigate adverse effects

Under the advisory council's regulations, a determination of either adverse effect or no adverse effect must be made for affected, national register eligible cultural resources.

> An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion on the national register. Examples include diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5).
>
> A determination of no adverse effect means there may be an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion on the National Register of Historic Places.

The CEQ regulations and *Director's Order #12* and its handbook call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g., reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under the National Environmental Policy Act only. It does not suggest that the level of effect as defined by section 106 is similarly reduced. Although adverse effects under section 106 may be mitigated, the effect remains adverse.

A section 106 summary is included at the end of the analysis section and is intended to meet the requirements of the National Historic Preservation Act. It also is intended to provide an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based on the criteria found in the advisory council's regulations.

IMPACT ON MARINE ARCHEOLOGICAL RESOURCES

Certain important research questions about human history can only be answered by the actual physical material of cultural resources. Archeological resources have the potential to answer, in whole or in part, such research questions. An archeological site or sites can be eligible to be listed on the National Register of Historic Places if they have yielded, or may be likely to yield, information important in prehistory or history. An archeological site or sites can be nominated to the national register in one of three historic contexts or levels of significance: local, state, or national (National Register Bulletin #15, *How to Apply the National Register Criteria for Evaluation,* NPS 2002d). For purposes of analyzing impacts on archeological resources, thresholds of change for the intensity of an impact are based on the potential of the site(s) to yield information important in prehistory or history, as well as the probable historic context of the affected site(s):

Negligible: The impact would be at the lowest levels of detection — barely measurable with no perceptible consequences, either adverse or beneficial. For purposes of section 106, the determination of effect would be *no adverse effect*.

Minor: Beneficial impact — A site or sites would be maintained and preserved. For purposes of section 106, the determination of effect would be *no adverse effect*.

Adverse impact — Disturbance of a site or sites would results in little, if any, loss of integrity. For purposes of section 106, the determination of effect would be *no adverse effect*.

Moderate: Beneficial impact — stabilization of a site(s). For purposes of section 106, the determination of effect would be *no adverse effect*.

Adverse impact — Disturbance of a site or sites would result in the loss of integrity. For purposes of section 106, the determination of effect would be *adverse effect*. A memorandum of agreement would be executed among the National Park Service and the applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). The mitigation measures identified in the memorandum of agreement would reduce the intensity of impact under the National Environmental Policy Act from major to moderate.

Major: Beneficial impact — Active intervention would be taken to preserve a site or sites. For purposes of section 106, the determination of effect would be *no adverse effect*.

Adverse impact — Disturbance of a site or sites would result in the loss of integrity. For purposes of section 106, the determination of effect would be *adverse effect*. The National Park Service and the applicable state or tribal historic preservation officer would be unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Impairment: There would be a major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation for Padre Island National Seashore; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's *General Management Plan* or other relevant NPS planning documents. Project inventories and mitigation would still be conducted. However, without a systematic monitoring program and given the potential access concerns, there would continue to be a risk of some unavoidable adverse impacts.

Impact Analysis Area

The impact analysis area is the Mansfield Cut Underwater Archeological District, located at the very southern end of the park from approximately the 53-mile marker to the end of the national seashore, including the Mansfield Channel.

Impacts of the No-Action Alternative — Continue to Prohibit PWC Use

Analysis. Continuing the ban on PWC use at Padre Island National Seashore would result in no impacts on marine cultural resources.

Cumulative Impacts. Even without the potential for PWC users to access the district, activities by other watercraft users and beach visitors would still have the potential to cause adverse, minor to moderate, cumulative impacts as a result of the illegal collection or damage of resources that may be encountered along the shoreline or in shallow waters. In addition, offshore oil rigs and tankers could leak oil that would adversely affect the remains of the shipwrecks in the districts. Hurricanes and storm events could also cause extreme wave action that would disturb the ruins. Cumulative impacts from these other sources would be adverse, long term, and minor to potentially moderate.

Conclusion. Prohibiting PWC use would have no impact on the Mansfield Cut Underwater Archeological District.

All visitor activities and uses in the area could continue to result in adverse, long-term, minor to moderate, cumulative impacts, depending on the accessibility of the resource and the potential for illegal collection or damage. Oil operations in nearshore waters and the natural impacts related to storm events and hurricanes could adversely affect resources.

This alternative would not impair any marine cultural resources.

Impacts of Alternative A — Reinstate PWC Use as Previously Managed (before April 22, 2002)

Analysis. PWC users would have access to marine cultural resources located in the Mansfield Cut Underwater Archeological District under this alternative. The most likely impact to these cultural sites would result from PWC users landing in areas otherwise inaccessible to most other visitors and illegally collecting or damaging artifacts. According to park staff, looting and vandalism of cultural resources has not been a substantial problem. A direct correlation of impacts attributed to PWC users is difficult to establish since this area is also accessible to other visitors and other watercraft users, and it is not heavily patrolled. Under this alternative the low number of PWC users within the national seashore would have only minor adverse impacts on listed archeological resources.

Cumulative Impacts. PWC users, other boaters, and land-based user groups would have access to the southern portion of the national seashore where the archeological district is located. On a cumulative basis all visitor activities, coupled with potential oil spills and hurricane or storm damage, could result in adverse, long-term, minor to potentially moderate impacts on the resources in the district.

Conclusion. PWC use within the national seashore could result in adverse, minor impacts on the Mansfield Cut Underwater Archeological District as a result of illegal collection, vandalism, and damage.

Cumulative impacts could be adverse, long term, and minor to moderate due to the number of visitors and the potential for illegal collection or destruction, plus the potential for impacts form oil operations in nearshore waters and the natural impacts related to storm events and hurricanes.

This alternative would not impair any marine cultural resources.

Impacts of Alternative B — Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. Because PWC use under this alternative would be restricted to the Bird Island Basin launch area where no cultural resources exist, Alternative B would have no impact on the Mansfield Cut Underwater Archeological District.

Cumulative Impacts. On a cumulative basis, the types of impacts would be the same as described for the no-action alternative. All visitor activities, industrial uses (oil production), and the natural forces of hurricanes and storms could result in adverse, long-term, minor to moderate impacts on resources in the Mansfield Cut District. All impacts would continue at similar levels over the next decade.

Conclusion. Under Alternative B, PWC use would have no effect on the Mansfield Cut Underwater Archeological District because no use would be permitted along the gulf shore.

All visitor activities and uses in the area could result in adverse, long-term, minor to moderate, cumulative impacts, depending on the accessibility of the resource and the potential for illegal collection or damage, the same as the no-action alternative.

This alternative would not impair any marine cultural resources.

SECTION 106 SUMMARY

The Advisory Council on Historic Preservation's regulations authorize federal agencies to use the National Environmental Policy Act process for Section 106 purposes. This document serves as combined documentation, serving both NEPA and Section 106 purposes. This environmental assessment provides detailed descriptions of three alternatives (including the no-action alternative), and it analyzes the potential impacts associated with possible implementation of each alternative. The analysis of potential impacts of PWC use at Padre Island National Seashore also considered access by other types of watercraft.

Visitors may access areas used by personal watercraft by many modes of transportation, including motor vehicles and all types of motorized watercraft (including personal watercraft), as well as on foot. Because of the diverse modes of access, the impacts on the Mansfield Cut Underwater Archeological District directly attributable to PWC use are difficult to define. Under the no-action alternative and alternative B, no PWC use would be permitted in or near the district, so no adverse impacts would result. PWC users under alternative A could cause minor adverse impacts as a result of possible illegal collection, vandalism, or damage to archeological resources that are listed on or eligible to be listed on the National Register of Historic Places.

To help reduce the potential for impacts from all sources, cultural resources would continue to be monitored. In cases where it was determined there was a potential for adverse impacts (as defined in 36 CFR 800) to cultural resources listed on or eligible for listing on the National Register of Historic Places, the National Park Service would coordinate with the state historic preservation officer to determine the level of effect on the property, and the needed mitigation measures.

Pursuant to 36 CFR 800.5 (revised regulations effective January 2001), the National Park Service finds that the implementation of any PWC management alternative at Padre Island National Seashore, with identified mitigation measures, would not result in any new adverse effects (no adverse effect) to cultural resources currently identified as eligible for or listed on the National Register of Historic Places.

VISITOR EXPERIENCE

Some research suggests that PWC use is viewed by some segments of the public as a nuisance due to their noise, speed, and overall environmental effects, while others believe the PWC use is no different from other motorcraft and that people have a right to enjoy the sport. The primary concern involves

changes in noise, pitch, and volume due to the way that personal watercraft are operated. Additionally, the sound of any watercraft can carry for long distances, especially on a calm day.

GUIDING REGULATIONS AND POLICIES

The NPS *Management Policies 2001* state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the National Park Service is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks (NPS 2000c). Because many forms of recreation can take place outside a national park setting, the National Park Service will therefore seek to

- provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in a particular unit
- defer to local, state, and other federal agencies; private industry; and non-governmental organizations to meet the broader spectrum of recreational needs and demands that are not dependent on a national park setting

Unless mandated by statute, the National Park Service will not allow visitors to conduct activities that

- would impair park resources or values
- create an unsafe or unhealthful environment for other visitors or employees
- are contrary to the purposes for which the park was established
- unreasonably interfere with the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park; NPS interpretive, visitor service, administrative, or other activities; NPS concessioner or contractor operations or services; or other existing, appropriate park uses

The purpose of Padre Island National Seashore is to "preserve, protect and interpret a portion of one of the last undeveloped seashores for public recreation, benefit, and inspiration" (NPS 1998b). It is significant because it is the longest section of the longest undeveloped barrier island in the world, and it protects rare coastal prairie; a complex, dynamic dune system; and the hyper-saline Laguna Madre. The mission of Padre Island National Seashore is to "preserve, research, and interpret the critical habitat of one of the world's last undeveloped barrier islands for the recreation, benefit, inspiration, and education of the public" (NPS 1998b). To achieve this mission goal, the following long-term (five-year) visitor goals were identified in the park's *Strategic Plan* (NPS 1998b):

- Visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreational opportunities.
- Park visitors and the general public understand and appreciate the preservation of parks and their resources for this and future generations.

METHODOLOGY AND ASSUMPTIONS

The purpose of this impact analysis is to determine if PWC use at Padre Island National Seashore is compatible or conflicts with the purpose of the park, its visitor experience goals, and the direction provided by NPS *Management Policies* (NPS 2000c). Thus, these policies and goals were integrated into the impact thresholds.

To determine impacts, the level of PWC use prior to the April 22, 2002, ban was calculated for areas of the national seashore (see "PWC and Boating Use Trends" section). Other recreational activities and visitor experiences that are proposed in these locations were also identified. Staff observations and

historical visitor surveys were evaluated to determine visitor attitudes and satisfaction in areas where personal watercraft were used. Visitor survey data from "A Survey of Visitors to Padre Island National Seashore: A Final Report" shows that 85% of visitors felt that sections of the national seashore should remain in an untouched state (Texas A&M University 2004).

The potential for change in visitor experience was evaluated by identifying projected increases or decreases in both PWC and other visitor uses, and by determining whether these projected changes would affect the desired visitor experiences and result in greater safety concerns or additional user conflicts.

IMPACT ANALYSIS AREA

The impact analysis area includes the entire gulf side of Padre Island National Seashore south from the 5-mile marker. On the Laguna Madre side the impact analysis area includes the entire Bird Island Basin visitor area and the Bird Island Basin boat channel (including 200 feet on either side of the boat channel) from the shore to the Intracoastal Waterway.

IMPACT OF PERSONAL WATERCRAFT ON VISITOR EXPERIENCE GOALS

The following thresholds were defined:

> *Negligible:* Visitors would likely not be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources.
>
> *Minor:* Visitors would likely be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources; however the changes in visitor use and experience would be slight and likely short term. Other areas in the park would remain available for similar visitor experiences and uses without derogation of park resources and values.
>
> *Moderate:* Visitors would be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources. Changes in visitor use and experience would be readily apparent and likely long term. Other areas in the park would remain available for similar visitor experiences and uses without derogation of park resources and values, but visitor satisfaction might be measurably affected (visitors could be either satisfied or dissatisfied). Some visitors who desired to continue their use and enjoyment of the activity / visitor experience would be required to pursue their choice in other available local or regional areas.
>
> *Major:* Visitors would be highly aware of the effects associated with changes proposed for visitor use and enjoyment of park resources. Changes in visitor use and experience would be readily apparent and long term. The change in visitor use and experience proposed in the alternative would preclude future generations of some visitors from enjoying park resources and values. Some visitors who desired to continue their use and enjoyment of the activity / visitor experience would be required to pursue their choices in other available local or regional areas.

Impacts of the No-Action Alternative — Continue to Prohibit PWC Use

Analysis. Although Padre Island provides excellent water-based activities, PWC use made up a very small percentage of all motorized watercraft prior to the April 22, 2002, ban. For purposes of this analysis, a 2004 baseline of 5 personal watercraft and 128 boats was applied. Current use projections estimate that by 2014 the number of PWC users would increase by approximately 1.1% per year, to 7 personal watercraft and 145 motorboats.

Impacts on PWC Users — Due to the limited historical nature of PWC use within the park, continuing to prohibit PWC use would not necessarily preclude a visit to the national seashore by PWC owners. Current PWC users could still use a motorboat or other watercraft and could continue to experience activities such as windsurfing, hiking, swimming, camping, and driving along the beach. It is not expected that park visitation would decrease as a result of continuing to prohibit PWC use.

Padre Island National Seashore was never historically been a high use area for PWC use for numerous reasons. Few rental facilities are available near the park; the closest stores are near Corpus Christi. No fueling facilities exist near the park, which precludes long periods of constant PWC use. Submerged aquatic vegetation within the Laguna Madre regularly breaks off and can get drawn into and cause damage to PWC engines.

PWC users have numerous options in the area around the park that are more conducive to PWC use and are generally more popular with PWC recreationists. Along the Gulf of Mexico, areas north of Padre Island include Kleberg County-owned beach property, Padre Balli County Park, Bob Hall Pier, J.P. Luby Park, and Mustang Island State Park. Additional areas in the vicinity of the park include the Laguna Madre outside the park boundary, especially at the 37-mile marker at the John F. Kennedy Causeway (which has a marina and fueling facilities), the Riveria at Baffin Bay (which also has a marina and fueling facilities), and Packery Channel. These areas have few restrictions on PWC use and, with the exception of Mustang Island State Park, do not charge money to enter or launch a personal watercraft from the beach.

Continuing the PWC ban would have the largest adverse impact on shark fishermen, who used PWC to place bait offshore within the Gulf of Mexico. The shark fishermen have devised other methods of running bait, including using soft-sided, inflatable boats, such as Zodiacs®, and wading to the fishing location. Overall, this alternative would have minor adverse impacts on PWC users.

Impacts on Other Motorized Boaters — With a continued ban on PWC use within Padre Island National Seashore there would be no interactions or any possible conflicts between other boaters and PWC operators within the park.

Impacts on Other Visitors — Continuing to ban PWC use within the park would also eliminate possible conflicts with nonmotorized watercraft users, including windsurfers and sea kayakers. Conflicts have been reported between windsurfers and PWC users operating illegally within Bird Island Basin, and PWC use was deemed to be incompatible with windsurfing in this area. Continuing the PWC ban would not affect other visitors along the gulf shoreline since there would be no potential for conflicts between PWC users and visitors swimming, fishing, and playing in the surf. Also, PWC noise and presence would be eliminated on down-island beaches, where many people go to experience solitude and remoteness. The desire for such opportunities is reflected in the 2004 visitor survey, in which 85% of visitors felt that sections of Padre Island should remain in an untouched state. In addition, nearly one-third of those respondents favored making Padre Island free of human-made noise (Texas A&M University 2004).

The experiences of PWC users who formerly used the park would continue to be adversely affected because of these same restrictions. In summary, PWC operators, who comprise a very small percentage of park visitors, would experience minor adverse effects.

Cumulative Impacts. The primary activities at Padre Island National Seashore that may affect visitor experiences include the number and activities of other visitors, and noise from vehicles, motorboats, and in certain locations, oil and gas-related operations. Other actions currently planned that could affect PWC use or visitor experiences within the national seashore include expanding and improving

the Bird Island Basin visitor area to accommodate more boat trailers and campers, and expanded oil and gas operations. The proposed implementation of non-propeller areas, motorized boating areas, non-motorized boating areas, and kayak trails should benefit all visitors, as conflicting watercraft uses would be more segregated. Re-marking the park boundary would help ensure that visitors know when they have entered park waters and must therefore abide by park regulations.

Additional oil and gas operations are planned by BNP Petroleum Corporation within the first 13 miles of South Beach along the Gulf of Mexico shoreline. Although the wells would be located 900 feet west of the gulf beaches, visitors would be subjected to approximately 13 oil and gas trucks driving along the beach per day (NPS 2002b). This increased vehicular activity would increase noise levels and detract from the isolation and solitude that many visitors expect at down-island locations.

Cumulative visitor experience impacts related to all other motorized uses would be adverse and negligible to minor, particularly considering the presence of the oil and gas operations. No change to other park visitors and activities would result under this alternative. Based on the results of the 2004 visitor survey, most visitors would probably continue to be satisfied with their experiences at Padre Island National Seashore without PWC use.

Conclusion. The continued ban would have no further impact on the experiences of most park visitors. Impacts on PWC users who could no longer ride in the national seashore would be adverse, long term, and minor.

Cumulative impacts would be negligible and adverse for the majority of visitors.

Impacts of Alternative A — Reinstate PWC Use as Previously Managed (before April 22, 2002)

Analysis. PWC operators under alternative A would be able to use the portions of Padre Island that were open to PWC use prior to April 22, 2002. These areas include south of the 5-mile marker on South Beach on the gulf side, and the Bird Island Basin boat channel for direct travel to and from the Intracoastal Waterway only. No other PWC use within the Laguna Madre would be allowed.

Impacts on PWC Users — PWC users would again be able to recreate in the national seashore, which would be a beneficial impact for these users. Shark fishermen would also be able to use personal watercraft to place bait offshore within the Gulf of Mexico, while recreational users would have full access to the southern 55 miles of the gulf shoreline within the park. PWC users within the Laguna Madre would be able to use the park for direct access to the Intracoastal Waterway through the Bird Island Basin boat channel. People would also be able to use personal watercraft to access the leased spoil islands outside the park boundary near the Intracoastal Waterway.

As described in the no-action alternative, numerous other areas exist in the vicinity of the park that are more conducive to PWC use and are generally more popular with PWC recreationists. Allowing PWC use within Padre Island would give PWC users an additional location to recreate. However, PWC use within the park has historically been small and sporadic, for the reasons described in the no-action alternative. Overall, alternative A would have beneficial impacts for a small number of PWC users.

Impacts on Other Motorized Boaters — Other boaters visiting Padre Island National Seashore would interact with PWC operators. As described on page 72, boats would still not be allowed to launch from the gulf beach, with the exception of inflatable boats less than 12 feet long; therefore, there would be minimal interaction with boats along the gulf beaches. All watercraft share the same boat launches at Bird Island Basin, which is the most common area for PWC user / boater interaction. Interactions would remain minimal at this location, since PWC users historically did not spend more than 5 to 10

minutes in this area. Visitors are also attracted by the windsurfing, sailing, camping, and fishing opportunities at this location.

Based on this analysis, alternative A would have negligible adverse effects on the visitor experience of other motorized boaters at Padre Island.

Impacts on Other Visitors — Nonmotorized watercraft users, including sailboaters, windsurfers, and sea kayakers who utilize Bird Island Basin, could also interact with PWC users. Although PWC use would be restricted to the Bird Island Basin boat channel, illegal PWC use in other portions of the basin has resulted in conflicts with windsurfers.

Swimmers, hikers, anglers, and other visitors to the national seashore would have contact with PWC users. PWC use would have the greatest adverse impact on other visitors along the South Beach portion of the gulf shoreline, where wave running historically occurred. This adverse impact would be concentrated at down-island locations, where many visitors expect a greater degree of isolation and solitude. Alternatively, reinstating PWC use would have a beneficial impact on shark fishermen who historically used personal watercraft to place bait offshore within the Gulf of Mexico.

In summary, reinstating PWC use would have a beneficial impact on a small number of PWC users, including shark fishermen who historically used personal watercraft in the Gulf of Mexico. This alternative would have an adverse, negligible to moderate impact on all other visitors to Padre Island National Seashore, including windsurfers, swimmers, hikers, other anglers, and other visitors — particularly those seeking an untouched natural environment free of human-made noise.

Cumulative Impacts. The primary activities at Padre Island National Seashore that may affect visitor experiences include the number and activities of other visitors, and noise from vehicles, motorboats and in some locations, oil and gas-related operations. As described in the no-action alternative, other actions currently planned that would affect PWC use or visitor experiences within the national seashore include expanding and improving the Bird Island Basin visitor area to accommodate more boat trailers and campers, and expanded oil and gas operations. Increased vehicular activity on the beach from oil and gas operations, coupled with PWC use along the gulf beach, would increase noise levels and detract from the environment of isolation and solitude that many visitors expect at down-island locations. The proposed implementation of non-propeller areas, motorized boating areas, non-motorized boating areas, and kayak trails should benefit all visitors, as conflicting watercraft uses would be more segregated. Re-marking the park boundary would help ensure that visitors know when they have entered park waters and must therefore abide by park regulations.

According to past down-island visitor surveys, most visitors are satisfied with their experiences at the national seashore. Cumulative impacts related to the use of personal watercraft, motorized boats, other visitor activities, and expanded oil and gas operations would be adverse, short and long term, and negligible to minor in most locations, as compared to the no-action alternative. Impacts would be adverse, short and long term, and minor to moderate in more remote down-island locations due to the presence of PWC users along with other recreational and oil and gas activities.

Conclusion. PWC use would have adverse, short- and long-term, negligible to moderate impacts on overall visitor experiences. PWC users would benefit by being able to recreate within park waters, although a very small percentage of the total park visitors would be affected. If PWC use increased substantially in the future, impacts could be adverse, short and long term, and moderate.

Cumulative effects of PWC use, other watercraft, and other visitor activities would be adverse, short and long term, and negligible to moderate because there would be little noticeable change in visitor experiences.

Impacts of Alternative B — Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. PWC use would only be permitted in the Bird Island Basin boat channel for direct access to the Intracoastal Waterway. No PWC use would be allowed in any other portions of the Laguna Madre or the Gulf of Mexico within park boundaries.

Impacts on PWC Users — PWC users would be able to directly access the Intracoastal Waterway from the park through the Bird Island Basin boat channel. People could also use personal watercraft to access the leased spoil islands outside the park boundary near the Intracoastal Waterway. This alternative would have a beneficial impact on these users, similar to alternative A.

Continuing to prohibit PWC use within the Gulf of Mexico would have an adverse impact on shark fishermen, who have used PWC to place bait offshore. However, these fishermen have devised other methods of running bait, including using soft-sided, inflatable boats and wading to the fishing location.

As mentioned in the no-action alternative, Padre Island National Seashore has never historically been a popular PWC use area, and numerous other areas exist in the vicinity of the park that are more conducive to this form of recreation use and are generally more popular with PWC recreationists.

Overall, alternative B would have a beneficial impact on those PWC users wanting to use Bird Island Basin for access to the Intracoastal Waterway. This alternative would have a negligible to minor adverse impact on PWC users who used the gulf side of the island.

Impacts on Other Motorized Boaters — Other boaters visiting Bird Island Basin would interact with PWC operators because all watercraft would share the same boat launches at Bird Island Basin. Interactions would remain minimal since PWC historically did not spend more than 5 to 10 minutes in this area on their way to the Intracoastal Waterway. Inflatable boats launched from gulf beaches would have no interaction with PWC users, because no use would be permitted in the Gulf of Mexico within park boundaries.

Based on this analysis, alternative B would have negligible adverse effects on the visitor experiences of other motorized boaters at Padre Island National Seashore.

Impacts on Other Visitors — Impacts to other shoreline users within the Laguna Madre would be similar to those under alternative A. Nonmotorized watercraft users could interact with PWC users at Bird Island Basin. Even though PWC use would be restricted to the Bird Island Basin boat channel, reports of previous illegal PWC use in other portions of the basin indicated conflicts with windsurfers. Overall, interactions would remain minimal at this location, since PWC users historically did not spend more than 5 to 10 minutes in the water in this area.

Similar to the no-action alternative, continuing to ban PWC within the Gulf of Mexico would have a beneficial impact on visitors on the east side of the national seashore, since the potential conflicts between PWC users and visitors swimming, fishing, and playing in the surf would be eliminated. Also, visitors seeking the more remote experience of down-island beaches would benefit. Continuing to prohibit PWC use in this area would have a negligible adverse impact on shark fishermen who historically used personal watercraft to take bait offshore.

In summary, PWC operators along the gulf shore would experience negligible to minor adverse effects, while the remainder of other users in this area would experience beneficial effects, especially in areas used by those visitors wanting to experience quieter, undeveloped beaches. PWC users at Bird Island Basin would experience beneficial impacts, while the remainder of other users in this area would experience negligible to minor adverse impacts.

Cumulative Impacts. The primary activities at Padre Island National Seashore that may affect visitor experiences include the number and activities of other visitors, and noise from vehicles and motorboats. Besides expanding and improving the Bird Island Basin visitor area to accommodate more boat trailers and campers, no other actions are currently planned that would affect PWC use or visitor experiences within the Bird Island Basin portion of the national seashore. The proposed implementation of non-propeller areas, motorized boating areas, nonmotorized boating areas, and kayak trails should benefit all visitors. Re-marking the park boundary would help ensure that visitors know when they have entered park waters and must therefore abide by park regulations. Cumulative impacts related to the use of personal watercraft, motorized boats, other visitor activities, and oil and gas operations would be adverse, short and long term, and negligible to minor when combined with PWC restrictions under this alternative.

Conclusion. PWC use at Bird Island Basin would have adverse, short- and long-term, negligible to minor impacts on overall visitor experiences. PWC users would benefit from being able to recreate within the park, although only a very small percentage of the total park visitors would be affected.

Cumulative effects of PWC use, other watercraft, and other visitors would be adverse, short and long term, and negligible to minor due to the historically low number of PWC users within the park.

VISITOR CONFLICTS AND SAFETY

Industry representatives report that PWC accidents decreased in some states in the late 1990s. The National Transportation Safety Board reported that in 1996 personal watercraft represented 7.5% of state-registered recreational boats but accounted for 36% of recreational boating accidents. In the same year PWC operators accounted for more than 41% of people injured in boating accidents. PWC operators accounted for approximately 85% of the persons injured in accidents studied in 1997 (NTSB 1998). Within the past seven years three boating accidents have occurred at the national seashore, none of which involved personal watercraft.

Boating regulations are enforced by NPS rangers and Texas Parks and Wildlife officers. However, Texas Parks and Wildlife officers cannot enforce PWC-related bans within Padre Island National Seashore. NPS rangers conduct sporadic water patrols of the park. The U.S. Coast Guard Auxiliary occasionally patrols the park by conducting flyovers.

PWC speeds, wakes, and operations near other users can pose hazards and conflicts, especially to windsurfers and sea kayakers. Windsurfers are the primary nonmotorized boats used in the national seashore, and conflicts could occur with personal watercraft. Prior to April 22, 2002, several conflicts between windsurfers and PWC users operating illegally within Bird Island Basin were reported.

GUIDING REGULATIONS AND POLICIES

In addition to the guiding regulations and policies discussed in the “Visitor Experience” section, the NPS *Management Policies 2001* state that the National Park Service is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks. The policies also state, “While

recognizing that there are limitations on its capability to totally eliminate all hazards, the Service and its concessioners, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees" (NPS 2000c, sec. 8.2.5.1). Further, the National Park Service will strive to protect human life and provide for injury-free visits (sec. 8.2.5).

In the past Padre Island National Seashore abided by the Texas Parks and Wildlife regulations for personal watercraft. The regulations, as stated on page 74, stipulate safety requirements for PWC use throughout the state of Texas.

Until April 22, 2002, personal watercraft were permitted along the gulf shoreline south of the 5-mile marker and at Bird Island Basin only for direct travel to and from the Intracoastal Waterway by way of the marked Bird Island Basin boat channel. PWC operators were subject to all federal and state laws. There are no local ordinances regarding PWC operation.

The following long-term (five-year) visitor goal related to visitor safety was identified in the park's *Strategic Plan* (NPS 1998b):

- Visitor Safety — Reduce the visitor safety accident rate by 10% from 1997 levels.

METHODOLOGY AND ASSUMPTIONS

The methodology for visitor conflicts and safety is similar to that used for visitor experience. Potential impacts were identified based on PWC numbers and activities within the area, the number and activities of other visitors in an area, and the proximity of these user groups.

If PWC use was reinstated, Texas PWC regulations would be enforced within the national seashore. These regulations govern PWC activities near the shore, the timing of use, and the age and educational requirements of operators.

IMPACT ANALYSIS AREA

On the gulf side of the national seashore the impact analysis area includes the entire shoreline south of the 5-mile marker. On the Laguna Madre side of the national seashore, the impact analysis area includes the entire Bird Island Basin visitor area and the Bird Island Basin boat channel (including the 200 feet on either side of the boat channel) from the shore to the Intracoastal Waterway.

IMPACT OF PWC USE AND CONFLICTING USES ON VISITOR SAFETY

The impact intensities for both visitor conflicts and safety follow. Where impacts to visitor experience or visitor safety become moderate or minor, it is assumed that current visitor satisfaction and safety levels would begin to decline and the park would not be achieving some of its long-term visitor goals.

Negligible: The impact to visitor safety would not be measurable or perceptible.

Minor: The impact to visitor safety would be measurable or perceptible, but it would be limited to a relatively small number of visitors at localized areas. Impacts to visitor safety could be realized through a minor increase or decrease in the potential for visitor conflicts in current accident areas.

Moderate: The impact to visitor safety would be sufficient to cause a permanent change in accident rates at existing low accident locations or to create the potential for additional visitor conflicts in areas that currently do not exhibit noticeable visitor conflict trends.

Major: The impact to visitor safety would be substantial either through the elimination of potential hazards or the creation of new areas with a high potential for serious accidents or hazards.

Impacts of the No-Action Alternative — Continue to Prohibit PWC Use

Analysis. Under the no-action alternative all PWC use would be banned, eliminating any conflicts between PWC operators and other visitors, such as at Bird Island Basin, which is recognized as one of the premiere windsurfing areas in the country. Under this alternative no additional recreational conflicts would occur between these user groups in this location, or with other park visitors at Bird Island Basin, including anglers, sea kayakers, motorboaters, and sailboaters. Along the gulf coast no PWC-related incidents would occur involving park visitors who are swimming, fishing, and playing in the surf.

Cumulative Impacts. Some conflicts relating to safety would still exist between more passive park users and motorboats at Bird Island Basin. Visitor safety would also be affected by vehicular traffic on the gulf beaches. However, overall safety would improve because eliminating PWC use within the national seashore would remove the potential for conflicts between PWC users and other visitors. In addition, the proposed implementation of non-propeller areas, motorized boating areas, nonmotorized boating areas, and kayak trails should benefit all visitors, as conflicting watercraft uses would be more segregated. Re-marking the park boundary would help ensure that visitors know when they have entered park waters and must therefore abide by park regulations. Cumulative impacts relating to visitor conflict and safety would be adverse and negligible.

Conclusion. A continued ban on PWC use would result in no visitor use conflicts or impacts on safety.

PWC-related contributions to overall cumulative impacts to visitor safety would be eliminated. Visitor safety impacts from other sources would be adverse and negligible.

Impacts of Alternative A —— Reinstate PWC Use as Previously Managed (before April 22, 2002)

Analysis. Under this alternative PWC operations would resume in the same areas where they occurred prior to April 22, 2002 — along the gulf shoreline and at Bird Island Basin. An annual 1.1% increase in PWC and motorboat use is assumed over the next 10 years. Approximately five PWC would have used the park on a high-use day in 2004, of which three would be on the gulf side. Use would increase to approximately seven personal watercraft in 10 years, with four on the gulf side.

Within the past seven years, three boating accidents have occurred at the national seashore, none of which involved personal watercraft. One accident involved a boat and a windsurfer, the second a catamaran the capsized in the Gulf of Mexico, and the third a powerboat that swamped in the surf zone of the Gulf of Mexico. Limited violation data are available specifically regarding PWC use, given low historical use. According to park staff, one citation was issued in October 2002 when a PWC user was found operating in the Gulf of Mexico near the 43-mile marker after being warned twice about the closure (Echols and Larson, pers. comm., Dec. 9–10, 2002). The most likely location for PWC/boat interactions is at Bird Island Basin, which provides the only boat launch ramp in the national seashore.

Historically, the primary safety conflicts related to PWC use were occasional conflicts with windsurfers in Bird Island Basin. PWC operators have reportedly illegally traversed this portion of the Laguna Madre outside the Bird Island Basin boat channel, resulting in conflicts with windsurfers and other nonmotorized boaters in this area. There is concern on the part of park staff about additional

potential recreational conflicts between PWC users and windsurfers in this area, especially if more PWC users accessed the park than has been projected. The estimated 1.1% increase in PWC and motorboat use over the next 10 years could result in increased conflict and safety problems. Reestablishing PWC use in this area would have minor to moderate adverse impacts on windsurfers and other boaters in Bird Island Basin.

PWC users historically utilized the gulf coast for wave running and other stunt-like maneuvers. Park staff is concerned about potential conflicts between the dangerous use of personal watercraft in this area and conflicts with visitors who are swimming, fishing, and playing in the surf. Permitting PWC use along the gulf coast would have adverse, short and long term, minor impacts on other visitors.

Cumulative Impacts. Padre Island National Seashore is used by a variety of visitors, including swimmers, motorboaters, campers, and sailors. All of these user groups interact with each other and occasionally come into conflict. The proposed implementation of non-propeller areas, motorized boating areas, nonmotorized boating areas, and kayak trails should benefit all visitors, as conflicting watercraft uses would be more segregated. Re-marking the park boundary would help ensure that visitors know when they have entered park waters and must therefore abide by park regulations. Some conflicts have also occurred between recreationists and truck drivers for oil and gas operations. None of these uses has resulted in conflicts or substantial safety concerns. For this reason, the cumulative impact of the various user groups on visitor conflicts and safety would be adverse and minor to moderate over the short and long term.

Conclusion. Reestablished PWC use would have adverse, short- and long-term, minor to moderate impacts on visitor conflicts and safety at Padre Island National Seashore due to the number of visitors and boats present on high-use days, particularly at Bird Island Basin. Conflicts on the gulf side would be minor because of the small number of personal watercraft would be typically used and fewer boats and other vessels.

Cumulative impacts related to visitor conflicts and safety would be adverse and minor to moderate for all user groups in the short and long term.

Impacts of Alternative B — Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. PWC use would be reinstated only in the Bird Island Basin Boat channel under alternative B.

Impacts would be similar to those described for alternative A at Bird Island Basin. Few conflicts or safety concerns have arisen at the launch area, although the potential for collisions or conflicts exists, especially on very busy summer days. Nonmotorized boaters (sea kayakers) generally avoid the areas used by PWC users and motorboaters. The biggest potential for conflicts is between windsurfers and PWC users operating illegally across Bird Island Basin. As described in alternative A, reestablishing PWC use in the Bird Island Basin area would have adverse, short- and long-term, minor to moderate impacts on windsurfers and other recreationists in this area.

Cumulative Impacts. Cumulative impacts would be similar to the types described for alternative A for Bird Island Basin, with adverse, short- and long-term, minor to moderate impacts relating to potential conflicts between motorboats and swimmers, windsurfers, and sea kayakers.

Conclusion. PWC use would have adverse, short- and long-term, minor to moderate impacts on visitor conflicts and safety at Bird Island Basin due to the potential conflict with windsurfers on high-use days.

Cumulative impacts related to visitor conflicts and safety would be adverse and minor to moderate for all user groups in the short and long term.

SOCIOECONOMIC EFFECTS

This section summarizes the socioeconomic impacts associated with the alternatives being considered for PWC use at Padre Island National Seashore. A detailed description of these impacts and a complete list of references is provided in the report "Economic Analysis of Personal Watercraft Regulations in Padre Island National Seashore" (MACTEC Engineering and Consulting 2003).

The primary economic impacts associated with the current PWC restrictions are potential reductions in the sales, profits, and employment of businesses that serve PWC users visiting the park. To the extent that affected local retailers could provide substitute products and services, they would be able to reduce the negative impact on their profits. For instance, some PWC users would continue to visit the park to participate in other recreational activities, which would decrease the financial impact on local businesses. It is also possible that visitation by non-PWC users to the national seashore has increased following restrictions on PWC use, if the restrictions made park visitation more enjoyable for other users. However, the total impact of any of the alternatives on regional economic output would be very small compared to the size of the regional economy, because of the relatively small number of PWC users affected by the ban or by the reinstatement of limited PWC use. Under alternative A or B, even if all the revenues related to PWC use in the park were to reappear in the regional economy, the positive impact would be very small, although businesses and communities that rely more heavily on PWC users could experience larger localized impacts.

BENEFIT-COST ANALYSIS

The purpose of a benefit-cost analysis is to determine whether an alternative being considered would generate more benefits or costs, which would accrue directly to households that use personal watercraft or who are indirectly affected by PWC use. Decisions relating to PWC use restriction could impose costs on those who own or work for PWC-related businesses. Even individuals who do not visit this national seashore could benefit from the knowledge that resources were being protected and preserved. Evidence of "nonuse" values for resources like Padre Island National Seashore have been established in the economics literature (Pearce and Moran 1994). Restrictions on PWC use could therefore provide benefits to both users and nonusers by protecting the national seashore's ecological and other resources.

The lack of available data and the low level of PWC use prior to the ban signify that a quantitative comparison of benefits and costs would be imprecise and unwarranted in the case of Padre Island National Seashore. However, some general statements about the expected benefits and costs can be made for each of the alternatives considered. The no-action alternative would have no benefits or costs compared to the baseline. Both the benefits and costs of implementing alternative A would likely be quite small and of similar magnitude. Under alternative B the benefits and costs are both expected to be very small, but the benefits to the PWC community would likely outweigh the costs to other recreationists and those who place a nonuse value on the natural environment at Padre Island National Seashore.

COSTS TO PWC USERS (OR POTENTIAL PWC USERS)

Under the no-action alternative there would be no change in consumer surplus to PWC users. Under alternative A consumer surplus is expected to increase slightly for PWC users. Under alternative B

there would be a similar increase in consumer surplus for PWC users, but not as much as under alternative A because of the additional spatial restrictions on PWC use.

COSTS TO LOCAL AREA BUSINESSES

Since the ban on PWC use has been in effect since 2002, the no-action alternative would result in no change in consumer surplus.

Based on the existing data that indicate there are few PWC-focused businesses in the region, alternative A would result in a negligible change in producer surplus for PWC rental shops. Producer surplus could increase very slightly for PWC dealerships, but other parts of the economy (hotels, gas stations, etc.) would not be expected to experience a substantial increase in producer surplus. Alternative B would have similar effects, but any increase in producer surplus would be less than that experienced under alternative A.

NATIONAL SEASHORE MANAGEMENT AND OPERATIONS

CONFLICT WITH STATE AND LOCAL PWC ORDINANCES AND POLICIES

Some states and local governments have taken action, or are considering taking action, to limit, ban, or otherwise manage PWC use. While a national park system unit may be exempt from these local actions, consistency with state and local plans must be evaluated in accordance with the National Environmental Policy Act.

Boating regulations are enforced by NPS rangers and Texas Parks and Wildlife officers. The U.S. Coast Guard occasionally patrols the park by conducting flyovers. The national seashore has adopted state PWC regulations. No local regulations affect PWC operations within the national seashore. PWC users would be required to follow all applicable state regulations, as well as NPS regulations.

Impacts related to conflicts with state and local ordinances have been analyzed qualitatively using professional judgment to define thresholds or impact magnitude.

Impacts of the No-Action Alternative — Continue to Prohibit PWC Use

Analysis. The no-action alternative would continue the ban of PWC use within the national seashore, in accordance with the National Park Service's right to regulate the types of activities that take place under its jurisdiction. Texas does not currently ban PWC use at any locations, but it does define regulations guiding how the watercraft can be operated. State PWC regulations do not have provisions that forbid additional controls or bans; thus, the implementation of additional restrictions would not be in conflict with state regulations or policies. The no-action alternative would not be in conflict with federal or state regulations or polices, and conflicts would be negligible.

Cumulative Impacts. The other waters adjacent to the national seashore (the gulf shore and Laguna Madre) are subject to state PWC regulations. The no-action alternative would not be in conflict with any agency policies or state regulations. Cumulative impacts relating to regulation conflicts would be negligible.

Conclusion. Discontinuing PWC use within the national seashore would not result in conflict with state PWC regulations, and no local PWC regulations exist. Therefore, impacts (including cumulative impacts) related to such conflicts would be negligible.

Impacts of Alternative A — Reinstate PWC Use as Previously Managed (before April 22, 2002)

Analysis. Under this alternative PWC use would be reinstated in Bird Island Basin and along the gulf shoreline in Padre Island National Seashore. NPS rangers and Texas Parks and Wildlife officers would enforce all state regulations within the national seashore, and NPS rangers would enforce the restrictions placed on PWC use within the park. These restrictions are not prohibited by state laws or regulations; therefore, the implementation of restrictions on PWC use would not be in conflict with state regulations or policies. Impacts for alternative A would be negligible because no conflicts with state regulations would occur.

Cumulative Impacts. Cumulative impacts would be negligible under this alternative because management of PWC and boating use would not be in conflict with any agency, state, or local regulations.

Conclusion. PWC use at certain locations within the park under alternative A would not result in conflicts with state regulations. Therefore, impacts (including cumulative impacts) would be negligible.

Impacts of Alternative B — Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. Similar to alternative A, restricting PWC use to Bird Island Basin only is not prohibited by state regulations, and NPS rangers would enforce these restrictions within the park. This alternative would be more restrictive than state PWC regulations, but it would not conflict with state provisions or jurisdiction. Therefore, impacts related to conflicts with federal, state, or local requirements or policies would be negligible.

Cumulative Impacts. Cumulative impacts would be negligible under this alternative because management of PWC use would not be in conflict with any agency, state, or local regulations.

Conclusion. PWC use restrictions under alternative B would not result in conflicts with state PWC regulations or policies. Impacts (including cumulative impacts) related to conflicts with federal or state requirements or policies would be negligible.

IMPACT TO PARK OPERATIONS FROM INCREASED ENFORCEMENT NEEDS

Director's Order #9: Law Enforcement Program (NPS 2000a), in conjunction with the accompanying reference manual, establishes and defines standards and procedures for NPS law enforcement. Along with education and resource management, law enforcement is an important tool in achieving the NPS goals to protect human life and provide for injury-free visits. Commissioned rangers perform resource stewardship, education, and visitor use management activities, including law enforcement. They provide for tranquil, sustainable use and enjoyment of park resources while simultaneously protecting these resources from all forms of degradation. The objectives of the law enforcement program are to (1) prevent criminal activities through resource education, public safety efforts, and deterrence, (2) detect and investigate criminal activity, and (3) apprehend and successfully prosecute criminal violators.

Impacts to park operations from increased enforcement needs have been analyzed qualitatively using professional judgment to define thresholds or impact magnitude.

Impacts of the No-Action Alternative — Continue to Prohibit PWC Use

Analysis. PWC operations have been prohibited within Padre Island National Seashore since April 22, 2002. Park staff would continue to educate visitors about the restriction and continue the ban along the gulf shore and in Bird Island Basin. PWC restrictions are currently addressed at the entrance station, and a sign at North Beach informs visitors about the restriction within the national seashore waters. Information programs would be conducted at the most popular launch sites, as needed, in order to ensure compliance. Enforcement actions to ensure that PWC use restrictions were not violated could be completed using the existing ranger patrols. In addition, the park has received additional funding for its law enforcement program, so more rangers are available for patrolling and enforcing regulations. Impacts to park operations from continuing the ban on PWC use would be adverse, generally short term, and negligible.

Cumulative Impacts. Existing staff and boat patrol frequency are adequate to enforce current regulations. The proposed implementation of non-propeller areas, motorized boating areas, non-motorized boating areas, and kayak trails could reduce the amount of conflict between watercraft users, thus reducing the amount of intervention required by park rangers. Re-marking the park boundary would help ensure that visitors know when they have entered park waters and must therefore abide by park regulations, which might also benefit park law enforcement efforts. Cumulative impacts relating to park operations and enforcement would be adverse and negligible.

Conclusion. This alternative would have adverse, short-term, negligible impacts on park operations.

Impacts of Alternative A — Reinstate PWC Use as Previously Managed (before April 22, 2002)

Analysis. Boating regulations are enforced by both NPS rangers and Texas Parks and Wildlife officers. Padre Island National Seashore currently has one permanent law enforcement staff, or ranger, and one seasonal staff member. On weekends, two to three employees patrol the park from 7 a.m. to midnight, mostly on land, with sporadic patrols in the waters of the Laguna Madre and the gulf. A recent increase in law enforcement funding would augment overall ranger presence throughout the park, particularly related to water-based activities. Texas Park and Wildlife personnel patrol the waterways during the summer but do not have enforcement authority related to locational restrictions on PWC use.

Reinstating PWC use at Bird Island Basin and along the gulf coast would not likely require additional park patrols to ensure that use occurred only in authorized areas, because of the few PWC users that would be expected. There would be an initial need for additional public information and education, with a focus on the rules and regulations pertaining to use in the park. Therefore, this alternative would have an adverse, short-term, negligible to minor impact on park operations, depending on the length of time needed to educate users about the restrictions and the numbers of PWC users in park waters.

Cumulative Impacts. Park staff would continue to provide assistance to various user groups to resolve conflicts between them and ensure safety. According to park staff, existing operations do not focus on water-based activities. The staffing requirements to implement the PWC use restrictions would be adequate for handling cumulative impacts related to park operations. In addition, the proposed implementation of watercraft use areas and re-marking the park boundary should help reduce the amount of conflicts requiring intervention.

Conclusion. This alternative would have negligible to minor adverse impacts on park operations, since some additional public information and education efforts would be required to inform the public about PWC use restrictions in the park.

Impacts of Alternative B — Reinstate PWC Use Only in the Bird Island Basin Boat Channel

Analysis. PWC use under alternative B would be prohibited on the gulf beach, but would still be permitted in the Bird Island Basin boat channel. Park staff would have to monitor the Bird Island Basin area, because Texas Park and Wildlife personnel who patrol the Laguna Madre do not have enforcement authority. Enforcement activities, including additional education about the reinstatement and restrictions, could be accomplished using existing patrols, as described in alternative A. Therefore, this alternative would have an adverse, negligible to minor impact on park operations.

Cumulative Impacts. Cumulative impacts would be similar to those described for alternative A. The staffing requirements to implement the PWC restrictions would be adequate for handling cumulative impacts related to park operations.

Conclusion. Similar to alternative A, this alternative would have adverse, negligible to minor impacts on park operations, because most violations would occur in Bird Island Basin. Park staff would have to spend more time initially enforcing and educating visitors about the new regulation.

UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are impacts that cannot be avoided and cannot be mitigated and, therefore, would remain throughout the duration of the action. The following list describes potential adverse impacts related to the alternatives being considered:

- PWC use would cause minor levels of pollutant emissions into national seashore water and air under alternatives A and B. These impacts would decrease in the long term due to the required improvements in engine emission technology.
- PWC use and landing along the shoreline under alternatives A and B would have adverse impacts to the park's natural soundscape and could occasionally cause flight response in wildlife that are present along the shore.
- Submerged aquatic vegetation could be adversely affected by PWC users in the Laguna Madre under alternatives A and B. These impacts would not be noticeable and would not cause long-term changes in vegetation.
- Reinstated PWC use under alternatives A and B would have adverse impacts on the experiences of other visitors, through occasional noise and visual intrusions. Under the no-action alternative, PWC users who could no longer ride within the national seashore would be adversely affected.
- Reinstated PWC use under alternative A could result in minor impacts to submerged cultural resources by providing additional access and the potential for illegal collection or destruction of artifacts in the Mansfield Cut Underwater Archeological District.

THE RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

None of these resources would be impacted to the degree that long-term productivity would be lost.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible impacts are those effects that cannot be changed over the long term or are permanent. An effect to a resource is irreversible if the resource cannot be reclaimed, restored, or otherwise returned to its condition prior to the disturbance.

Irretrievable commitments of resources are those that, once gone, cannot be replaced; that is, the commitment of a renewable resource or the short-term commitment of any resource. These include the commitment of water quality and air quality by allowing all mobile sources desiring to do so, including personal watercraft, to resume using the national seashore under alternatives A and B. The use of fossil fuels to power PWC engines would be an irretrievable commitment of this resource; however, this use is minor.

CONSULTATION AND COORDINATION

PUBLIC SCOPING

Public scoping related to the prohibition of PWC use at Padre Island National Seashore occurred at two separate times. Public comment was first solicited on the ban in April 2002, prior to the issuance of the "Notice of Determination" in April 2002. A public meeting was held on April 4, 2002, to allow for public comment on the PWC ban. A mailing list of constituency individuals and groups likely to be interested in the PWC issue was used to inform the public about the meeting. Information on the PWC ban, including an invitation to the public meeting, was also described on the Padre Island National Seashore website.

A total of 28 people attended the meeting, in which the different management options for PWC use, including prohibition, was described. Approximately 20 people were in favor of the ban, 8 were against the ban, and a few complaints were received regarding the ban in general. The majority of people attending the meeting inquired about the rules regarding the ban and whether the ban was permanent.

A second effort to solicit public input was completed as part of the public involvement requirements for this environmental assessment. The mailing list, which includes 97 names of federal, state, and local agencies, individuals, and organizations, was used to distribute a newsletter.

The newsletter was sent in May 2002 to all addresses on the mailing list. The list below outlines public involvement steps that have been taken to date.

Date	Topic or Action
July 1998	Press picks up proposed rule and canvases park.
1998	Padre Island receives over 70 letters/cards supporting the PWC ban.
1999 – 2000	Padre Island received the final NPS rule and directions on how to proceed to implement the final rule. Padre Island received 800+ letters/cards "for" or "opposed" to the proposed special regulation.
Jan. 9, 2002	Padre Island initiates public outreach with a press release on the development of a determination to not seek special regulation to allow PWC use. Several hundred e-mails and letters were received over the next two months supporting a PWC ban.
Mar. 29, 2002	Padre Island announces an open house to discuss the determination and to allow public input.
Apr. 2–3, 2002	Padre Island receives 300+ e-mails and phone calls supporting a PWC ban by a 2 to 1 margin as opposed to the development of a special regulation to allow PWC use. Campaign initiated by the American Watercraft Association and the Personal Watercraft Industry Association.
Apr. 4, 2002	Padre Island holds an open house, 5 –7 p.m. A total of 28 people show up, of whom 20 favor a PWC ban and 8 are opposed.
Apr. 16, 2002	The National Park Service announces that Padre Island will prohibit PWC use beginning April 22, 2002. At that time, Padre Island also began the process of developing an environmental assessment.

The park received 53 comments prior to the issuance of this environmental assessment. Of that number, 19% were considered substantive. The comments expressed concern for the natural environment, particularly sea turtles, as reflected in the examples below:

> It is known that these beaches and waters are highly utilized by sea turtles, and it has been documented that the use of such watercraft could adversely affect sea turtles in these waters.
>
> The operation of personal watercraft at the seashore would likely result in collisions with the highly endangered Kemp's ridley sea turtle as well as other threatened and endangered sea turtles.
>
> All kinds of personal watercraft should be kept away from areas where the endangered Kemp's ridley and other sea turtles can be injured or adversely affected by noise and/or pollution.
>
> In my opinion, national seashores were created to ensure that some coastal areas remain as natural as possible. Personal watercraft will not enhance Padre Island national seashore; in fact it will degrade its value.

Commenters were also concerned about impacts to other visitors:

> Just one person on a PWC craft can spoil the day for literally hundreds of people on the shoreline.
>
> The price of a relatively few people's enjoyment is too high if it is destructive to sensitive sea creatures and their habitat as well as the pleasure of many visitors who go to the beach to enjoy nature and experience peace and quiet.

No substantive comments in support of PWC use at the national seashore were received.

CONSULTATION WITH OTHER AGENCIES

In accordance with the Endangered Species Act, the U.S. Fish and Wildlife Service was consulted about the presence of threatened, endangered, and candidate species, as well as species of concern within the area of PWC use in Padre Island National Seashore. Their response is included in appendix C. The Texas Department of Natural Resources was also contacted to determine if state-listed rare species and unique natural features are present in the area of PWC use; no response had been received from them at the time this document was printed.

A letter was also sent to the Texas State Historic Preservation Office, and no response had been received at the time this document was printed. Consultation with the SHPO will be completed upon issuance of this environmental assessment to the public, which will include a copy to the state historic preservation officer.

The following governmental agencies, groups, and organizations will be sent review copies of this environmental assessment.

U.S. Congress
Sen. J. Cornyn
Sen. Kay Bailey Hutchinson
Rep. Solomon Ortiz

Texas State Legislature
Sen. Chuy Hinojosa
Rep. Jaime Capelo
Rep. Judy Hawley
Rep. Velma Luna
Rep. Gene Seaman

Texas State Agencies
Texas General Land Office
Texas Historical Commission, Trans-Pecos Region
Texas Parks and Wildlife Department
Lower Coast Conservation Program

Local Governmental Agencies
Nueces County
Board of Commissioners
City of Corpus Christi
City Council
City Manager
City Secretary
Mayor

Businesses and Organizations
American Bird Conservancy
Audubon Outdoor Club
Audubon Texas
Breakaway Tackle
Coastal Bend Audubon Society
Coastal Bend Bays Foundation
Coastal Bend Bays and Estuaries Program, Inc.
Coastal Bend Sierra Club
Corpus Christi Visitor Bureau
Corpus Christi Windsurfing Association
Help Endangered Animals Ridley Turtles
Lower Laguna Madre Foundation
National Fish and Wildlife Foundation
Nature Conservancy
Padre Island Park Co.
Peregrine Fund, The
Saltwater Fisheries Enhancement Association
Sea Turtle Restoration Project
Texas Marine Mammal Stranding Network
Texas Sierra Club
University of Texas Marine Science Institute
Worldwinds Windsurfing

Newspapers, Radio and TV Stations
Austin American Statesman
Channel 3 TV
Corpus Christi Caller Times
Flour Bluff Sun
Houston Chronicle
Padre Island Moon
San Antonio Express News
KBRA
KBSO Radio
KDF TV
KEDT 16
KEYS Radio
KFGG Radio
KFTX FM
KIII TV
KLUX FM
KNCN/KRYS/KSAB
KORO TV
KRIS TV
KZFM Radio
KZTV 10
Sea Grant Texas
Valley Morning Star

APPENDIX A: PERSONAL WATERCRAFT USE NOTICE OF DETERMINATION

United States Department of the Interior
National Park Service
Padre Island NS
P.O. Box 181300
20301 Park Road 22
Corpus Christi, Texas 78418

IN REPLY REFER TO:

L7615

April 5, 2002

Memorandum

To: Associate Director, Park Operations and Education

Through: Director, Intermountain Region

From: Superintendent, Padre Island NS

Subject: Personal Watercraft (PWC) Notice of Determination

The National Park Service (NPS) issued the final rule for managing personal watercraft (PWC) use in areas of the National Park System on April 20, 2000 (36 CFR § 3.24(a)). This rule prohibits PWC use throughout the National Park System unless specifically exempted by legislation, rule, or management action. The final rule also requires specific National Park Service units to complete various levels of environmental analysis and documentation prior to adopting the rule, or authorizing PWC use in that park unit.

Two methods of authorizing PWC use are available under the final rule. One method is through the Superintendent's Compendium, and the other is through adoption of a Special Regulation. Padre Island National Seashore is addressed under the Special Regulation requirement and was required to complete a determination, including public comment period, by April 22, 2002. This document serves as the written administrative record for the decision to not seek Special Regulation to authorize PWC use within Padre Island National Seashore, and to allow the prohibition of PWC use to go into effect in April 2002.

This notice, and the supporting documentation of issues, impacts, the Determination of Appropriateness of Personal Watercraft Use, findings, and public outreach efforts conducted at Padre Island NS are submitted to the Regional Office for use and documentation.

Jock Whitworth

PROPOSED DETERMINATION OF APPROPRIATENESS OF PERSONAL WATERCRAFT (PWC) USE, PADRE ISLAND NATIONAL SEASHORE

March 8, 2002

Introduction

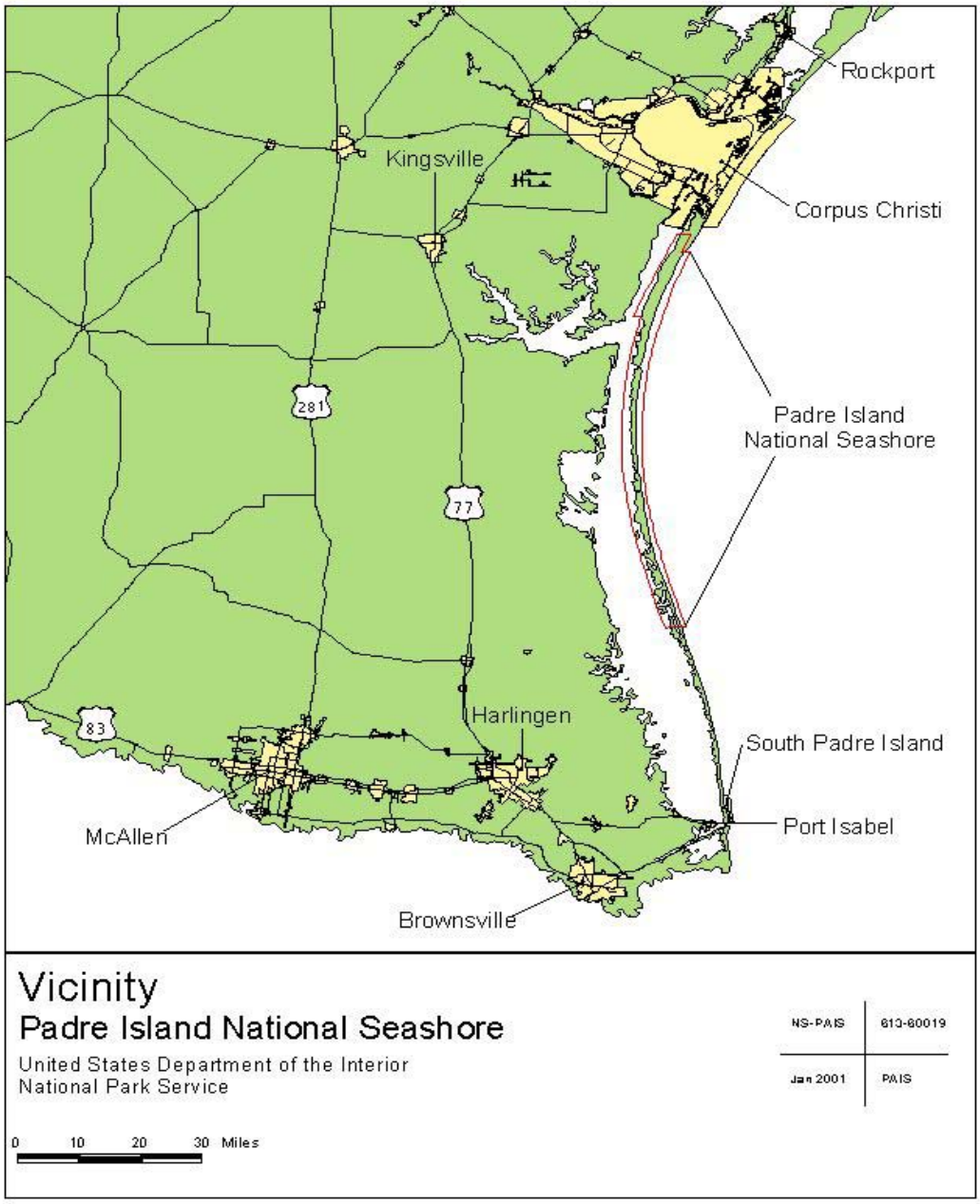
Padre Island National Seashore (NS) is a mostly undeveloped barrier island composed of 130,434 acres of upland grassland, beach shoreline and sand dune systems, emergent wetlands and inter-tidal algal mudflats, sporadically formed freshwater wetlands, and the highly productive, hyper-saline environment of the Laguna Madre lagoon. The Laguna Madre is a narrow, hyper-saline marine environment that extends from Corpus Christi Bay, south to the Rio Grande, covering approximately 320 km^2. There are about 18,682 acres of the Laguna Madre within Padre Island NS. The Laguna is noted as being one of the few hyper-saline bodies of water in the world, and one of the most productive estuarine ecosystems in the United States, which creates an extensive nursery habitat for finfish and shellfish and nesting colonial waterbirds. It averages only 0.76 meters in depth, and ranges from 0.5 K to 15 K in width, depending on wind generated tides. The Intra-Coastal Waterway extends from Texas to Florida and encompasses the length of the Laguna Madre, including the portion bordering the park. The Laguna Madre contains several species of seagrasses, including shoalgrass (*Halodule wrightii)*, widgeongrass (*Ruppia maritima)*, and manatee grass (*Syringodium testudium)*.

The boundary of the national seashore in the Gulf of Mexico is defined by water depth, and is set at two fathoms (12 feet). This depth is usually reached within ¼ mile of the shoreline and encompasses the near shore and surf zone environments. The southern boundary is set in the middle of Mansfield Channel, and connects to the western boundary on a wind tidal mudflat environment.

Background

Padre Island National Seashore has traditionally had limited "personal watercraft" or "PWC" use since its inception. Since 1997, PWC have been prohibited from operating within the Padre Island NS portion of the Laguna Madre, except for launching and direct travel to and from the Intra-coastal Waterway. In addition, PWC could only be operated south of the "Five-mile" marker on the Gulf of Mexico shoreline (Superintendent's Compendium).

The historical number of PWC used within Padre Island NS has been small, averaging around 250 sightings per year (5 PWC per week). In contrast, tourism at State and County parks and beaches 8 miles to the north, and South Padre Island 80 miles to the south of the national seashore have thousands of PWC users monthly (high use periods). Most PWC use by locals and visitors in these areas is associated with Gulf shoreline development (hotels/time shares), sporting and recreational apparel and equipment shops, small businesses, and various concessions operations that cater to the beach and Laguna Madre areas.


Rockport
Kingsville
Corpus Christi
281
Padre Island
National Seashore
77
Harlingen
83
South Padre Island
Port Isabel
McAllen
Brownsville
Vicinity
Padre Island National Seashore
United States Department of the Interior
National Park Service
NS-PAIS
613-60019
Jan 2001
PAIS
0 10 20 30 Miles

The term "personal watercraft" or "PWC" refers to a vessel usually less than sixteen feet in length using an internal combustion engine to power a water pump to provide primary propulsion. These vessels are rapidly evolving in their design and configuration, and are usually operated by a person or persons sitting, standing, or kneeling on the vessel, rather than within the confines of a hull. They are high performance vessels designed for speed and maneuverability. They are often used to perform stunt-like maneuvers and to get the passenger(s) to a destination in a more rapid, freeform manner. PWC refer to such vessels as the jet ski, waverunner, wavejammer, wetjet, sea-doo, wetbike, and surf jet to name a few.

As it stands today, PWC are recognized at Padre Island NS as class A motorboats and are treated and regulated as any other such vessel. All applicable Texas State or NPS regulations that apply to any registered vessel also apply to PWC.

PWC use has infrequently occurred in its short history of use within the waters of Padre Island NS. Currently, the Superintendent's compendium allows for PWC use within Padre Island NS in the Gulf of Mexico, below the five-mile marker on South Beach, and allows them to be launched at Bird Island Basin and driven directly out to or in from the Intracoastal Waterway (ICW) by way of the marked Bird Island Basin Boat Channel and be used outside of Padre Island NS boundaries in the intra-coastal waterway. Boating is not mentioned in Padre Island NS enabling legislation, but park management recognizes it as an appropriate recreational opportunity for many visitors.

The Laguna Madre offers numerous recreational opportunities for unique fishing experiences and has been used by private boaters, windsurfers, and fishermen for many years. Boating from Padre Island NS is traditionally a method to access the leased spoil island cabins outside of Padre Island NS boundary that are administered by the Texas General Land Office (TXGLO), and to shorten boating time to the lower Laguna Madre area.

The NPS began to recognize the need to address PWC use and its potential to impact park resources, values, and purposes several years ago. In 1994, the NPS prohibited the use of PWC at Everglades National Park through a special regulation (59 FR 58781). Studies conducted at the Everglades determined that the use of PWC over emergent vegetation, shallow grass flats and mud flats commonly used by feeding shore birds, damaged the vegetation, adversely impacted these shore birds, disturbed the life cycles of other wildlife, and was inconsistent with the resources, values and purpose for which the park was established. Padre Island NS, as well as Everglades National Park, was established to protect a unique natural ecosystem. NPS determined that activities such as water skiing and the use of PWC are incompatible with protecting such natural resources and preserving wilderness qualities such as serenity. The studies conducted at the Everglades recommended that the potential impact of PWC be studied before their use is permitted within other areas of the National Park System.

At about the same time as the Everglades rulemaking, the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration (NOAA) were addressing the impact of PWC on similarly sensitive resources and adopting regulations to manage PWC. NOAA has already regulated the use of PWC in most National Marine Sanctuaries. (See, e.g., 50 CFR 922). In PWIA v. the Department of Commerce, NOAA, 48 F.3d 540, (D.C. Cir. 1995), concerning PWC use in the Monterey Bay National Marine Sanctuary, the U.S. Court of Appeals for the District of Columbia Circuit held that Federal officials could regulate certain types of vessels (i.e., PWC) differently from other types of vessels.

Park Values and Significance Statements:

The following are value statements that represent the purpose of Padre Island NS and those aspects of the seventy (70) mile long barrier island that employees and key stakeholders have come to recognize as the

most important reasons Padre Island NS was set apart as a unit of the National Park system. It remains a place of scientific importance and offers an opportunity to reflect in a remote place of solitude and open wildness. The dune system, supported by a marine environment, still maintains the true character of an undeveloped coastal shoreline and functional barrier island.

Significance Statements

- Padre Island NS is the longest section of the longest undeveloped barrier island in the world; protecting rare coastal prairie, a complex, dynamic dune system, and the Laguna Madre, a hyper-saline lagoon environment.
- The location of the island, ocean dynamics, biotic diversity and integrity, lack of development, and easy access make Padre Island NS an ideal place to study natural communities and species associated with barrier islands.
- Padre Island NS includes important habitat for marine and terrestrial plants and animals, including a number of rare, threatened, and endangered species.
- Padre Island NS is the only area on the Texas coast where nests from all five species of sea turtles that occur in the Gulf of Mexico have been documented. More Kemp's ridley sea turtle nests have been found at Padre Island NS than anywhere else in the U.S.
- The Gulf of Mexico, Laguna Madre, and Mansfield Channel provide important habitat for these five sea turtle species.
- Situated along the central flyway, Padre Island NS is a globally important area for migratory, over-wintering, and resident birds; over 350 bird species inhabit the island.
- With the longest stretch of undeveloped barrier island beach in the world (accessible by vehicle), Padre Island NS provides rare opportunities for beach recreation in an environment of isolation and solitude.
- Padre Island NS offers outstanding recreational fishing opportunities in the Laguna Madre and the Gulf of Mexico.
- Bird Island Basin in the Laguna Madre is internationally recognized as one of the premier windsurfing areas in the world.
- The integrity of Padre Island NS as a cultural landscape exemplifies a continuum of human habitation and use from more than 2,500 years ago to today. Some of the richest and best-documented archival resources regarding Spanish exploration of North America document the history of the area that is now Padre Island NS.
- Padre Island NS includes important archeological resources to the era of early Spanish exploration – including three shipwrecks dating to 1554.
- The Novillo line camp and associated historic resources of Padre Island NS include the last remaining structures relating to barrier island open-range cattle ranching in the U.S.

Policy and Regulations

<u>Authority</u>:

The National Park Service (NPS) has the authority and mandates to manage units of the National Park System to protect, preserve, and provide for the use and enjoyment of those resources so as to prevent

impairment, to provide for solitude and the potential for experiencing the wildness of nature, and to promote opportunities for recreational enjoyment and scientific understanding of the environment. Preserving nature and the historical significance of times and places unique to our national heritage is fundamental to the purpose of the National Park System. Numerous case law and environmental policy and regulations assist the NPS in its efforts to protect, educate and inform the public on the unique and increasingly important natural environments that form our national park system. The mission of the National Park Service is to promote and protect the scenic and historic qualities, wildness of nature, and scientific value of these public lands, while educating and informing all visitors of their unique place in our country and in the lives of those generations that have come and gone or are our future generations.

A regulation (36 CFR 3.24) published in March 2000 authorized PWC use to continue in all or part of ten National Recreational Areas, including Amistad, Bighorn Canyon, Chickasaw, Curecanti, Gateway, Glen Canyon, Lake Mead, Lake Meredith, Lake Roosevelt and Wiskeytown-Shasta-Trinity. A review of the legislation which established these areas shows that water-based recreation is a primary purpose for these parks and that they are characterized by substantial motorized boating use. Initially PWC use in these areas was to be managed at the park level. In a subsequent court settlement the National Park Service agreed to manage PWC use in these parks through the formal rule-making process.

As part of the regulation a second group of park areas are allowed to authorize, manage, and restrict PWC use through Special Regulation Rulemaking through the "Federal Register." Parks under this authority include the National Seashores of Padre Island, Assateague, Cape Cod, Cape Lookout, Cumberland Island, Fire Island, and Gulf Islands, Indiana Dunes and Pictures Rocks National Lakeshores, Delaware Water Gap National Recreation Area, and Big Thicket National Preserve. PWC are allowed to operate in these areas during a two-year grace period while the parks seek special regulations necessary to authorize PWC use. For those areas that do not pursue special regulations, all PWC use will be prohibited at the end of the grace period, which is April 22, 2002.

Regulations, Policy, Park Purpose and Values

The National Park Service determines what types of activities are appropriate in units of the national park system. This is not an arbitrary decision process. It is guided by a codified body of laws and policies that have their roots in the congressional legislation that created the National Park Service in 1916, and subsequent policy decisions, congressional mandates, and legal decisions which are summarized below.

The National Park Service **Organic Act of 1916** (16 U.S.C. Section l, *et seq.)* gives broad authority to the NPS to:

> *"... regulate the use of the Federal areas known as national parks, monuments, and reservations...by such means and measures as conform to the fundamental purposes of said parks...which purpose is to conserve the scenery and the natural and historic objects and the wildlife 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 " (I 6 U.S. C. Section 1).*

In addition, the Organic Act (16 U.S.C. 3.) allows the NPS, through the Secretary of the Interior, to:

> *"make and publish such rules and regulations as he may deem necessary or proper for the use and management of the parks, monuments, and reservations under the jurisdiction of the National Park Service.... "*

In 1970, Congress amended the NPS Organic Act of 1916 to clarify its intentions as to the overall mission of the National Park Service. Through the **General Authorities Act of 1970** (16 U.S.C. la-1 through la-8), Congress brought all areas administered by the NPS into one National Park System and directed the NPS to manage all areas under its administration consistent with the Organic Act of 1916.

16 U.S.C. Section la-l states:

> *"The authorization of activities shall be conducted in the 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, except as may have been or shall be directly and specifically provided by Congress. "*

In the **Redwood Act of 1978**, Congress amended the General Authorities Act of 1970 and reassured System-wide the high standard of protection defined in the original Organic Act by stating:

> *"Congress further reaffirms, declares, and directs that the promotion and regulation of the various areas of the National Park System, as defined in Section I of this title, shall be consistent with and founded in the purpose established by Section I of this title, to the common benefit of all people of the United States. "*

16 U.S.C. Section lc defines the National Park System as:

> *"... any area of land and water now or hereafter administered by the Secretary of Interior through the National Park Service for park, monument, historic, parkway, recreational, or other purposes. "*

On December 27, 2000, Director Bob Stanton announced his approval of the 2001 edition of the National Park Service Management Policies. **Section S.2.3.3** discusses Personal Watercraft and states the following:

> *"Motorized Personal Watercraft (PWC) use is prohibited unless it has been identified as appropriate for a specific park. PWCs may be authorized if an evaluation of the park's enabling legislation, resources and values, other visitor uses, and overall management objectives confirms that PWC use is appropriate and consistent with the criteria in section 8.2."*

The criteria in section S.2 are as follows:

- *Enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks. The Service is committed to providing appropriate,* ***high quality opportunities for visitors*** *to enjoy the parks, and will maintain within the parks an atmosphere that is open, inviting, and accessible to every segment of American society. However, many forms of recreation enjoyed by the public do not require a national park setting, and are more appropriate to other venues. The Service will therefore:*
- *Provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the parks.*

- *Defer to local, state, and other Federal agencies; private industry; and nongovernmental organizations to meet the broader spectrum of recreational needs and demands.*

To provide for enjoyment of the parks, the National Park Service will encourage visitor activities that:

- *Are appropriate to the purpose for which the park was established; and·*
- *Are inspirational, educational, or healthful, and otherwise appropriate to the park environment; and*
- *Will foster an understanding of, and appreciation for, park resources and values, or will promote enjoyment through a direct association with, interaction with, or relation to park resources; and*
- *Can be sustained without causing unacceptable impacts to park resources or values.*

The Service will allow other visitor uses that do not meet all the above criteria if they are appropriate to the purpose for which the park was established and they can be sustained without causing unacceptable impacts to park resources or values.

Unless mandated by statute, the Service will not allow visitors to conduct activities that:

- *Would impair park resources or values;*
- *Create an unsafe or unhealthful environment for other visitors or employees;*
- *Are contrary to the purposes for which the park was established; or*
- *Unreasonably interfere with:*
  - *The atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park;*
  - *NPS interpretive, visitor service, administrative, or other activities;*
  - *NPS concessionaire or contractor operations or services; or*
  - *Other existing, appropriate park uses.*

As with the U.S. Coast Guard, NPS regulatory authority over waters subject to the jurisdiction of the United States, including navigable waters and areas within their ordinary reach, is based upon the Property and Commerce Clauses of the U.S. Constitution. In regards to the NPS, Congress in 1976 amended the 1970 Act for Administration (known as the **General Authorities Act**) and authorized and directed the NPS to 'promulgate and enforce regulations concerning boating and other activities on or relating to waters within areas of the National Park System, including waters subject to the jurisdiction of the United States . . .," (16 U.S.C. l a-2(h)).

In 1996 the NPS clarified that NPS regulations otherwise applicable within the boundaries of a National Park System unit apply on and within waters subject to the jurisdiction of the United States by publishing a final rule 36 CFR 1.2(a) which states:

> *"The regulations contained in this chapter apply to all persons entering, using, visiting, or otherwise within:*

> *(3) Waters subject to the jurisdiction of the United States located within the boundaries of the National Park System, including navigable waters and waters within their ordinary reach (up to the mean high water line in places subject to the ebb and flow of the tide and up to the ordinary high water mark in other places) and without regard to the ownership of submerged lands, tidelands, or lowlands."*

In proposing this rulemaking, NPS has considered certain legal issues brought to its attention about PWC regulation. The Personal Watercraft Industry Association believes that PWC are Class A vessels according to the USCG, and therefore cannot be singled out and regulated differently than any other Class A vessel. However, USCG officials state that the term "Class A" vessel no longer has any significant meaning other than with respect to certain fire extinguisher and life preserver requirements. Indeed, the Recreational Boating Product Assurance Division of the USCG has determined as a practical matter that the term "Class A" has no meaning insofar as Coast Guard regulations are concerned, except with regard to fire extinguisher regulations.

No matter how PWC are classified, NPS and other agencies believe PWC can be regulated differently from other vessels because of the unique performance capabilities and operational characteristics of PWC.

National Park Service PWC Regulation

On March 21, 2000, the NPS published final rules, discussed above, which prohibited PWC use in national park areas unless the Service determined that this type of water-based recreation activity is appropriate for a specific park, based on the legislation establishing that area, the park's resources and values, other visitor use of the area, and overall management objectives.

Padre Island NS Legislation and Management Plans

Public Law 94-578 established Padre Island NS in 1962. The mandate of Padre Island NS is to “save and preserve, for the purpose of public recreation, benefit, and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped …”

Analysis of Potential Resource Impacts

Noise:

A notable impact from the typical operation of PWC is the noise generated from the engine at maneuvering speeds, from the water-to-hull impacts during high-speed maneuvers, and from the typically repeated actions associated with recreating on this vessel. The erratic changes in engine pitch from changes in speed, the pulsation of sound produced by jumping boat wakes, etc., and repeated near shore maneuvers (circling, figure eights, jumping, etc.) usually performed in groups of two or more, create noise that is perceived, by other visitors, as both irritating and intrusive on the visitor experience. The Industry is making changes in the overall design of the vessel to reduce noise pollution. However, even with noise reduction in the engine, typical operation of the vessel will still produce those sounds found irritating to the visitor.

Wildlife is also affected by the continued operation of these types of vessels. The repeated activity and maneuvers typically conducted by PWC operators can negatively affect nearby wildlife populations within the park. At Padre Island NS, impacts will occur to nesting neo-tropicals and colonial waterbirds as they utilize several islands that lie within the seashore boundary, and the Laguna Madre shoreline. Allowing use in the Gulf Intra-coastal Waterway is not as impacting to wildlife as there is

major commercial shipping and recreational boating occurring daily. Differentiating noise from PWC use is not as important here due to overall noise impacts from ongoing boating and shipping activity.

PWC use east of the spoil island chain to the Laguna Madre shoreline would have moderate to major noise impacts on wildlife (birds) and people who are fishing, as do other banned vessels like airboats. Airboats are often operated in the extremely shallow waters of the Laguna Madre, but are prohibited from operating within Padre Island NS due to noise and the ability to negatively impact park resources.

The noise and typical activity issues are also the case for PWC use in those designated areas of the Gulf of Mexico, within the park and south of the 5-mile marker. That use is typically confined to the surf zone and noise generation would negatively impact shore birds, and those visitors who are fishing, camping or sunbathing along the shoreline. Because of these negative impacts, PWC activities are considered to have an impact on park resources, at least within several hundred feet of the recreational activity.

For these reasons, the use of PWC should be prohibited.

Air/Water Pollution

Hydrocarbon emissions from PWC use will add minimal amounts of air and water pollution to this environment. Occasional oil spills from offshore oil and gas facilities, commercial boating activities (near shore), and the few recreational vessels that utilize park waters would contribute a greater amount of hydrocarbon pollution than the rare to occasional PWC use. Overall PWC use of park waters in the Gulf of Mexico is minimal. Most activity is limited to shark fishing, delivering bait, and for going out to a desired depth of the surf zone. There are no reported occurrences of pollution from PWC use to date in the park.

Cumulative PWC use of the Gulf shoreline and Laguna Madre within park boundary is traditionally minimal. Therefore, prohibition of PWC use for air or water quality issues alone is not proposed. However, this issue is always a concern when protecting air and water quality within the park cumulatively as small incremental increases could lead to larger impacts if not monitored or controlled.

Wildlife

As mentioned above, the major impact from PWC use at this park would result from noise and "typical" operation of the vessel. There is ample documentation that supports noise and intrusion impacts to birds, mammals, reptiles, etc., which has and does occur within national parks. The same is true at Padre Island NS. Because of the known impacts of flushing, nest abandonment, and displacement effects on birds from past automobile use studies and published information, PWC use is considered an additional impact that is not beneficial to migrating, resting/loafing, or nesting bird populations.

When the Gulf Intracoastal Waterway (GICW) was created in the Laguna Madre, "spoil" from the dredging activities was deposited adjacent to the waterway. As this dredge spoil accumulated, islands were established and later utilized by numerous waterbird species. Padre Island NS contains two natural and twenty-three human-made islands that provide nesting habitat for nearly 20 species of birds. Some of these 20 bird species nest in large groups and are referred to as colonial waterbirds, wading, or shorebirds. These bird species include several federal and state protected species such as the Piping Plover (*Charadrius melodus*), Reddish Egret (*Egretta rufescens*), White-faced Ibis (*Plegadis chihi*), and the Least Tern (*Sterna antillarum*). In addition to the protected species, the park also contains one of only two annual saltwater populations of nesting American White Pelican (*Pelecanus erythrorhynchos*) in North

America. To demonstrate the importance of these islands as nesting and rearing areas, an average of 20,800 birds were counted on the park's islands during the 1998 through 2001 colonial water bird census efforts, which included such species as the Great Blue Heron (*Ardea herodias*), Laughing Gull (*Larus atricilla*), Black Skimmer (*Rynchops niger*), Royal Tern (*Sterna maxima*) and the Caspian Tern (*Sterna caspia*).

The PWC has the ability to be operated in areas typically too shallow or confining for other motorized boating traffic. Because of the limited use history here at Padre Island, and the typical use pattern of PWC operators, there is a greater potential for major impacts to wildlife and their habitat if PWC use is authorized. Being able to run in shallow water can disturb important seagrass habitat and fish populations, move and alter recreational fishing patterns, reduce development of young marine life populations, and negatively impact reproductive activity and overall marine productivity by affecting the habitat.

Currently, there are planning efforts underway to begin enhancement and protection of the spoil islands and natural islands for rookery use and non-motorized recreational activities. In addition, annual waterbird counts to determine the level and trend of nesting will continue, as will replacement of signs to maintain "buffer" distance (1,000 feet) and seasonal closures (February 15 through August 31). Proposed management actions on the spoil islands for the fall and winter of 2002 include placement of nest platforms on selected islands, continuation of the shoreline stabilization study to document island erosion, and an effort to begin replanting native vegetation to provide nesting habitat (while controlling encroaching non-native or exotic vegetation continues). A review of a limited program of predator control/removal is also being considered. PWC use is currently not authorized within the designated "buffer" zone established around the islands, to be defined in the developing spoil island management plan.

For these reasons, the use of PWC should be prohibited.

Visitor Experience

PWC use has major potential to conflict with other visitors' enjoyment of park values and purposes according to the evidence supplied in the NPS Final Rule. Many documented complaints throughout the National Park Service list the noise and pitch changes associated with PWC use. There are additional concerns when high speed PWC are operated in park areas used almost exclusively by slower moving watercraft on lakes, rivers and backwater areas, and in the surf zone. Experience has shown that the visitor experience is negatively impacted and recreational use conflicts arise from mixing incompatible recreational opportunities. When related to traditional river, lake, or secluded cove or inlet uses, the visitor experience is compromised with the introduction of PWC into the same area. This is true where the number of vessel launches or number of users (carrying capacity) is limited to protect the remote quality and expectations of solitude, and where parties encounter each other infrequently. Fishermen have also voiced concerns over the introduction of PWC use in areas historically known for their isolation, solitude, and overall fishing experience.

The areas north of the five-mile mark of South Beach on the Gulf of Mexico and at Bird Island Basin are the most popular recreational use areas in the park. These areas experience year-round fishing, camping, and boating or windsurfing visitation. This part of the Gulf shoreline is also highly utilized by swimmers and for surf fishing during the warm water seasons of spring, summer, and fall. The park has already received complaints about PWC operating in and around the Bird Island Basin shoreline, even though the area has been closed to PWC since 1995.

The NPS is aware that the use of PWC has raised controversy in numerous locations throughout the nation in addition to NPS units. PWC clearly differ from conventional watercraft in terms of design, use, safety record, controversy, and visitor and resource impacts. They are high performance vessels designed for speed and maneuverability and are often operated in an aggressive manner. One common complaint often voiced by the boating public about PWC is their operators' seeming disregard for other boaters and unsafe boating activity. Complaints include PWC operating too close to other boaters in order to jump the wake of the other boats, buzzing swimmers or sail craft, failure to control their vessels, going in circles in the same area for long periods of time, underage operators, and not observing "no wake" zones.

In an effort to avoid conflict among historic visitor use activities such as surf fishing, swimming, surfing, windsurfing, and sailing, PWC should be prohibited from operating in these areas.

Safety Concerns

While PWC make up about eleven percent of the vessels registered in the country, they comprise over 35 percent of the vessels involved in accidents. Forty-four percent of the boating injuries reported in 1996 involved PWC (National Association of State Boating Law Administrators). The majority of these accidents are attributed to rider inexperience and lack of skill, operation and use patterns, excessive speed, alcohol use, and conflicts with other vessels in congested use areas. Also, PWC are considered too dangerous to operate at night and are explicitly prohibited from night operation in some States. The number of PWC accidents has created enough concern that the United States Coast Guard, as well as many States, is looking into their use and operation and the potential for regulation. At least 34 States have implemented or are contemplating some type of legislation or regulation specific to PWC use, including minimum age requirement, education and training requirement, prohibition on wake jumping, specific use areas, speed limits, and adult presence on the vessel. The average shallowness of the Laguna Madre creates a potentially additional hazardous environment for PWC operation.

There is a strong potential for negatively impacting park operations, especially in smaller staffed areas like Padre Island NS. Based on statistics, there is a justifiable concern due to the greater potential for emergency response requirements and EMT callouts, and increased law enforcement presence necessary to address the "typical," documented PWC caused incidents and use.

For these reasons PWC use should be prohibited.

Findings and Determination

Based on the interdisciplinary team review of environmental impacts associated with PWC use within Padre Island NS, the past safety record of PWC use in other National Park units, the well documented nature and methods of PWC use, and minimal number of PWC used at Padre Island NS historically, the following determination is described below.

Appropriateness of PWC use within Padre Island National Seashore

Park Values and Purpose:

All but two of the Significant Statements listed above, that represent park values, are in conflict with the use of PWC within Padre Island National Seashore.

The use of PWC as a recreational pursuit in and of itself is not necessarily an appropriate use in certain units of the National Park System, especially where it has the potential to affect adversely the resources

and values of that unit or other visitors' enjoyment of those resources and values. Such use of PWC for excitement and thrills is to be distinguished from use of motorized vessels or vehicles for access and enjoyment of the statutorily protected resources, recreational opportunities, and scientific values of the park unit.

Impact to Park Resources

To minimize impacts to wildlife, to the resource sensitive Laguna Madre, and those spoil islands within Padre Island NS used by colonial waterbirds for nesting and loafing habitat, and to protect important neo-tropical migratory habitat along the shoreline and on the islands, PWC will be prohibited.

In addition, because of the potential for conflicting recreational uses with windsurfers, boaters and fishermen, and swimmers, and on the expected visitor experience impacts from PWC due to the noise and past safety record documented in the Final Rule, PWC are to be prohibited within Padre Island NS according to the Final Rule.

Continued use of the Bird Island Basin launch ramp to launch PWC, or launching of PWC below the Five-Mile marker on the Gulf of Mexico shoreline is also prohibited after April 22, 2002. Use can continue outside the boundary of Padre Island NS and within the confines of the Gulf Intracoastal Waterway, but no PWC launching or use may occur within the park boundary.

Safety and Enforcement

While PWC make up about eleven percent of the vessels registered in the country, they comprise over 35 percent of the vessels involved in accidents. Forty-four percent of the boating injuries reported in 1996 involved PWC (National Association of State Boating Law Administrators). PWC are explicitly prohibited from night operation in some States, and the number of PWC accidents has created enough concern that the United States Coast Guard, as well as many States, is looking into their use and operation and potential for regulation. At least 34 States have implemented or are contemplating some type of legislation or regulation specific to PWC use.

There is a strong potential for negatively impacting park operations, especially at this smaller staffed park. Based on statistics, there is a justifiable concern due to the greater potential for emergency response requirements and EMT callouts, and increased law enforcement presence necessary to address the "typical," documented PWC caused incidents and use. During the first season park personnel will prioritize education as the primary enforcement tool when encountering those in violation of 36 CFR 3.24.

Proposed Determination

PWC use within Padre Island NS will be prohibited for the reasons described above. Therefore, Padre Island NS will not seek Special Regulations to authorize PWC use in this park.

This determination, which will go into effect on April 22, 2002 is categorically excluded from further NEPA compliance, under Departmental exclusion 3.4 A (8) of DO-12. In compliance with Section 7 of the Endangered Species Act of 1973, as amended, the National Park Service has determined that this action will not adversely affect any federally listed threatened or endangered species, or designated habitat. This completes the compliance for this action.

/s/

Jock Whitworth

Superintendent, Padre Island NS

APPENDIX B: APPROACH TO EVALUATING SURFACE WATER QUALITY IMPACTS

Objective

Using simplifying assumptions, estimate the minimum (threshold) volume of water in a reservoir or lake below which concentrations of gasoline constituents from PWC or outboards would be potentially toxic to aquatic organisms or humans. Using the estimated threshold volumes, and applying knowledge about the characteristics of the receiving waterbody and the chemical in question, estimate if any areas within the waterbody of interest may present unacceptable risks to human health or the environment.

Overall Approach

Following are the basic steps in evaluating the degree of impact a waterbody (or portion of a water-body) would experience based on an exceedance of water quality standards / toxicity benchmarks for PWC- and outboard-related contaminants.

1. Determine concentrations of polycyclic aromatic hydrocarbons (PAHs), benzene, and methyl tertiary-butyl ether (MTBE) in gasoline (convert from weight percent to mg/L, as needed) and PAHs in exhaust. The half-life of benzene in water is five hours at 25°C (Verschuren 1983; US EPA 2001).
2. Estimate loading of PAHs, benzene, and MTBE for various appropriate PWC-hour levels of use for one day (mg/day)
3. Find/estimate ecological and human health toxicity benchmarks (risk-based concentrations [RBCs]) (micrograms per liter [µg/L]) for PAHs, benzene, and MTBE.
4. Divide the estimated loading for each constituent (µg) by a toxicity benchmark (µg/L) to determine the waterbody threshold volume (L) below which toxic effects may occur (convert liters to ac-ft).

Estimated reductions in hydrocarbon (HC) emissions from PWC and outboards will be substantially reduced in the near future, based on regulations issued by the U.S. Environmental Protection Agency and California Air Resources Board (see the estimated reductions in the Environmental Consequences section [Water Quality]).

Assumptions and Constants

Several assumptions must be made in order to estimate waterbody threshold volumes for each HC evaluated. Each park should have park-specific information that can be used to modify these assumptions or to qualitatively assess impacts in light of park-specific conditions of mixing, stratification, etc. and the characteristics of the chemicals themselves. The assumptions are as follows:

- BTEX (benzene, toluene, ethyl benzene, and xylene) are volatile and do not stay in the water column for long periods of time. Because benzene is a recognized human carcinogen, it is retained for the example calculations below and should be considered in each environmental assessment or environmental impact statement (Verschuren 1983; US EPA 2001).

- MTBE volatilizes slightly and is soluble in water. MTBE may accumulate in water from day to day, but this is not factored into the calculation and should be considered qualitatively in the assessment.
- PAHs volatilize slightly (depending on structure and molecule size) and may adhere to sediment and settle out of the water column or float to the surface and be photo-oxidized. They may accumulate in water from day to day, but this is not factored into the calculation and should be considered qualitatively in the assessment.
- The toxicity of several PAHs increases (by several orders of magnitude) when the PAHs are exposed to sunlight. This was not incorporated because site-specific water transparency is not known, and should be discussed qualitatively.
- The threshold volume of water will mix vertically and aerially with contiguous waters to some extent, but the amount of this mixing will vary from park to park and location to location in the lake, reservoir, river, etc. Therefore, although the threshold volume calculation assumes no mixing with waters outside the "boundary" of the threshold volume of water, this should be discussed in the assessment after the threshold volume is calculated. The presence or absence of a thermocline should also be addressed.
- Volume of the waterbody, or portion thereof, is estimated by the area multiplied times the average depth.

In addition to these assumptions, several constants required to make the calculations were compiled from literature and agency announcements. Gasoline concentrations are provided for benzene, MTBE and those PAHs for which concentrations were available in the literature. Constants used are:

- Gasoline emission rate for two-stroke PWC: 3 gal/hour at full throttle (CARB 1998)
- Gasoline emission rate for two-stroke outboards: estimated at approximately the same as for PWC for same or higher horsepower outboards (80–150 hp). Small (e.g. 15 hp) outboards have emission rates approximately twice that of PWC or large outboards. This estimate is based on data from figures 5, 6, and 8 of Allen et al. (1998). Other studies may show different results, e.g. about the same emissions regardless of horsepower, or larger horsepower engines having more emissions than smaller engines (e.g., CARB 2001); the approach selected represents only one reasonable estimate. (Note: Assume total hours of use for the various size boats/motors, and that smaller [15 hp] motors that exhaust relatively more unburned fuel would probably be in use for a shorter period of time or at slower speeds than recreational speedboats and PWC).
- 1 gallon = 3.78 liters
- Specific gravity of gasoline: 739 g/L
- 1 acre-foot = 1.234×10^6 L
- Concentration of benzo(a)pyrene (B[a]P) in gasoline: 2.8 mg/kg (or 2.07 mg/L) (Gustafson et al. 1997)
- Concentration of naphthalene in gasoline: 0.5% or 0.5 g/100 g (or 3,695 mg/L) (Gustafson et al. 1997)
- Concentration of 1-methyl naphthalene in gasoline: 0.78% or 0.78 g/100 g (or approx. 5,760 mg/L) (estimated from Gustafson et al. 1997)
- Concentration of benzene in gasoline: 2.5% or 2.5 g/100 g (or 1.85×10^4 mg/L) (Hamilton 1996)

- Concentration of MTBE in gasoline: 15% or 15 g/100 g (or approx. 1.10×10^5 mg/L) (Hamilton 1996). (Note: MTBE concentrations in gasoline vary from state to state. Many states do not add MTBE.)
- Estimated emission of B(a)P in exhaust: 1080 µg/hr (from White and Carroll, 1998, using weighted average B(a)P emissions from 2-cylinder, carbureted two-stroke liquid cooled snow mobile engine using gasoline and oil injected Arctic Extreme injection oil, 24-38:1 fuel:oil ratio. Weighted average based on percentage of time engine was in five modes of operation, from full throttle to idle).
- Estimated amount of B(a)P exhaust emissions retained in water phase = approximately 40% (based on value for B(a)P from Hare and Springer, quoted in North American Lake Management Society 2001).

Toxicity Benchmarks

A key part of the estimations is the water quality criterion, standard, or toxicological benchmark for each contaminant evaluated. There are no EPA water quality criteria for the protection of aquatic life for the PWC-related contaminants (EPA 2002b). There are, however, limited EPA criteria for the protection of human health (via ingestion of water and aquatic organisms) (EPA 2002b). Chronic ecological and human health benchmarks for contaminants were acquired from various sources.

Ecological benchmarks for benzo(a)pyrene, naphthalene, and benzene are from *EPA Region 6 Surface Water Screening Benchmarks* (EPA 2005). The benchmarks for 1-methyl naphthalene (19 and 34 µg/L) are based on acute toxicity (LC_{50}) values of 1900 and 3400 µg/L for the marine invertebrate, dungeness crab, and the fresh water/estuarine fish, sheepshead minnow, respectively (USFWS 2000a). The MTBE benchmarks of 18,000 and 51,000 µg/L are for marine and fresh water, respectively, and are based on the preliminary chronic water quality criteria presented in Mancini et al. (2002).

State water quality standards (including the numeric standards and descriptive text) must be reviewed and applied, as appropriate for each park being evaluated. Be sure to use the standards or criteria that fit the designated uses for the waters in the park – e.g., is it designated as a drinking water source or used only for support of aquatic life (fishing)? This will determine whether you use a protection of human health "water plus organism" benchmark or the benchmark for "ingestion of aquatic organisms only." Also be sure you are using the correct benchmark for either freshwater or marine/estuarine locations if there are different numbers provided for these two environments. Following are the toxicity benchmarks for the PAHs, benzene, and MTBE having gasoline concentration information:

Chemical	Ecological Benchmark (µg/L)	Source	Human Health Benchmark** (µg/L)	Source
Benzo(a)pyrene	0.014	EPA Region 6 2005	0.0044** 0.049***	US EPA 2002a
Naphthalene	250	EPA Region 6 2005	--	--
1-methyl naphthalene	19–34*	USFWS 2000a	--	--
Benzene	100	EPA Region 6 2005	1.2** 71***	US EPA 2002a
MTBE****	18,000 53,000	Mancini et al. 2002	13	--

* Based on LC_{50}s of 1900 and 3400 µg/L for dungeness crab and sheepshead minnow, respectively (34 µg/L used for freshwater calculations; 19 µg/L used for marine and estuarine calculations).

** Based on the consumption of water and aquatic organisms.

*** Based on the consumption of aquatic organisms only.

**** Ecological benchmarks considered preliminary chronic water quality criteria for marine and freshwater, respectively. Human health toxicological information for MTBE is currently under review. There is no EPA human health benchmark, but California has established a public health goal of 13 µg/L, which is used in the calculations below.

Example Calculations

Calculations of an example set of waterbody volume thresholds are provided below for the chemicals listed above together with their concentrations in gasoline and available toxicity benchmarks.

Loading to Water

Loadings of the five contaminants listed above are calculated for one day assuming 10 PWC operate for four hours (40 PWC-hours), each discharging 3 gallons (11.34 L) gasoline per hour and having concentrations in fuel or exhaust as listed.

Benzo(a)pyrene (from the fuel): 40 PWC-hrs × 11.34 L gas/hr × 2.07 mg/L = 939 mg

Benzo(a)pyrene (from the gas exhaust): 40 PWC-hrs × 1080 μg/hr × 1/1000 mg/μg × 0.40 = 17 mg

Total B(a)P = 956 mg

Naphthalene: 40 PWC-hrs × 11.34 L gas/hr × 3695 mg/L = 1.68×10^6 mg

1-methyl naphthalene: 40 PWC-hrs × 11.34 L gas/hr × 5764 mg/L = 2.62×10^6 mg

Benzene: 40 PWC-hrs × 11.34 L gas/hr × 1.85×10^4 mg/L = 8.39×10^6 mg

MTBE: 40 PWC-hrs × 11.34 L gas/hr × 1.10×10^5 mg/L = 4.99×10^7 mg

Loadings of contaminants from two-stroke outboards should be estimated based on the estimated loading based on the horsepower of the outboards involved (see "Assumptions and Constants" above) and the estimated hours of use, based on the types of boats and the pattern of use observed.

Threshold Volumes

Threshold volumes of water (volume at which a PWC- or outboard-related contaminant would equal the thresholds listed above) are calculated by dividing the estimated loadings (mg of contaminant) for the number of operational hours (e.g., 40 PWC-hours) by the listed toxicity benchmark concentrations (μg/L), correcting for units (1 mg = 10^3 μg), and converting from liters to acre-feet (1 acre-foot = 1.234 X 10^6 L):

Protection of Aquatic Organisms (fresh water)

Benzo(a)pyrene: 956 mg B(a)P × 10^3 μg/mg / 0.014 μg/L = 6.8×10^7 L or 55 ac-ft

Naphthalene: 1.68×10^6 mg naphthalene × 10^3 μg/mg / 250 μg/L = 6.72×10^6 L or 5.4 ac-ft

1-methyl naphthalene: 2.62×10^6 mg 1-methyl naphthalene. × 10^3 μg/mg / 34 μg/L = 7.69×10^7 L or 62 ac-ft

Benzene: 8.39×10^6 mg benzene × 10^3 μg/mg / 100 μg/L = 8.39×10^7 L or 68 ac-ft

MTBE (chronic): 4.99×10^7 mg MTBE × 10^3 μg/mg / 18,000 μg/L = 2.77×10^6 L or 2.2 ac-ft

MTBE (acute): 4.99×10^7 mg MTBE × 10^3 μg/mg / 53,000 μg/L = 9.42×10^5 L or 0.76 ac-ft

Based on these estimates and assumptions, benzene appears to be the contaminant (of those analyzed) that would be the first to accumulate to concentrations potentially toxic to aquatic organisms (i.e., it requires more water [68 ac-ft] to dilute the contaminant loading to a concentration below the toxicity

benchmark); however, the threshold volumes are very similar among 1-methyl naphthalene, benzo(a)pyrene, and benzene.

Protection of Human Health (ingestion of water plus organisms)

Benzo(a)pyrene: 956 mg B(a)P × 10^3 µg/mg / 0.0044 µg/L = 2.17 × 10^8 L or 180 ac-ft

Benzene: 8.39 × 10^6 mg benzene × 10^3 µg/mg / 1.2 µg/L = 6.99 × 10^9 L or 5,700 ac-ft

Note: If CA public health goal of 13 µg/L used: *MTBE:* 4.99 × 10^7 mg MTBE × 10^3 µg/mg / 13 µg/L = 3.83 × 10^9 L or 3,100 ac-ft

The California public health goal for MTBE is a drinking water–based goal and is not directly comparable to the other criteria used in this analysis. However, it may be of interest, since MTBE is very soluble, and MTBE concentration could be an issue if the receiving body of water is used for drinking water purposes and MTBE is not treated. Using the numbers provided above, benzene would be the first PWC-related contaminant in these example calculations that would reach unacceptable levels in surface water; however, volatilization of benzene from water to air was not included in the calculation. MTBE would be the next contaminant to reach unacceptable concentrations. If human health water quality criteria for ingestion of aquatic organisms only were used for benzo(a)pyrene and benzene (0.049 µg/L and 71 µg/L, respectively), the corresponding threshold volumes would be 16 acre-feet and 96 acre-feet.

As a result of the estimated reductions in HC emissions (from the unburned fuel) in response to EPA regulations (listed above), additional PWC and/or outboards may be used in the parks without additional impacts to water quality. For example, based on the expected overall reductions from EPA (1996a, 1997), up to 75% additional PWC/ outboards may be used in a given area in 2025 without additional impacts to water quality over current levels. Effects on noise levels, physical disturbance, or hydrocarbon emissions that are products of combustion (e.g., B(a)P) may not be similarly ameliorated by the reduced emission regulations.

Application of Approach

Use of the approach described above for evaluating possible exceedance of standards or other benchmarks must be adapted to the unique scenarios presented by each park, PWC use, and waterbody being evaluated. *State water quality standards (including the numeric standards and descriptive text) must be reviewed and applied, as appropriate.*

Factors that would affect the concentration of the contaminants in water must be discussed in light of the park-specific conditions. These factors include varying formulations of gasoline (especially for MTBE); dilution due to mixing (e.g., influence of the thermocline), wind, currents, and flushing; plus loss of the chemical due to volatilization to the atmosphere (Henry's Law constants can help to predict volatilization to air; see Yaws et al. 1993); adsorption to sediments and organic particles in the water column (e.g., PAHs), oxidation, and biodegradation (breakdown by bacteria). Toxicity of phototoxic PAHs may be of concern in more clear waters, but not in very turbid waters.

The chemical composition of gasoline will vary by source of crude oil, refinery, and distillation batch. No two gasolines will have the exact same chemical composition. For example, B(a)P concentrations may range from 0.19 to 2.8 mg/kg, and benzene concentrations may range from 0 to 7% (2%–3% is typical). MTBE concentrations will vary from state to state and season to season, with concentrations ranging from 0% to 15%. The composition of gasoline exhaust is dependent on the chemical composi-

tion of the gasoline and engine operating conditions (i.e., temperature, rpms, and oxygen intake). If site-specific information is available on gasoline and exhaust constituents, they should be considered in the site-specific evaluation. If additional information on the toxicity of gasoline constituents (e.g., MTBE) become available, they should be considered in the site-specific evaluation.

Lastly, results of the studies included in the collection of papers entitled "Personal Watercraft Research Notebook" provided by the NPS staff, can be used to provide some framework for your analysis. The following table summarizes some of the results presented in various documents on the collection for benzene, benzo(a)pyrene, and MTBE.

Table B-1: Pollutant Concentrations Reported in Water

Pollutant	Source(s)	Levels Found	
		"Lower Use" (e.g. open water, offshore locations; reduced motorized watercraft use)	"Higher Use" (e.g., nearshore, motorized watercraft activity high)
Benzene	*Lake Tahoe Motorized Watercraft Report* (Allen et al. 1998); several studies reported 1. USGS 2. Miller and Fiore 3. U of CA	1. <0.032 µg/l 2. ≤0.3 µg/l 3. <0.1 µg/l	1. 0.13 – 0.33 µg/l 2. just over 1 µg/l 3. 0.1 – 0.9 µg/l
PAHs	A. Mastran et al. B. Oris et al.	A. All below detection limits (<0.1 µg/l for pyrene and naphthalene; <2.5 µg/l for B(a)P, B(a)A, chrysene) B. Experiment #1 – 2.8 ng/l phototoxic PAHs	A. Total PAHs – up to 4.12 µg/l in water column; total PAHs – up to 18.86 µg/l in surface sample at marina, with naphthalene at 1 µg/l; B(a)P – ≥2.3 µg/l B. Experiment #1 – ± 45 ng/l photo-toxic PAHs; 5–70 ng/L total PAHs
MTBE	A. *Lake Tahoe Motorized Watercraft Report* (Allen et al. 1998); several studies reported 1. USGS 2. Miller and Fiore 3. U of CA 4. U of Nevada – Fallen Leaf Lake 5. Donner Lake (Reuter et al. 1998) B. NPS, VanMouwerik and Hagemann 1999 6. Lake Perris 7. Shasta Lake 8. 3-day Jet Ski event 9. Lake Tahoe	1. 0.11 – 0.51 µg/l 2. ≤3 µg/l 3. less than nearshore area 4. -- 5. <0.1 µg/l 6. 8 µg/l (winter)	1. 0.3 – 4.2 µg/l 2. 20 µg/l (up to approx. 31 µg/l) 3. up to 3.77 µg/l 4. 0.7 – 1.5 µg/l 5. up to 12 µg/l (Dramatic increase from 2 to 12 µg/l from July 4 to 7) 6. up to 25 µg/l 7. 9–88 µg/l over Labor Day weekend 8. 50–60 µg/l 9. often within range of 20–25 µg/l, with max of 47 µg/l

APPENDIX C: CONSULTATION LETTERS

TEXAS PARKS & WILDLIFE

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EXECUTIVE DIRECTOR

April 9, 2003

Mr. Jock Whitworth
US Department of the Interior
National Park Service
Padre Island National Seashore
P.O. Box 181300
Corpus Christi, TX 78480-1300

Dear Mr. Whitworth:

This letter is in response to your information request sent to Mr. Ismael Nava, TPWD Resource Protection Division, dated March 10, 2003, for rare and threatened and endangered (T&E) species within Padre Island National Seashore (PINS) in Willacy, Kenedy, and Kleberg counties. TPWD understands this information request is associated with proposed personal watercraft use at PINS. This response does not constitute a review of potential impacts to rare and T&E species from proposed project activities.

Given the small proportion of public versus private land in Texas, the TPWD Biological and Conservation Data System (BCD) does not include a representative inventory of rare resources in many areas of the state. Although it is based on the best data available to TPWD regarding rare species, the data from the BCD do not provide a definitive statement as to the presence, absence, or condition of special species, natural communities, or other significant features in your project area. These data cannot substitute for an on-site evaluation by your qualified biologists. The BCD information is intended to assist you in avoiding harm to species that may occur on your site.

Currently, the below BCD occurrences are documented within or possibly within PINS. BCD printouts are enclosed for these occurrences. **Please do not include the occurrence printouts in your draft or final documents. Because some species are especially sensitive to collection or harassment, these records are for your reference only.** If you would like additional copies of these printouts, please do not hesitate to contact me.

ENJOY THE TEXAS OUTDOORS!

Take a kid hunting or fishing

Visit a state park or historic site

Federal and State Listed Endangered
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)
Loggerhead Sea Turtle (*Caretta caretta*)

Federal and State Listed Threatened
Piping Plover (*Charadrius melodus*)

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512-389-4800
www.tpwd.state.tx.us

To manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.
multi info only padre island ns.doc

State Listed Threatened and/or Endangered
Peregrine Falcon (*Falco peregrinus*)

State Listed Threatened
Mexican Treefrog (*Smilisca baudinii*)
Black-striped Snake (*Coniophanes imperialis*)
Indigo Snake (*Drymarchon corais*)

Species of Concern
Keeled Earless Lizard (*Holbrookia propinqua*)
Plains gumweed (*Grindelia oolepis*)

Special Feature
Colonial Waterbird Rookery

Natural Community
Seacoast Bluestem-Gulfdune Paspalum (*Schizachyrium scoparium* var. *littoralis-Paspalum monostachyum*) Series

TPWD does not designate critical habitat for state-listed species or species of concern. For information on critical habitat of federally listed species potentially occurring on or near PINS, please contact the US Fish and Wildlife Service Corpus Christi Ecological Services office at (361) 994-9005.

Enclosed are copies of the TPWD county lists of rare and T&E species for Willacy, Kenedy, and Kleberg counties. TPWD recommends the county lists be reviewed entirely as species could be present depending upon habitat availability. If rare or T&E plant or animal species are found within or near the project area, TPWD recommends precautions be taken to avoid adverse impacts to them.

The information request stated an Environmental Assessment (EA) is being prepared for the proposed project. This office of TPWD would appreciate receiving a copy of the EA for review during the NEPA process. The EA may be sent to: Habitat Assessment Program, 3000 S. IH-35, Suite 100, Austin, TX 78704.

This letter does not constitute a general review of fish and wildlife impacts that might result from the activity for which this information is provided. Should you need such a review, contact Kathy Boydston, TPWD Wildlife Habitat Assessment Program, Wildlife Division (512) 389-4571.

Thank you for the opportunity to provide information for this project. Please contact me if you have any questions or need additional assistance (512) 912-7054.

Sincerely,

Amy Sugeno, Habitat Review Assistant
Wildlife Habitat Assessment Program, Wildlife Division
Threatened and Endangered Species

Enclosures (2)

cc: Smiley Nava, TPWD Resource Protection

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

April 14, 2003

Jock F. Whitworth
Superintendent
Padre Island National Seashore
P.O. Box 181300
Corpus Christi, TX 78480-1300

Consultation No. 2-11-03-I-0200

Dear Mr. Whitworth:

This responds to your March 10, 2003 letter to the U.S. Fish and Wildlife Service (Service) regarding the preparation of an Environmental Assessment (EA) to identify and consider alternatives for personal watercraft use at Padre Island National Seashore (PINS) and the request for information concerning Federally-listed threatened and endangered species that may exist at PINS. Enclosed for your information is an update of federally-listed species occurring in Nueces and Kleberg Counties. The list may include endangered and threatened species, as well as proposed species, candidate species, and species of concern. Proposed species are candidate species for which rules have been published in the Federal Register, nominating the species for threatened or endangered status. Candidate Species and Species of Concern currently have no legal protection under the Endangered Species Act, however, they may be protected under other Federal and/or State laws. There are no designated critical habitat units for any listed species located within PINS. If you determine any potential project impacts to these species, the Service would like to provide technical assistance to help avoid or minimize adverse effects. Addressing these species at this stage could better provide for overall ecosystem health in the local area and may avert potential future listing.

The Service will be glad to review your draft EA, upon its completion, in order to assessthe project alternatives for impacts to endangered or threatened species, and other valuable natural resources. If we can be of further assistance, please contact Dr. Larisa Ford at (361)994-9005, or by email Larisa_Ford@fws.gov.

Sincerely,

Robyn A. Cobb

FOR Allan M. Strand
Field Supervisor

Enclosures

Federally Listed as Threatened and Endangered Species of Texas
November 13, 2002

This list represents species that may be found in counties throughout the state. It is recommended that the field station responsible for a project area be contacted if additional information is needed.

DISCLAIMER

This County by County list is based on information available to the U.S. Fish and Wildlife Service at the time of preparation. This list is subject to change, without notice, as new biological information is gathered and should not be used as the sole source for identifying species that may be impacted by a project.

Migratory Species Common to many or all Counties: Species listed specifically in a county have confirmed sightings. If a species is not listed they may occur as migrants in those counties.

Least tern	(E ~)	*Sterna antillarum*
Whooping crane	(E w/CH)	*Grus americana*
Bald eagle	(T)	*Haliaeetus leucocephalus*
Piping plover	(T w/CH)	*Charadrius melodus*
Loggerhead shrike	(SOC)	*Lanius ludovicianus*
White-faced ibis	(SOC)	*Plegadis chihi*

Our data indicate that the following species may occur in Kleberg County:

Gulf Coast Jaguarundi	(E)	*Herpailurus yagouaroundi cacomitli*
Ocelot	(E)	*Leopardus pardalis*
West Indian manatee (=Florida)	(E)	*Trichechus manatus*
Brown pelican	(E)	*Pelecanus occidentalis*
Northern aplomado falcon	(E)	*Falco femoralis septentrionalis*
Hawksbill sea turtle	(E w/CH‡)	*Eretmochelys imbricata*
Kemp's Ridley sea turtle	(E)	*Lepidochelys kempii*
Leatherback sea turtle	(E w/CH‡)	*Dermochelys coriacea*
Black lace cactus	(E)	*Echinocereus reichenbachii* var. *albertii*
Slender rush-pea	(E)	*Hoffmannseggia tenella*
South Texas ambrosia	(E)	*Ambrosia cheiranthifolia*
Green sea turtle	(T)	*Chelonia mydas*
Loggerhead sea turtle	(T)	*Caretta caretta*
American alligator	(TSA)	*Alligator mississipiensis*
Bald eagle	(T)	*Haliaeetus leucocephalus*
Piping plover	(T w/CH)	*Charadrius melodus*
Mountain plover	(P/T)	*Charadrius montanus*
Audubon's oriole	(SOC)	*Icterus graduacauda audubonii*
Cerulean warbler	(SOC)	*Dendroica cerulea*
Ferruginous hawk	(SOC)	*Buteo regalis*

Loggerhead shrike	(SOC)	*Lanius ludovicianus*
Reddish egret	(SOC)	*Egretta rufescens*
Sennett's hooded oriole	(SOC)	*Icterus cucullatus sennetti*
Texas Botteri's sparrow	(SOC)	*Aimophila botterii texana*
Texas olive sparrow	(SOC)	*Arremonops rufivirgatus rufivirgatus*
White-faced ibis	(SOC)	*Plegadis chihi*
Black-spotted newt	(SOC)	*Notophthalmus meridionalis*
Rio Grande lesser siren	(SOC)	*Siren intermedia texana*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*
Bailey's ballmoss	(SOC)	*Tillandsia baileyi*
Lilia de los llanos	(SOC)	*Echeandia chandleri*
Welder machaeranthera	(SOC)	*Psilactis heterocarpa*
Maculated manfreda skipper	(SOC)	*Stalligsia maculosus*

Our data indicate that the following species may occur in Nueces County:

Gulf Coast Jaguarundi	(E)	*Herpailurus yagouaroundi cacomitli*
Ocelot	(E)	*Leopardus pardalis*
Brown pelican	(E)	*Pelecanus occidentalis*
West Indian manatee (=Florida)	(E)	*Trichechus manatus*
Hawksbill sea turtle	(E w/CH‡)	*Eretmochelys imbricata*
Kemp's Ridley sea turtle	(E)	*Lepidochelys kempii*
Leatherback sea turtle	(E w/CH‡)	*Dermochelys coriacea*
Slender rush-pea	(E)	*Hoffmannseggia tenella*
South Texas ambrosia	(E)	*Ambrosia cheiranthifolia*
Piping plover	(T w/CH)	*Charadrius melodus*
Green sea turtle	(T)	*Chelonia mydas*
Loggerhead sea turtle	(T)	*Caretta caretta*
Mountain plover	(P/T)	*Charadrius montanus*
Audubon's oriole	(SOC)	*Icterus graduacauda audubonii*
Black rail	(SOC)	*Laterallus jamaicensis*
Black tern	(SOC)	*Chlidonias niger*
Cerulean warbler	(SOC)	*Dendroica cerulea*
Ferruginous hawk	(SOC)	*Buteo regalis*
Loggerhead shrike	(SOC)	*Lanius ludovicianus*
Northern gray hawk	(SOC)	*Buteo nitidus maximus*
Reddish egret	(SOC)	*Egretta rufescens*
Sennett's hooded oriole	(SOC)	*Icterus cucullatus sennetti*
Texas Botteri's sparrow	(SOC)	*Aimophila botterii texana*
Texas olive sparrow	(SOC)	*Arremonops rufivirgatus rufivirgatus*
White-faced ibis	(SOC)	*Plegadis chihi*
Black-spotted newt	(SOC)	*Notophthalmus meridionalis*
Rio Grande lesser siren	(SOC)	*Siren intermedia texana*
Gulf salt marsh snake	(SOC)	*Nerodia clarkii*
Texas diamondback terrapin	(SOC)	*Malaclemys terrapin littoralis*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*

Maritime Texas pocket gopher	(SOC)	*Geomys personatus maritimus*
Lilia de los llanos	(SOC)	*Echeandia chandleri*
Roughseed sea-purslane	(SOC)	*Sesuvium trianthemoides*
Texas windmill-grass	(SOC)	*Chloris texensis*
Thieret's skullcap	(SOC)	*Scutellaria thieretii*
Welder machaeranthera	(SOC)	*Psilactis heterocarpa*
Maculated manfreda skipper	(SOC)	*Stallingsia maculosus*

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Statewide or areawide migrants are not included by county, except where they breed or occur in concentrations. The whooping crane is an exception; an attempt is made to include all confirmed sightings on this list.

E	=	Species in danger of extinction throughout all or a significant portion of its range.
T	=	Species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
C	=	Species for which the Service has on file enough substantial information to warrant listing as threatened or endangered.
CH	=	Critical Habitat (in Texas unless annotated ‡)
P/	=	Proposed ...
P/E	=	Species proposed to be listed as endangered.
P/T	=	Species proposed to be listed as threatened.
TSA	=	Threatened due to similarity of appearance.
SOC	=	Species for which there is some information showing evidence of vulnerability, but not enough data to support listing at this time.
□	=	with special rule
‡	=	CH designated (or proposed) outside Texas
~	=	protection restricted to populations found in the "interior" of the United States. In Texas, the least tern receives full protection, except within 50 miles (80 km) of the Gulf Coast.

GLOSSARY

BTEX — benzene, toluene, ethylbenzene, and xylene

down-island — The 55 miles of beach in Padre Island National Seashore south of the 5-mile marker.

kriging — A statistical interpolation process that uses ozone data from nearby monitoring sites to estimate data for the point of interest.

national ambient air quality standards (NAAQS) — Concentrations of criteria pollutants in ambient air (outdoor air to which the public may be exposed) below which it is safe for humans or other receptors to be permanently exposed. The Clean Air Act establishes two types of national air quality standards. **Primary standards** set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. **Secondary standards** set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

nonroad model — An air quality emissions estimation model developed by the U.S. Environmental Protection Agency to estimate emissions from various spark-ignition type "nonroad" engines. The June 2000 draft of the nonroad model was used to estimate air pollutant emissions from PWC. It is available at <http://www.epa.gov/otaq/ nonrdmdl.htm>.

PAHs — polycyclic aromatic hydrocarbons

personal watercraft (PWC) — As defined in 36 CFR §1.4(a) (2000), refers to a vessel, usually less than 16 feet in length, which uses an inboard, internal combustion engine powering a water jet pump as its primary source of propulsion. The vessel is intended to be operated by a person or persons sitting, standing, or kneeling on the vessel, rather than within the confines of the hull. The length is measured from end to end over the deck excluding sheer, meaning a straight line measurement of the overall length from the foremost part of the vessel to the aftermost part of the vessel, measured parallel to the centerline. Bow sprits, bumpkins, rudders, outboard motor brackets, and similar fittings or attachments, are not included in the measurement. Length is stated in feet and inches.

SUM06 — The cumulation of instances when measured hourly average ozone concentrations equal or exceed 0.06 part per million (ppm) in a stated time period, expressed in ppm-hours.

thermocline — The region in a thermally stratified body of water that separates warmer, oxygen-rich surface water from cold, oxygen-poor deep water. In a thermocline, temperature decreases rapidly with depth.

wake — Moving waves, track, or path that a boat leaves behind when moving across the waters.

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Abbreviations used in text references:

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AWA	American Watercraft Association
CARB	California Air Resources Board
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration, U.S. Department of Transportation
IWL	Izaak Walton League of America
NALMS	North American Lake Management Society
NPS	National Park Service, U.S. Department of the Interior
NTSB	National Transportation Safety Board
ODEQ	Oregon Department of Environmental Quality
PWIA	Personal Watercraft Industry Association
SPMA	Southwest Parks and Monuments Association
TCEQ	Texas Commission on Environmental Quality
TNRCC	Texas Natural Resource Conservation Commission
TPWD	Texas Parks and Wildlife Department
TRPA	Tahoe Regional Planning Agency
USFWS	United States Fish and Wildlife Service

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Sarah Bransom, Compliance Program Coordinator. MRP (Master's Degree, Environmental Planning). Managed all PWC environmental assessments for the National Park Service. Experience: 24 years NEPA compliance (federal service).

Intermountain Region Support Office

Rick Ernenwein, Overflights and Noise Program Coordinator. B.S., Renewable Natural Resources. Assisted in developing soundscape methodology. Experience: 15 years with NPS noise and NEPA issues; 23 years federal service.

Water Resource Division, Washington Office

Gary Rosenlieb, Hydrologist, Water Quality Program Coordinator. M.S., Water Resources Management. Assisted with water quality methodology. Experience: 23 years federal service, with primary experience in water quality management and environmental impact analysis for water resources issues.

Mark VanMouwerik, Contaminants Specialist / CSU Research Associate. M.S., Environmental Health. Worked with fate and effects on contaminants in the environment. Experience: 5 years with National Park Service.

Consultants

URS Corporation

Thomas G. Campbell, Consultant and Leader, Risk Assessment Team. M.S., Marine Biology. Refined approach to evaluating surface water quality impacts and conducted water quality analysis. Experience: Over 25 years experience in aquatic and marine ecology, water quality, toxicology, and ecological risk assessment.

Kathryn Fontaine, Project Manager and Environmental Scientist, Air Quality Team. B.S., Civil Engineering. Responsible for air quality analysis and technical review. Experience: over 15 years of air quality, environmental engineering, and pipeline integrity management experience.

Pamela Roszell, Environmental Scientist. B.S., Biology; M.S., Environmental Science. Responsible for research and report writing for human resource sections. Experience: Over 5 years in environmental planning, assessment, and compliance, including NEPA projects.

Greg Sorensen, Technical Writer/Editor. B.A., International Affairs. Responsible for editing document. Experience: 30 years.

Patti Steinholtz, Senior Environmental Planner, Editor/Graphic Illustrator. B.A., Communications and English. Responsible for technical and editorial review and preparing maps. Experience: 10 years.

Nancy VanDyke, Senior Consultant and Leader, Regulatory Team. B.A., Biology and Geography; M.S., Environmental Sciences. Team Leader, development of water quality methodology, report writing for purpose and need, alternatives, and natural resource sections. Experience: Over 22 years in environmental planning, assessment, and compliance.

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 wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic 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. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.