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National Park Service
U.S. Department of the Interior

Gulf Islands National Seashore
Florida/Mississippi

GULF ISLANDS NATIONAL SEASHORE

Personal Watercraft Use Environmental Assessment

Color Scans
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United States Department of the Interior

NATIONAL PARK SERVICE
Gulf Islands National Seashore
1801 Gulf Breeze Parkway
Gulf Breeze, Florida 32563

IN REPLY REFER TO:
L3425(GUIS-S)

APR 19 2004

Dear Interested Party:

The National Park Service (NPS) respectfully submits this copy of the Gulf Islands National Seashore Personal Watercraft Use Environmental Assessment (EA) for your review and comment. The EA analyzes the impacts of personal watercraft use at the park unit in accordance with the National Environmental Policy Act (NEPA) and NPS Director's Order 12. The purpose of this EA is to help determine whether to reestablish personal watercraft (PWC) use at Gulf Islands National Seashore.

The 30 calendar-day public review period begins on the date of this letter. If you wish to comment on the document, you may submit your comments by any one of several methods: you may mail or hand-deliver written comments to Superintendent, Gulf Islands National Seashore, 1801 Gulf Breeze Parkway, Gulf Breeze, Florida 32563; submit electronically to *guis@den.nps.gov;* or you may fax to (850)916-3026.

Our practice is to make comments on the EA, including names and addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address, which we will honor to the extent allowable by law. If you wish us to withhold your name and/or address, then you must state this prominently at the beginning of your comment. However, we will not consider anonymous comments. We will make all submissions from organizations, businesses, or individuals identifying themselves as representatives or officials of organizations or businesses available for public inspection in their entirety.

If, as a result of this environmental assessment, an alternative is selected that would allow PWC use to be reinstated, then a special regulation to authorize that use will be drafted. At a later date, you would be able to comment on the draft special regulation during the designated 60-calendar-day public review and comment period.

We appreciate your interest in the management of Gulf Islands National Seashore.

Sincerely,

Jerry A. Eubanks
Superintendent

National Park Service
U.S. Department of the Interior

Gulf Islands National Seashore
Florida/Mississippi

GULF ISLANDS NATIONAL SEASHORE

Personal Watercraft Use Environmental Assessment

March 2004

SUMMARY

Gulf Islands National Seashore was established in 1971, "In order to preserve for public use and enjoyment certain areas possessing outstanding natural, historic and recreational values..." The seashore stretches approximately 160 miles from Cat Island in Mississippi to the eastern tip of Santa Rosa Island in Florida. There are snowy-white beaches, sparkling blue waters, fertile coastal marshes, and dense maritime forests. Visitors can explore 19th century forts, enjoy shaded picnic areas, hike on winding nature trails, and camp in comfortable campgrounds. In addition, Horn and Petit Bois islands located in Mississippi are federally designated wilderness areas. Nature, history, and recreational opportunities abound in this national treasure. All areas of Gulf Islands National Seashore in the Florida District and the Davis Bayou area in the Mississippi District are reachable from Interstate 10. The Mississippi District barrier islands are only accessible by boat.

The purpose of and the need for taking action is to evaluate a range of alternatives and strategies for managing personal watercraft (PWC) use at Gulf Islands National Seashore 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 this process, in accordance with the *National Environmental Policy Act* (NEPA), the National Park Service (NPS) may either take action to adopt special regulations to manage PWC use, or it may not reinstate PWC use at this park unit.

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 an inboard, internal combustion engine powering a water jet pump as their primary source of propulsion. They are used for enjoyment, particularly for touring and wave jumping, and they are capable of speeds in the 60 mile-per-hour (mph) range. Personal watercraft were once the fastest growing segment of the boating industry and represented over one-third of total sales. 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. While PWC use remains a relatively new recreational activity, it has occurred in 32 of the 87 national park system units that allow motorized boating.

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 NPS 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,* as well as increased awareness and public controversy about PWC use, the NPS subsequently reevaluated its methods of PWC regulation. Historically, the National Park Service had grouped personal watercraft with all vessels; thus, PWC use was allowed when the unit's *Superintendent's Compendium* allowed the use of other vessels. Later, the NPS 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 NPS to initiate a rulemaking process to prohibit PWC use throughout the national park system. In response to the petition, the NPS 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 NPS envisioned the servicewide regulation as an opportunity to evaluate impacts from PWC use before authorizing the use. On March 21, 2000, the NPS 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 NPS, challenging the NPS decision to allow continued PWC use in 21 units while prohibiting PWC use in other units. In response to the suit, the NPS and the environmental group negotiated a settlement. Each park desiring to continue long-term PWC use must promulgate a park-specific special regulation in 2002. In addition, the settlement stipulates that the NPS must base its decision to issue a park-specific special regulation to continue PWC use on an environmental analysis conducted in accordance with NEPA. 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 response to the final rule for management of personal watercraft use in units of the National Park Service, which went into effect on April 20, 2000, Gulf Islands National Seashore evaluated the effects of personal watercraft within park boundaries. The results of the study conducted by the park and dated October 17, 2001, concluded that the park lacks specific evidence to support proposing unit-specific regulations to allow PWC use in the waters over which it has regulation authority (NPS 2001a). The finding was based on the requirements of the regulation, staff review of available research findings, opportunities available for PWC use outside of park waters, and evaluation of citizen comments received by the park. On February 21, 2001, Gulf Islands National Seashore issued a news release announcing its intention to allow the national regulation to take effect in the park on April 23, 2002.

As the settlement deadline approached and the park units were preparing to prohibit PWC use, the NPS, Congress, and PWC user groups sought legal methods to keep the parks open to this activity. However, no method was successful. On April 23, 2002, Gulf Islands National Seashore was closed to PWC use. If, as a result of this environmental assessment, an alternative is selected that would allow PWC use to be reinstated, then a special regulation to authorize that use would be drafted.

ALTERNATIVES CONSIDERED

This environmental assessment evaluates three alternatives concerning the use of personal watercraft at Gulf Islands.

- The no-action alternative would continue the prohibition of PWC use in Gulf Islands National Seashore. No special rule would be promulgated.
- Alternative A would reinstate PWC use under a special NPS regulation as previously managed.
- Alternative B would reinstate PWC use under a special NPS regulation with additional management prescriptions.

Based on the environmental analysis prepared for PWC use at Gulf Islands, alternative B is considered the environmentally preferred alternative because it would best fulfill park responsibilities as trustee of this sensitive habitat; ensure safe and healthy, productive, and aesthetically and culturally pleasing surroundings; and attain a wider 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* (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 impact analysis, is the continued prohibition of personal watercraft in Gulf Islands (no-action alternative).

Table A summarizes the results of the impact analysis for the impact topics that were assessed in the "Environmental Consequences" chapter. The analysis considered a 10-year period (2002–2012).

TABLE A: SUMMARY OF THE IMPACT ANALYSIS

Impact Topic	No-Action Alternative: Continue Prohibition of PWC in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Water Quality	PWC use impacts: No impacts from PWC use to water quality of the national seashore. Cumulative impacts: Negligible adverse impacts on the national seashore's water quality due to discharge of organic pollutants from non-PWC motorized watercraft.	PWC use impacts: Negligible impacts in 2002 and 2012. Cumulative impacts: Negligible for all pollutants in all areas of the national seashore in 2002 and 2012. In 2012, impacts from watercraft are expected to be lower than in 2002 due to reduced emission rates.	PWC use impacts: Same as alternative A. Cumulative impacts: Same as alternative A.
Human Health and Airborne Pollutants Related to PWC Use	PWC use impacts: No impacts on human health from PWC related CO, PM_{10}, HC, and NO_x emissions for the year 2002 and 2012. Cumulative impacts: Negligible adverse impacts for PM_{10} and NO_x to moderate for Co in 2002 and 2012 in the Florida District. Negligible for PM_{10}, NO_x, and HC, to minor for CO in 2002 in the Mississippi District. The risk from PAH would be negligible in 2002 and 2012.	PWC use impacts: Negligible adverse impacts to existing air quality conditions, with future reductions in PM_{10} and HC emissions due to improved emission controls. The risk from PAH would also be negligible. Cumulative impacts: Negligible adverse impacts for PM_{10} and NO_x and moderate for CO and HC in 2002 and 2012 in the Florida District. Negligible for PM_{10}, HC, and NO_x in 2002 and 2012 in the Mississippi District. CO would be minor in 2002 and would increase to moderate in 2012.	PWC use impacts: Same as alternative A. Cumulative impacts: Same as alternative A.
Air Quality Related Values from PWC Pollutants	PWC use impacts: No impacts to air quality related values from PWC use. Cumulative impacts: Moderate long-term adverse impacts to air quality related values from all watercraft in the Florida District in 2002 and 2012, and minor long-term adverse impacts to air quality related values in the Mississippi District in 2002 and 2012.	PWC use impacts: Implementation of this alternative would not result in an impairment of air quality related values. Cumulative impacts: Minor adverse impacts to air quality related values from PWC would occur in both 2002 and 2012 in both districts of the national seashore.	PWC use impacts: Same as alternative A. Cumulative impacts: Same as alternative A.
Soundscapes	PWC use impacts: No impacts from PWC use to soundscapes. Cumulative impacts: Cumulative impacts of boating noise and ambient noise levels would range from negligible to minor, depending on the location, within the unit, the time of day, and the time of year. Impacts would typically be short in duration (i.e., a passing motorboat) but over the long-term.	PWC use impacts: Impacts would be negligible to moderate adverse depending on the location, within the unit, the time of day, and the time of year. Cumulative impacts: Cumulative adverse noise impacts from personal watercraft and other watercraft, commercial boats, and aircraft would be negligible to moderate, and would predominate on busy days during the high use season.	PWC use impacts: Impacts would be negligible to minor adverse depending on the location, within the unit, the time of day, and the time of year. Cumulative impacts: Similar to alternative A.

Impact Topic	No-Action Alternative: Continue Prohibition of PWC in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Shoreline and Submerged Aquatic Vegetation	PWC use impacts: Negligible impacts from PWC use. No PWC impacts Cumulative impacts: Minor to moderate to shoreline vegetation and submerged aquatic vegetation communities. Impacts would potentially be higher in 2012 than in 2002.	PWC use impacts: Minor to moderate adverse impacts to shoreline vegetation and seagrass communities. Potential for increased impacts in 2012. Cumulative impacts: Minor to moderate to shoreline vegetation and submerged aquatic vegetation communities.	PWC use impacts: Negligible adverse impacts to shoreline vegetation from physical disturbance and wave action, and minor adverse impacts from visitor access to emergent shoreline vegetation. Minor adverse impacts to seagrass habitats. Potential for increased impacts in 2012. Cumulative impacts: Minor to moderate impacts to shoreline vegetation and submerged aquatic vegetation.
Wildlife and Wildlife Habitat	PWC use impacts: No PWC related disturbance to aquatic or terrestrial wildlife and wildlife habitat. Cumulative impacts: Minor to moderate adverse impacts to aquatic wildlife species and habitats. Negligible to minor impacts to terrestrial mammals and minor to moderate impacts to avian species. Impacts in 2012 would likely be higher than 2002 levels due to the projected increase in motorized watercraft use within the national seashore.	PWC use impacts: Minor to moderate adverse impacts to wildlife species and habitats. Cumulative impacts: Minor to moderate adverse impacts to aquatic species, minor to moderate impacts to avian species and negligible to minor impacts to terrestrial mammals. Increase in impacts in 2012 possible.	PWC use impacts: Negligible to minor adverse impacts to wildlife species and habitats. Cumulative impacts: Minor to moderate impacts to aquatic and avian species and negligible to minor to terrestrial wildlife and habitat.
Aquatic Fauna	PWC use impacts: No impacts to aquatic fauna from PWC noise. Cumulative impacts: Minor to moderate impacts from other motorized craft and PWC use in adjacent waters.	PWC use impacts: Moderate adverse impacts to aquatic fauna. Cumulative impacts: Long-term, moderate impacts from PWC and other motorized vessel noise.	PWC use impacts: Minor to moderate impacts. Cumulative impacts: Minor to moderate impacts from PWC and other motorized vessel noise.
Threatened and Endangered, and other Special Status Species	PWC use impacts: No impacts from PWC to special status species. Cumulative impacts: Other visitor activities may affect but would be unlikely to adversely affect any special status species within the national seashore.	PWC use impacts: May affect, but is not likely to adversely affect any federal or state listed or other special status species. Cumulative impacts: Not likely to adversely affect special status species.	PWC use impacts: May affect, but not likely to adversely affect special status species. Management prescriptions would minimize impacts. Cumulative impacts: Similar to alternative A.
Visitor Use and Experience	PWC use impacts: No impacts to any user groups from continuation of the PWC ban. Cumulative impacts: Negligible to minor impacts from other visitor activities. Impacts would potentially increase with projected increase in boating and other visitor use of the national seashore.	PWC use impacts: Short term beneficial impact on PWC users from reinstatement of PWC use. Long-term, increased PWC use with no additional restrictions would result in minor adverse impacts on PWC users. Cumulative impacts: Negligible to moderate adverse impacts on visitor experience goals.	PWC use impacts: Beneficial impact to PWC users. Negligible to minor adverse impacts on experiences for swimmers and other shoreline users. Minor adverse impacts on other motorized boaters and negligible to minor adverse impact on non-motorized boaters. Cumulative impacts: Minor adverse impacts on visitor experience goals.

Impact Topic	No-Action Alternative: Continue Prohibition of PWC in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Visitor Conflicts and Safety	PWC use impacts: No impacts from PWC use to visitor conflicts and safety. Cumulative impacts: Negligible to minor long-term, adverse impacts for other users.	PWC use impacts: Moderate to major adverse impacts on conflicts and safety of other boaters, swimmers, and minor to moderate adverse impacts on other shoreline visitors particularly in the noted high PWC use locations. Cumulative impacts: Minor adverse for all user groups in the short and long term, particularly near the high-use areas.	PWC use impacts: Negligible to minor adverse impacts on visitor conflicts and safety. Cumulative impacts: Minor adverse impacts for all NPS user groups in the short and long term.
Cultural Resources	PWC use impacts: No impacts on archaeological sites from PWC use. Cumulative impacts: Minor to major impacts, depending on the accessibility of the resource and the potential for illegal collection or damage.	PWC use impacts: Minor adverse impacts on listed or potentially listed archaeological sites from possible illegal collection and vandalism. Minor adverse impacts on listed or potentially listed archaeological sites as a result of erosion. Cumulative impacts: Minor to moderate adverse impacts, due to the number of visitors and the potential for illegal collection or destruction.	PWC use impacts: Minor adverse impacts from PWC use. Minimized erosion impacts resulting from flat-wake zoning. Cumulative impacts: Minor to moderate adverse impacts, due to the number of visitors and the potential for illegal collection or destruction.
Socioeconomic Effects	There are no incremental costs associated with the no-action alternative. There would be not change in consumer surplus, producer surplus, or welfare.	Because the national recreation area would still be open to PWC, the National Park Service expects this alternative to result in a net benefit relative to the no-action alternative.	Alternative B is considered to provide the greatest level of net benefits.
National Seashore Management and Operations			
Conflicts with State and Local Ordinances and Policies	PWC use impacts: No conflict with state regulations or local ordinances as a result of the no-action alternative. No effect to the enforcement of state boating regulations.	PWC use impacts: No conflict with state regulations or local ordinances and no effect to the enforcement of state boating regulations from the reinstatement of PWC use.	PWC use impacts: Same as alternative A.
Impact to Park Operations from Increased Enforcement Needs	PWC use impacts: No adverse impacts on park operations with no additional staff, funding, or equipment.	PWC use impacts: Minor to moderate adverse impacts on park operations (more staff, funding, equipment, and educational material to regulate use).	PWC use impacts: Similar to alternative A.

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PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

Gulf Islands National Seashore is located in the northeastern portion of the Gulf of Mexico and includes a widely spaced chain of barrier islands extending nearly 160 miles from the eastern end of Santa Rosa Island in Florida to Cat Island in Mississippi. Other islands in the national seashore include Horn, Petit Bois, and East Ship and West Ship islands in Mississippi and a section of Perdido Key in Florida. Gulf Islands National Seashore also includes mainland tracts at Pensacola Forts and Naval Live Oaks Reservation near Pensacola, Florida and Davis Bayou, adjacent to Ocean Springs, Mississippi. The national seashore contains 139,775.46 acres within the authorized boundary, excluding Cat Island (only a portion has been acquired as of this date). Of this total acreage, 19,445.46 acres are fastlands (above water) and 119,730 acres are submerged lands (source for acreages – The National Parks: Index 2001 – 2003).

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 an inboard, internal combustion engine powering a water jet pump as their primary source of propulsion.[1] They are used for enjoyment, particularly for touring and maneuvers such as wave jumping, and they are capable of speeds in the range of 60 miles per hour (mph). The Personal Watercraft Industry Association (PWIA) believes that through the 2002 model year the output on a limited number of higher rated models was around 155 and 165 horsepower (PWIA 2002b).

The National Park Service maintains that personal watercraft (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 personal watercraft in Everglades National Park. The studies showed that PWC use over emergent vegetation, shallow grass flats, and mud flats commonly used by feeding shore birds damaged the vegetation, adversely impacted the shore birds, 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 personal watercraft by a special regulation at the park (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 PWC use. At least 34 states have either implemented or have considered regulating the use and operation of personal watercraft (63 FR at 49314). Similarly, various federal agencies, including the Fish and Wildlife Service and the National Oceanic and Atmospheric Administration, have managed personal watercraft differently than other classes of motorized watercraft.

Specifically, the National Oceanic and Atmospheric Administration regulates the use of personal watercraft in most national marine sanctuaries. The regulation resulted in a court case where the Court of

1. 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 aft most part of the vessel, measured parallel to the centerline. Bowsprits, bumpkins, rudders, outboard motor brackets, and similar fittings or attachments, are not included in the measurement. Length is stated in feet and inches.

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 *Organic Act* and NPS *Management Policies 2001,* as well as increased awareness and public controversy, the National Park Service reevaluated its methods of PWC regulation. Historically, the National Park Service grouped personal watercraft with all vessels; thus, people could use personal watercraft when the unit's superintendent's compendium allowed the use of other vessels. Later the 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, 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 National Park Service issued an interim management policy requiring superintendents of parks where personal watercraft 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 based on the determination 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 49, 312–17, Sept. 15, 1998).

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 (current draft of 36 CFR 3.24(a), 2000); 65 FR 15,077–90, Mar. 21, 2000). Specifically, the regulation allowed the National Park Service to designate PWC use areas and to continue their use by promulgating a special regulation in 11 units and by amending the units' superintendents' compendium in 10 units, including Gulf Islands National Seashore (current draft of 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 NPS decision to allow continued PWC use in 21 units while prohibiting such use in other units. In addition, the

organization also disputed the NPS decision to allow 10 units to continue PWC use after 2002 by making entries in superintendents' compendium, which would not require the opportunity for public input through a notice and comments rulemaking process. Further, the environmental group claimed that because personal watercraft cause water and air pollution, generate increased noise levels, and pose 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 NPS PWC rule. While 21 units could continue PWC use in the short-term, each of those parks desiring to continue long-term PWC use must promulgate a park-specific special regulation in 2002. In addition, the settlement stipulates that the National Park Service must base its decision to issue a park-specific special regulation to continue PWC use on an environmental analysis conducted in accordance with the *National Environmental Policy Act* (NEPA). 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 (NPS *Management Policies 2001*[NPS 2000d], sec. 8.2.3.3). The policy statement authorizes the use based on the park's authorizing legislation, resources, values, other park uses, and overall management strategies.

As the settlement deadline approached and the park units were preparing to prohibit PWC use, the National Park Service, Congress, and PWC user groups sought legal methods to keep the parks open to this activity. On March 28, 2002, the 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 the court enjoin the National Park Service from implementing the ban on PWC use effective April 22, 2002. However, no method was successful, and on April 22, 2002, the following units were closed for PWC use: Gulf Islands National Seashore, Assateague Island National Seashore; Big Thicket National Preserve; Pictured Rocks National Lakeshore; Fire Island National Seashore; and Gateway National Recreation Area. On September 15, 2002, eight other park units were scheduled to close to PWC use.

The proposed September 16, 2002 prohibition of personal watercraft was averted with the execution of a stipulated modification to the settlement agreement. The court approved the modified settlement agreement on September 9, 2002, and extended unrestricted PWC use in some selected national park system units until November 6, 2002. Park units, such as Gulf Islands, that prepare an environmental assessment to analyze PWC use alternatives and select an alternative to re-instate such use would be required to draft a special regulation to authorize that use in the future.

In response to the final rule for management of personal watercraft use in units of the National Park Service, which went into effect on March 21, 2000, Gulf Islands National Seashore evaluated the effects of PWC within park boundaries. The results of the study conducted by the park concluded that the park lacked specific evidence to support proposing unit-specific regulations to allow PWC use in the waters over which it has regulation authority. The finding was based on the requirements of the regulation, staff review of available research findings, opportunities available for PWC use outside of park waters, and evaluation of citizen comments received by the park. On February 21, 2001, Gulf Islands National Seashore issued a news release announcing its intention to allow the national regulation to take effect in the park on April 23, 2002. PWC use in Gulf Islands National Seashore has been prohibited since that date.

If the environmental assessment process results in selection of an alternative to re-instate PWC use, then a special regulation to authorize that use in the future would be drafted.

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 Gulf Islands National Seashore in order to ensure the protection of park resources and values while offering recreational opportunities as provided for in the Gulf Islands National Seashore enabling legislation, mission, purpose, and goals. Upon completion of the NEPA process, the National Park Service may either take action to adopt special regulations to manage PWC use at the national seashore, or it may continue the ban of PWC use at the park unit.

This environmental assessment evaluates three alternatives concerning the use of personal watercraft at Gulf Islands National Seashore. The alternatives include:

- *No-Action Alternative*: Allow no PWC use. Continue the prohibition of PWC use within Gulf Islands National Seashore. No action would be taken to promulgate a special regulation to reinstate PWC use.

- *Alternative A*: Reinstate PWC use under a special NPS regulation as previously managed in accordance with NPS *Management Policies 2001* (NPS 2000d), park practices, and state regulations.

- *Alternative B*: Reinstate PWC use under a special NPS regulation with additional management prescriptions, such as implementation of additional flat-wake zones. Alternative B has been identified as the park's preferred alternative.

SCOPE OF THE ANALYSIS

Although boating is not mentioned in the park's enabling legislation, it is recognized as a primary mode of access by park visitors to some areas of the park. Motorized boats and other watercraft have been used in Gulf Islands National Seashore since it was established in 1971. Personal watercraft emerged at the national seashore in the 1980s, although it was not a major recreational use. Based on observations of park staff, PWC use appears to have increased over the last few years. The potential exists for considerable expansion of this use, both by local residents and by visitors from outside the immediate area.

While some effects of PWC use are similar to other watercraft, and 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, NEPA 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 GULF ISLANDS 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."

The mission, purpose, and significance statements listed below are from the national seashore's *Strategic Plan* (NPS 1997b) and *General Management Plan* (NPS 1978).

LEGISLATIVE INTENT OF GULF ISLANDS NATIONAL SEASHORE

Gulf Islands National Seashore, Florida and Mississippi, was authorized by Act of Congress, Public Law 91-660, January 8, 1971, to provide for recognition of certain historic values such as coastal fortifications and other purposes such as the preservation and enjoyment of undeveloped barrier islands and beaches.

MISSION OF GULF ISLANDS NATIONAL SEASHORE

Gulf Islands National Seashore preserves certain outstanding natural, cultural and recreational resources along the Northern Gulf Coast of Florida and Mississippi. These include several coastal defense forts spanning more than two centuries of military activity, historic and prehistoric archaeological sites, and pristine examples of intact Mississippi coastal barrier islands, salt marshes, bayous, submerged grass beds, complex terrestrial communities, emerald green water, and white sand beaches.

PURPOSE OF GULF ISLANDS NATIONAL SEASHORE

Gulf Islands National Seashore was established for the following purposes:

- Preserve for public use and enjoyment certain areas possessing outstanding natural, historic and recreational values.
- Conserve and manage the wildlife and natural resources.
- Preserve as wilderness any area within the national seashore found to be suitable and so designated in accordance with the provisions of the *Wilderness Act* (78 Stat. 890).
- Recognize, preserve, and interpret the national historic significance of Fort Barrancas Water Battery (Battery San Antonio), Fort Barrancas; Advanced Redoubt of Fort Barrancas at Pensacola Naval Station; Fort Pickens on Santa Rosa Island, Florida; Fort McRee site, Perdido Key, Florida; and Fort Massachusetts on West Ship Island, Mississippi, in accordance with the Act of August 21, 1935 (49 Stat. 666). That act states: "it is a National policy to preserve for public use historic sites, buildings, and objects of National significance for inspiration and benefits of the people of the United Sates" (NPS 1978).

SIGNIFICANCE OF GULF ISLANDS NATIONAL SEASHORE

Gulf Islands National Seashore is significant for the following reasons:

- Nationally significant historical coastal defense forts representing a continuum of development
- Several mostly undisturbed, natural areas in close proximity to major population centers
- Areas of natural significant high quality beaches, dunes and water resources
- Endangered species occur in several areas
- Contains regionally important prehistoric archaeological sites
- Provides outstanding controlled areas conducive to the successful reintroduction of native threatened and endangered species
- Provides habitat for early life stages of many coastal and marine flora and fauna of commercial and recreational importance
- Provides a benchmark to compare environmental conditions in developed areas of the Gulf Coast.

BACKGROUND

NPS ORGANIC ACT AND MANAGEMENT POLICIES

By enacting the NPS *Organic Act of 1916* (*Organic Act*), Congress directed the National Park Service to manage units under its jurisdiction "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" (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 1 a-1).

Despite these mandates, the *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]).

Yet, courts consistently interpreted the *Organic Act* 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" (NPS *Management Policies 2001* [NPS 2000d] sec.1.4.3).

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 (NPS *Management Policies 2001* [NPS 2000d] sec. 1.4.3). While some actions and activities cause impacts, the National Park Service cannot allow an adverse impact that constitutes a resource impairment (NPS *Management Policies 2001* [NPS 2000d] sec.1.4.3). The *Organic Act* prohibits actions that permanently impair park resources unless a law directly and specifically allows for the acts (16 USC 1 a-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" (NPS *Management Policies 2001* [NPS 2000d] sec.1.4.4). To determine impairment, the National 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" (NPS *Management Policies 2001,* [NPS 2000d] sec.1.4.4).

Because park units vary based on their authorizing 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 Gulf Islands National Seashore, as well as potential for resource impairment, as required by *Director's Order # 12: Conservation Planning, Environmental Impact Analysis and Decision-making* (NPS 2001b).

SUMMARY OF AVAILABLE RESEARCH ON THE EFFECTS OF PERSONAL WATERCRAFT

Over the past two decades PWC use in the United States increased dramatically. However, there are conflicting data about whether PWC use is continuing to increase. While the National Transportation Safety Board (NTSB) estimated that retailers sold approximately 200,000 personal watercraft each year and people used another 1 million (NTSB 1998), the PWC industry argues that PWC sales have decreased by 50% from 1995 to 2000 (American Watercraft Association [AWA] 2001). 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 and 2000 (see table 1).

Multiple studies have demonstrated that four-stroke engines are substantially cleaner than carbureted, two-stroke engines, generating approximately 90% fewer emissions (Warrington 1999; OQED 1999; TRPA 1999). A typical conventional (i.e., carbureted) two-stroke PWC engine discharges as much as 30% of its fuel directly into the water (NPS 1999; 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 1999). 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). PWIA notes that direct-injection engines have been available in personal watercraft for four years; and three PWC manufacturers introduced four-stroke engines for the 2002 model year (PWIA 2002a). 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 (40 CFR 89, 90, 91).

The average operating life of a personal watercraft is 5 to 10 years, depending upon 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 2012, most boat owners will already be in compliance with the 2006 EPA marine engine standards. The Personal Watercraft Industry Association believes the typical operating life of a PWC rental is 3 years and approximately 5 to 7 years for a privately owned vessel (PWIA 2002a).

TABLE 1: NATIONAL PWC REGISTRATION TREND

Year	Number of Boats Owned	Boat Ownership Trend (Annual Percentage Change)	Number of Personal Watercraft Owned	PWC Ownership Trend (Annual 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	NA*	NA	1,053,560	-2.4%

Source of boat information: USCG 2001.

Source of PWC information: National Marine Manufacturers Association (NMMA) 2002.

* NA = Information not available.

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. Research conducted on the effects of PWC use is summarized below for water pollution, air pollution, noise, wildlife, shoreline vegetation and erosion effects, and health and safety concerns.

Water Pollution

Personal watercraft emit various compounds that pollute the air. In the two-stroke engines commonly used in PWC, 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).

The majority of personal watercraft in use today are two-stroke, non-direct-injection engines, which discharge as much as 30% of their fuel directly into the water (NPS 1999; California Air Resources Board 1999). Hydrocarbons, benzene, toluene, and xylene are also released, as well as methyl tertiary-butyl ether (MTBE) in states that use this additive. In 1996, the Environmental Protection Agency promulgated a rule to control exhaust emissions from new marine engines, including outboards and personal watercraft (EPA 1996a). Emission controls provide for increasingly strict standards beginning in model years 1999 for outboards and 2000 for personal watercraft (EPA 1996a, 1997).

In 1996, the Environmental Protection Agency estimated an overall 52% reduction in hydrocarbon emissions from marine engines from present levels by 2010, and a 75% reduction by 2030, based on conversion of polluting machines. The 1997 EPA rule delayed implementation by one year (EPA 1996a, 1997). For use in calculations and models, a conservative approximation of 50% by 2012 was interpolated. However, changing from two-stroke carbureted engines to two-stroke direct-injection engines may result in increases of airborne particulate-associated polycyclic aromatic hydrocarbons (PAH) (Kado et al. 2000). Further research is needed to identify what impact this would have on PAH concentration in water.

PAHs, including benzo(a)pyrene, naphthalene, and 1-methyl naphthalene, are released during the combustion of fuel, though some PAHs are also found in unburned gasoline. PAH, 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). However, changing from two-stroke carbureted engines to two-stroke direct-injected engines may result in increases of airborne particulate-associated PAH (Kado et al. 2000). Further research is needed to identify what impact this would have on PAH concentration in water. The conversion of carbureted two-stroke engines would be an important step toward substantially reducing petroleum related pollutants.

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 emission (in some cases 10 times higher total hydrocarbons in two-stroke engines) between these two types of engines. An exception was air emissions of NO_x which were higher in four-stroke than in two-stroke engines. Concentrations of pollutants (MTBE; benzene, toluene, ethyl benzene, and xylene [BTEX]) in the tested water were consistently higher for two-stroke engines.

The amount of pollution correctly attributed to personal watercraft compared to other motorboats and the degree to which personal watercraft affect water quality remains debatable. As noted in a report by the Oregon Department of Environmental Quality, every water body has different conditions (e.g., water temperature, air temperature, water mixing, motorboating use, and winds) that affect the pollutants' impacts (ODEQ 1999).

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

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 related to motorized watercraft in the Tahoe Basin in 1997 and 1998. The results of these studies (Allen et al. 1998) confirm 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

Personal watercraft emit various compounds that pollute the air. In the two-stroke engines commonly used in personal watercraft, 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 VOC, NO_x, PM, and CO. In areas with high PWC use, some air quality degradation likely occurs (EPA 1996a, 2000b). Kado et al. (2000) found that two-stroke engines had considerably higher emissions of airborne particulates and PAH than four-stroke engines tested. It is assumed that the 1996 EPA rule concerning marine engines will substantially reduce air emissions from personal watercraft in the future (EPA 1996a).

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 volatile organic compounds, than the two-stroke carbureted engines (Kado et al. 2000). The EPA estimates that conversion to four-stroke engines and two-stroke direct injection will both result in an increase in the level of NO_x produced by PWC engines. In order to meet stringent hydrocarbon emission reduction contained in the EPA final rule, EPA 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 has little internal exhaust gas recirculation, which could reduce emission rates of nitrogen oxides (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 gasoline-fueled boats and personal watercraft manufactured after 2008 and would reduce emissions from fuel tanks by 80% (67 FR 157, August 14, 2002, pp. 53049–53115).

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 decibels 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 77 dBA at 25 meters (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. However, this regulation does not imply that there are no noise impacts from vessels operating below that limit. 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, which 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 non-motorized watercraft users (such as canoeists, sailing

enthusiasts, 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 noise from motorboats is that PWC 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 (e.g., if identical boats emit 75 dB, two such boats together would be expected to emit 78 dB, 3 together would emit 80 dB). 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 at a distance of 50 feet, a PWC unit with a 100-horsepower (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. 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 (2001) found that two PWC units operating 50 feet from the shore emit similar sound levels of about 74 dBA (PWIA 2000b).

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 personal watercraft was estimated to be about $700 per vessel each year or $47 for each 3-hour "personal watercraft 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 there are many more visitors to be affected at popular beaches, noise costs per personal watercraft were highest at crowded sites (*Drowning in Noise: Noise Costs of Jet Skis in America* [Komanoff and Shaw 2000]).

Wildlife Impacts

Few studies have specifically examined PWC effects on wildlife. Based on observations, some wildlife disturbances and harassment likely occur, likely caused by speed, noise, and access. Nesting colonial birds are particularly susceptible to disturbance; however, the extent, duration, and magnitude of

biological impacts because of PWC operations versus other motorboats remain unknown. 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 response in terns and contributing to lower reproductive success.

Shoreline Vegetation

The effects of personal watercraft on aquatic communities have not been fully studied, and scientists disagree about whether personal watercraft adversely impact aquatic vegetation. The majority of concern arises from the shallow draft of personal watercraft, allowing access to shallow areas that conventional motorboats 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 wave sizes vary depending on the environment, including weight of the driver, number of passengers, and speed. 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 (NTSB) 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).

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 National Transportation Safety Board 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 (US Coast Guard 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.

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. Some manufacturing changes on throttle and steering may reduce potential accidents. For

TABLE 2: NATIONWIDE PWC ESTIMATES AND ACCIDENT STATISTICS

Year	Recreational Boats Owned*	PWC Owned*	Number of PWC in Accidents	Number of PWC Injuries	Number of PWC Fatalities	Number 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: USCG 2001.

* Estimates from: National Marine Manufacturers Association 2000 and 2002; and USCG 2001.

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

PWC USE AND REGULATION AT GULF ISLANDS NATIONAL SEASHORE

In the past, PWC use in the Florida District was concentrated in the Perdido Key area, though some personal watercraft were observed traversing along the north and, to a lesser extent, the south shoreline of Santa Rosa Island. In the Florida District, PWC use consisted of an estimated 6 or 7 personal watercraft per day during the summer months, except during holiday weekends in the Perdido Key area where 25 personal watercraft per day were estimated (Snyder, 2003). PWC operation typically occurred between the hours of mid-morning and late afternoon.

The Mississippi islands (Cat, West and East Ship, Horn, and Petit Bois) are located from 6 to 14 miles from the mainland. Weather conditions can change quickly this far from shore and large commercial ships frequently use the intracoastal waterway shipping channels. Due to the distance between the mainland launch facilities and the barrier islands, it is hazardous for personal watercraft or other small watercraft to traverse across the intracoastal waterway. As a result, personal watercraft were used infrequently as transportation to and from the islands. Most personal watercraft used in the Mississippi District were towed by larger boats to the islands for use during the day.

In the Florida District of the park, it is estimated that personal watercraft comprise 0.5% of recreational boating. Personal watercraft account for 6% of registered boats in Mississippi and it is estimated that they comprise approximately 4% of recreational boating in the Mississippi District of the park.

Park staff believes that PWC use had increased in the five years prior to the national seashore's closure to personal watercraft, although PWC use was still a small percentage of total boat use within Gulf Islands National Seashore. East Ship and West Ship islands in Mississippi and Perdido Key in Florida had the

most concentrated PWC use within the national seashore, but the Florida District generally was not used as much as the Mississippi District. Many area residents have boat docks and own boats and/or personal watercraft. Because park waters comprise only 7% of the waters in the region in Florida and less than 4% of all waters in the Mississippi Sound, there are ample boating opportunities outside of park waters.

The PWC Use and Distribution section found the affected environment discussion (page 95) provides additional detail regarding PWC use at Gulf Islands.

OBJECTIVES IN TAKING ACTION

Objectives define what must be achieved for an action to be considered a success. Alternatives selected for detailed analysis must meet most objectives and must also resolve purpose of and need for action.

Using the park's authorizing legislation, mandates and direction in the *General Management Plan* (NPS 1978) and *Strategic Plan* (NPS 1997b), along with issues and servicewide objectives, park staff identified the following management objectives relative to PWC use:

WATER QUALITY

- Manage PWC emissions that enter the water in Gulf Islands National Seashore to prevent any additional degradation of water quality.
- Protect marine and estuarine organisms from PWC disturbances so that the viability of dependent species is conserved.
- Manage PWC emissions to maintain national seashore water quality necessary to retain designation as an Outstanding Florida Waters area.

AIR 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.

SOUNDSCAPES

- Manage noise from PWC use in all areas of the park so that visitors' health, safety, and visitor experience is not adversely affected.
- Manage PWC use to perpetuate an undisturbed environment that possesses an atmosphere of solitude.

WILDLIFE AND WILDLIFE HABITAT

- Protect birds, waterfowl, and marine mammals from the effects of PWC-generated noise, especially during nesting seasons.
- Protect fish and wildlife species and their habitat from disturbances by personal watercraft.

- Protect fish and wildlife from the adverse effects that result from the bioaccumulation of contaminants emitted from personal watercraft.

THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES

Protect threatened and endangered species, and species of special concern, and their habitats from PWC disturbances.

SHORELINE VEGETATION

Manage PWC use to protect sensitive shoreline and submerged vegetation from PWC activity and access.

VISITOR USE AND EXPERIENCE

- Manage PWC use to prevent conflicts between PWC users and other water recreationists.
- Manage PWC use to avoid conflict with wilderness and backcountry experience.

VISITOR CONFLICT AND VISITOR SAFETY

- Minimize or reduce the potential for PWC user accidents.
- Manage PWC use in park waters to provide safe recreation for PWC and other users.

CULTURAL RESOURCES

Manage PWC use and access to protect cultural resources.

SOCIOECONOMICS

Enhance communications with local communities regarding the management of personal watercraft.

NATIONAL SEASHORE MANAGEMENT AND OPERATIONS

- Minimize impacts to national seashore operations from increased enforcement needs.
- Seek cooperation with local and state entities that manage or regulate PWC use.

ISSUES AND IMPACT TOPICS

Issues associated with PWC use at Gulf Islands National Seashore were identified during the scoping process with NPS staff at the park. 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 "Issues Eliminated from Further Consideration" section.

WATER QUALITY

A typical conventional (i.e., carbureted) two-stroke PWC engine discharges as much as 30% of its fuel unburned directly into the water (NPS 1999; 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 1999). 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 1998b). (As described in appendix C, an estimated discharge rate of 3 gallons per hour is used in the water quality impact calculations.) Other water quality issues may include indirect effects on threatened and endangered species sensitive to water quality changes and degradation, effects on fish, and maintaining water quality standards that satisfy Outstanding Florida Waters designation. Some research shows that PAH, including those from personal watercraft emissions, adversely affect water quality via harmful phototoxic effects on ecologically sensitive plankton and other small water organisms (EPA 1998; Oris et al. 1998; Landrum et al. 1987; Mekenyan et al. 1994; Arfsten et al. 1996).

Although the park consists of islands and keys within the Gulf of Mexico, a large open water body, the primary area of PWC use is close to the islands. In Florida, PWC use occurs in coves and shallow embayments, which provides an opportunity for hydrocarbon emissions to remain for longer periods of time relative to emissions in open water due to poor circulation and low flush rates. Shallow water and bottom biota can potentially be exposed to higher concentrations of pollutants due to limited dilution in these areas. Due to the sensitive habitats and numerous state and federally listed species that inhabit the national seashore, a high water quality standard must be maintained, or, ideally, a higher quality reached. Additionally, shallow-water PWC use can increase sediment disturbances, which can negatively impact water quality. Other water quality issues may include indirect effects on benthic communities, plankton, fish, marine mammals and reptiles, and submerged aquatic vegetation sensitive to water quality changes and degradation.

Diminished water quality is a concern at Gulf Islands National Seashore. Numerous state and federally listed species exist in the park that could be negatively impacted by degraded water quality including black skimmer, least tern, piping plover, bald eagle, brown pelican, American alligator, green, leatherback, loggerhead, and Kemp's ridley sea turtles, Gulf sturgeon, and Florida manatee. The national seashore has a Florida Department of Environmental Protection (FDEP) "Outstanding Florida Waters" designation. Waters under this classification are worthy of special protection because of their natural attributes (FDEP 2002a).

Phototoxicity from PWC emissions is also of concern at Gulf Islands due to the abundance of extremely shallow waters and submerged vegetation (seagrass beds) within park boundaries. Physical characteristics of the water such as warm temperatures and dissolved oxygen content could influence how emissions are diluted.

AIR QUALITY

Pollutant emissions such as nitrogen oxides and hydrocarbons from PWC use 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.

The national seashore is in a Class II airshed. Although the park has no specific data on air quality, there are no localized, site-specific problem areas within the park. Air quality issues in the area are regional in nature. Currently, the Pensacola area is considered in attainment for ozone, however the 1-hour ozone standard was exceeded once in 1999 and once in 2000. During subsequent years, no reported violations of the 1-hour ozone standard were reported. There are no public fueling areas or marinas within the national seashore lands or waters.

SOUNDSCAPES

Noise limits established by the National Park Service require vessels to operate at less than 82 dB at 82 feet. Personal watercraft may be more disturbing than other motorized vessels because of rapid changes in acceleration and direction of noise.

Horn and Petit Bois islands were designated as wilderness in 1978 and are managed as such; the eastern section of Perdido Key and East Ship Island are managed as backcountry. Concentrated PWC operations can disturb other visitors and wildlife in these locations. Noise sources from outside the park influence the park soundscape, including vessels using the intracoastal waterway, commercial fishing activity, and large ships. However, many of these noises are transient, low-pitched sounds and relatively quiet. In addition, certain sites within the Florida District are subjected to military jet overflights due to the proximity to Pensacola Naval Air Station, Whiting Field, and Eglin Air Force Base. There are designated quiet hours in campgrounds, but no other noise restrictions in the park.

SHORELINE AND SUBMERGED AQUATIC VEGETATION

Personal watercraft are often able to access shoreline or shallow water areas that most other watercraft cannot. This may lead to disturbance of vegetation resources, including sensitive plant species. In addition, personal watercraft may land on the shoreline and allow visitors to access inland areas where sensitive vegetation and plants species may also exist. 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 and ultimately shoal formation (Vlasich 1998).

There is a fairly standard vegetation suite within the park on land; however, soil and sand disturbances from boating or storm events can cause intense wash-over disturbance from deposition of sand. No disturbances within the national seashore have been noted particular to personal watercraft. Emergent vegetation is common on most shores within the national seashore.

An important shoreline plant species within the national seashore is *Balduinia augustifolia*, a plant that grows among stranded and relic dune environments. The plant is the single floral host for *Hesperapis oraria*, a solitary bee species with a range limited to the northern coastal regions of the Gulf of Mexico. *B. augustifolia* is at risk of inadvertent disturbance by visitor use at potential habitat sites.

Submerged aquatic vegetation is an important resource at Gulf Islands National Seashore, and there is an abundance of seagrass or potential seagrass habitat within park boundaries. Some Perdido Key lagoons

are closed to all combustion craft for protection of seagrass. Most of the seagrass in Mississippi is within park boundaries. The north sides of all the islands support potential seagrass habitat. There is documentation of personal watercraft getting stuck in submerged aquatic vegetation in the Stark Bayou area of Davis Bayou. Substantial seagrass blowouts (areas of seagrass loss) resulting from PWC activity could have an impact on seagrass resources.

WILDLIFE AND WILDLIFE HABITAT

Some research suggests that personal watercraft impact wildlife through interruption of normal activities, alarm or flight; avoidance and displacement of habitat; and effects on 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. This may force nesting birds to abandon eggs during crucial embryo development stages and flush other waterfowl and shorebirds from habitat, causing stress and associated behavior changes. Collisions with waterfowl and wildlife may also be a concern.

Herons, terns, osprey and other birds occur in the park. Nesting sites are protected as needed with seasonal park closures, but feeding and loafing sites are not protected from disturbances. All the islands in the Mississippi District contain prime shorebird habitat, and the park monitors these sites and implements closures on a seasonal basis to protect nests. The Mississippi District park staff has observed colonies of shorebirds, including least terns, royal terns, sandwich terns, and black skimmers, being flushed from the nesting colony by PWC (NPS 2001a). Personal watercraft have also been observed flushing nesting shorebirds, osprey, and plovers at Big Sabine Point. Piping plovers utilize open beaches and tidal flats of both the Florida and Mississippi districts of the park to overwinter (NPS 2001a). Furthermore, Cat Island, East Ship Island, West Ship Island, Horn Island, Spoil Island, and Petit Bois Island in the Mississippi District are designated critical habitat for the piping plover during winter (Federal Register 2001). No critical habitat has been designated in the Florida District; however, according to USFWS, any place park staff observes wintering piping plovers within the park will be treated the same as critical habitat (Hoggard 2003d).

THREATENED, ENDANGERED AND SPECIAL CONCERN SPECIES

Personal watercraft may also affect federal listed or other species of concern through interruption of normal activities, alarm or flight, avoidance and displacement of habitat, and effects on reproductive success.

Gulf Islands National Seashore is a permanent or seasonal home to 29 state or federal threatened, endangered, or species of special concern animals and plants. At Gulf Islands National Seashore, piping plover, Florida manatee, Perdido Key beach mouse, and various sea turtles are among threatened or endangered species that could potentially be impacted by personal watercraft. Turtles nest on the Gulf side of the islands, and feed and loaf on the sound side. In shallow waters, sea turtles and manatees cannot dive to avoid personal watercraft and boats. Perdido Key beach mouse habitat could be accessible by PWC landing and, unlike motor vehicle access in parking areas, park staff cannot control where these vessels access land.

VISITOR EXPERIENCE

Some research suggests that personal watercraft are viewed by some segments of the public as a 'nuisance' due to their noise, speed, and overall environmental effects while others believe personal watercraft are no different from other watercraft and have a 'right' to enjoy the sport.

A visitor survey and some common opinions included the following (NPS 2002e):

- Personal watercraft are a "nuisance."
- Personal watercraft tend to operate in groups, which is more disturbing than single use.
- Personal watercraft disturb solitude.
- Kayakers and canoeists are not coming to the national seashore area due to PWC activity.
- People come to the national seashore to have a more primitive experience than what is available at other places nearby.

There is an abundance of non-park water surrounding the national seashore, and ample opportunity for PWC use in nearby areas. The general NPS water boundaries around the Mississippi islands, with the exception of Cat Island, extend out one mile from the perimeter of the islands. The National Park Service has no jurisdiction over waters around Cat Island. NPS water boundaries within the Florida District vary due to their proximity to local population centers and the intracoastal waterway. Generally, boundaries on the Gulf side extend out one mile from the low tide line, with variable boundary limits within the area north of Santa Rosa Island and intracoastal waterway (see Location Map at the end of this chapter).

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 part, this is believed to be a "boater education" issue (i.e., inexperienced riders lose control of the craft); but 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, manual steering becomes difficult.

PWC are used for enjoyment, particularly for touring and maneuvers such as wave jumping, and some models are capable of speeds in the 60-mph range. This and their ability to access shallow-draft areas, personal watercraft can create wakes that pose a conflict for both shore and boat fishermen and a safety hazard to other users such as swimmers, canoeists, kayakers, and windsurfers.

CULTURAL RESOURCES

Park units have listed or potentially listed (on the National Register of Historic Places) cultural resources along shorelines that may be affected by erosion or uncontrolled visitor access since PWC riders are able to access/beach/launch in areas less accessible to most motorized watercraft. Resources within the national seashore include several forts of historic significance and midden sites eroding out of cliffs at the Butcher Pen Cove area of Live Oaks.

SOCIOECONOMICS

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. Rentals of personal watercraft have also increased exponentially compared to other types of watercraft. Some businesses may be affected by actions to either increase or decrease PWC use.

Gulf Islands National Seashore is near locations that provide opportunities for PWC use: Pensacola Bay and Mississippi Sound, the Gulf of Mexico, several river systems, and Mobile Bay in Alabama.

NATIONAL SEASHORE AREA MANAGEMENT AND OPERATIONS

Conflict with State and Local Ordinances and Policies Regarding PWC Use

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. There is a cooperative relationship between the park, the Coast Guard, Mississippi Department of Marine Resources, Harrison County Sheriff's Department, and the Florida Marine Patrol regarding the enforcement of the current park PWC ban.

Impact to Park Operation from Increased Enforcement Needs

Park staff expressed concerns about enforcement of regulations that may limit PWC use, as enforcement capabilities are currently limited. PWC use may require additional park staff to enforce standards, limits, or closures because of increased accident rates and visitor conflicts. Enforcement capabilities are currently limited at Gulf Islands National Seashore and enforcement of additional regulations may pose a challenge. The vast expanse of open water between the islands makes enforcement quite difficult even under the current situation. Additional enforcement would be difficult for the park to provide.

ISSUES ELIMINATED FROM FURTHER CONSIDERATION

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

Cultural Landscapes – Thus far, no historic landscape studies have been completed for the park. No known cultural landscapes have been identified within the vicinity of the shoreline or in potential future landing areas. Therefore, this topic was eliminated.

Historic Structures – Fort Massachusetts is the only historic structure adjacent to the water, but is not affected by PWC use because such use is so low at this location within the park (see table 18 for PWC use data). No other historic structures have been identified along the shoreline as being affected by waves caused by PWC. The park has received funding to protect Fort Massachusetts from the effects of erosion due to natural causes, which were occurring before PWC use started at the seashore (Snyder 2003). Continual relocation of extensive amounts of beach sediment and shifting of the shoreline takes place even under completely natural conditions (NPS 1978). Storms and the natural movements of the barrier islands are the primary causes of erosion to the fort (Snyder 2003). Therefore, this topic was eliminated.

Museum Collections – The Gulf Islands National Seashore museum collection comprises approximately 197,000 items ranging from historical objects, archives, and biological specimens. While the majority of

these items are stored at the NPS Southeastern Archaeological Center in Tallahassee, Florida, both districts of the park have collection storage areas that are closed to the public and exhibit areas that are open to the public. Given the collection's dispersed storage locations outside the impact analysis area, there would be no impacts from PWC use in the national seashore to this cultural resource.

Ethnographic/Sacred Sites – While no ethnographic resources have been identified within the park, Gulf Islands National Seashore has not yet been evaluated for ethnographic resources or sacred sites. There are currently 15 affiliated tribes. It is possible that potentially eligible resources could be either outside the impact analysis area or in areas already experiencing heavy visitor use from both land and water vehicles. The impacts (if any) resulting from PWC users would be extremely difficult to distinguish or quantify.

Paleontological Resources – Little is known about the paleontological resources of the park. It is possible that potentially eligible resources could be either outside the impact analysis area or in areas already experiencing heavy visitor use from both land and water vehicles. However, the impacts (if any) resulting from PWC users would be extremely difficult to distinguish or quantify.

Impacts to Floodplains – The level of PWC use and associated PWC activities identified in each alternative would have no adverse impacts on floodplains. No development is proposed in the alternatives; thus, no flooding would result and cause impacts to human safety, health, or welfare.

Prime and Unique Agricultural Lands – No prime and unique agricultural farmland exists in the vicinity of areas that would be affected by PWC use.

Energy Requirements and Natural or Depletable Resource Requirements – PWC operation requires the use of fossil fuels. While PWC use could be limited or banned within this park unit, 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 by personal watercraft. The level of PWC use considered in this environmental assessment is minimal. PWC use would not have an adverse effect on continued fuel availability.

Environmental Justice – In some cases, PWC use may affect minority or low-income populations; for example, a small business in a very small low-income community that rents personal watercraft as its only source of income. There are no minority or low-income communities that would be affected by management or discontinuation of PWC use within the national seashore.

RELATIONSHIP TO OTHER PLANS, POLICIES, AND ACTIONS

The current *General Management Plan* (NPS 1978) and *Superintendent's Compendium* (NPS 2003a) give direction for appropriate visitor activities and facilities at specific places in the park.

The following plans, policies, and actions could affect the alternatives being considered for personal watercraft. These plans and policies are also considered in the analyses of cumulative effects.

PARK PLANS, POLICIES, AND ACTIONS

1978 General Management Plan and Development Concept Plan – The *1978 Gulf Islands General Management Plan* (NPS 1978) was created to outline the park-wide plan for meeting management objectives at the national seashore. The document consists of a resources management plan, visitor use plan, and general development plan. The document also includes a development concept plan, which is a

detailed implementation plan that supplements the *General Management Plan*. Recreation planning is included in the document, but not specific to PWC use, since at the time of production of the *General Management Plan*, personal watercraft were not in widespread use.

Superintendent's Compendium – Annual compendiums are composed by park superintendents to detail specific regulations applicable to a variety of topics within park units. The current Gulf Islands National Seashore *Superintendent's Compendium* (NPS 2003a) outlines regulations relevant to boating and other public recreation use within the national seashore. Restrictions include closures of facilities and natural and cultural resource areas to visitor use.

1997 Strategic Plan, Fiscal Years 1998–2002 – The *Strategic Plan* (NPS 1997b) addresses topics such as the mission of Gulf Islands National Seashore and goals for accomplishing and maintaining the mission. Strategies for achieving these goals are discussed, as well as long-term goals for the five-year period covered in the plan. Mission goals of the park addressed in the *Strategic Plan* fall under the following categories:

- Preserve park resources.
- Provide for the enjoyment and visitor experience of the park.
- Ensure organizational effectiveness.

These goals have been incorporated into the development of objectives and alternatives presented in this environmental assessment.

Future Park Plans and Actions – The following planning activities are currently underway or proposed for future initiation in fiscal years 2003, 2004, or 2005:

- *Wilderness Management Plan*
- *Business Plan*
- *New General Management Plan*
- *Commercial Services Plan* will be prepared concurrently with the *General Management Plan*, but will be a stand-alone document. This plan will review the types of concession operations or other business activities that may be appropriate within park boundaries.

LOCAL, STATE, OR OTHER POLICIES, PLANS, OR ACTIONS

In addition to Florida and Mississippi state regulations on personal watercraft, Escambia County, Florida regulates personal watercraft. Personal watercraft cannot be operated at any time at more than idle speed within 200 feet of any fishing pier, dock or wharf; or, within 200 feet of the shoreline except within designated PWC operation areas or when in transit to and from the shoreline; or within 200 feet of designated swim areas.

Several non-park actions or plans were identified by the Gulf Islands staff that could be related to PWC use and may assist with the evaluation of cumulative impacts. These non-park actions include both existing and proposed plans:

- Several offshore oil leases have been granted in the area of the national seashore in the past several decades. Those nearest to the seashore are between 15 and 28 miles south-southwest of the islands of Horn, Petit Bois, and Santa Rosa. The Secretary of the Interior may grant right-of-way access across park land for petroleum exploration. Florida has not been tapped as much as Mississippi for petroleum. However, there is a possibility that drilling could occur 50 to 70 miles south of the Florida District in Gulf waters.

- Continued maintenance dredging and spoil disposal from three ship channels that cross the seashore (Gulfport, Pensacola, and Pascagoula) is an ongoing process that has been occurring for decades. It is likely that these activities will continue in order to keep waterways open for aircraft carriers.

- Coast Guard activities are common in the waters around the national seashore; there is an active Coast Guard unit at the Naval Air Station. The Coast Guard was originally stationed within National Park Service land, but it has since transferred to the Naval Air Station and Gulf Islands National Seashore acquired the land.

- The U.S. Navy's Pensacola Naval Air Station has two operational air units that include the Blue Angels (jet fighter aircraft) and a search and rescue squadron. The Blue Angels conduct practice sessions each week during the summer creating aircraft noise in the area.

- A plan has been proposed to develop a pass, or canal, at the town of Navarre Beach on Santa Rosa Island, located just east of the national seashore's easternmost boundary. This canal would provide access for watercraft from Santa Rosa Sound to the Gulf of Mexico.

- Part of the U.S. Marine Corps' amphibious unit will be transferring its operations from Vieques, Puerto Rico, to Santa Rosa Island. This unit plans to conduct two to three amphibious operations per year at the eastern edge of the park's boundary. Dredging of Pensacola Pass has recently been completed to accommodate such activities, which are expected to begin in 2004.

- The park's Naval Live Oaks unit is the only open piece of land on the peninsula between the town of Gulf Breeze and the substantial residential developments east of Naval Live Oaks. Public utilities want to obtain rights-of-way to go through the Naval Live Oaks area.

- The portion of Highway 98 from Pensacola to the town of Gulf Breeze and through Naval Live Oaks is at capacity. Discussions are underway to possibly widen the bridge and the road, or re-route the bridge through or near Naval Live Oaks. Increasing the capacity of the road could increase the amount of visitation to and through the park.

- A highway connector may be built from Highway 65 into Pensacola or Fort Walton Beach. This could bring more visitors, industry, and traffic into the Pensacola area.

- The towns of Biloxi and Gulf Port in Mississippi voted to allow casino gambling. However, the casinos are not permitted to build on land, so several floating casinos exist outside these towns in the Mississippi Sound. Light pollution from the casinos can be seen from the national seashore islands, and has been known to affect sea turtles and possibly other species. The casinos want to attract families, and offer boat rides and fishing trips. It is possible they may also offer PWC rentals in the future.

- The barrier islands experience drug trafficking, and the islands represent the United States' southernmost international boundary in the area. The Department of Homeland Security may

possibly install radar or some type of early warning system on the islands, which would be accessed before the mainland in the event of an attack. Navy and Coast Guard activities have been increasing in the area as a result of an increase in Homeland Security operations. An Air National Guard radio tower is located on Horn Island.

- Visitation at the national seashore is expected to increase in the next 10 years to reflect the projected growth in the region. By the year 2012, the number of visitors to the national seashore is projected to be 5,308,532.

GULF ISLANDS NATIONAL SEASHORE

Mississippi/Florida

Location Map



United States Department of the Interior/National Park Service WASO/April 2003/635/20039

LEGEND

- National Seashore
- Swimming area
- Wheelchair accessible
- Campground
- Picnic area
- Ranger station
- Boat launch

ALTERNATIVES

All alternatives must be consistent with the purpose and significance of Gulf Islands National Seashore, and they must meet the purpose of and need for action, and meet the objectives to a large degree for the project. Three alternatives are described in this section, as well as alternatives that were considered but dismissed.

The alternatives analyzed in this document in accordance with NEPA are the result of agency scoping and public input following the public scoping meetings held in Florida and Mississippi in January 2003, and as stipulated in the settlement agreement between the Bluewater Network and the National Park Service (NPS). The no-action alternative would continue the ban on personal watercraft that was enacted at the park on April 22, 2002. The action alternatives address the reinstatement of PWC use under a special regulation with management strategies and mitigation measures.

Table 3 summarizes the alternatives being considered, table 4 summarizes the impacts of each alternative, and table 5 analyzes how the alternatives meet the project objectives (as identified in the "Purpose of and Need for Action" chapter). These three tables are located at the end of this chapter.

NO-ACTION ALTERNATIVE: CONTINUE PROHIBITION OF PWC USE IN GULF ISLANDS NATIONAL SEASHORE

The no-action alternative would continue the prohibition of PWC use at the national seashore that began on April 22, 2002, following a determination by the park not to propose a special regulation to allow PWC use in the park. The National Park Service would take no further action to draft a special regulation allowing PWC use to be reinstated. However, PWC use would continue outside the boundaries of the national seashore. The National Park Service would enforce the ban on PWC use within its waters with existing staff. Information regarding the closure would be made available to the public.

ALTERNATIVE A: REINSTATE PWC USE UNDER A SPECIAL NPS REGULATION AS PREVIOUSLY MANAGED

Under alternative A, a special NPS regulation would be written to reinstate PWC use as it was managed prior to April 22, 2002. PWC use would be managed in accordance with NPS *Management Policies 2001* (NPS 2000d), park practices, and state regulations with no added restrictions. This alternative would allow PWC use within Gulf Islands National Seashore, and the numbers of personal watercraft would be unrestricted.

Area of Use and Location Restrictions. PWC use would be reinstated through promulgation of a special regulation. PWC use would be allowed throughout the national seashore, except in areas where use restrictions had been in place, including:

- The lakes, ponds, lagoons and inlets of East Ship Island, West Ship Island, Horn Island, Petit Bois Island and Cat Island (lands under NPS management) are closed to the use of motorized vessels.
- No motorized vessels are permitted above the mean high tide line on the designated wilderness islands of Horn and Petit Bois.
- The lagoons of Perdido Key within Big Lagoon are closed to all combustion engines.

- The areas 200 feet from the remnants of the old fishing pier and 200 feet from the new fishing pier at Fort Pickens are closed to all boating operations.

- Operating a vessel in excess of 5 mph or creating a wake is prohibited within 500 feet of the Davis Bayou launch ramp, the West Ship Island Pier, the Horn Island Pier, the Fort Pickens Pier, within the buoyed, flat-wake zone at Spoil (Sand) Island, and within the posted area on the north side of Perdido Key near the Fort McRee site.

- Seasonal closures within the seashore to protect wildlife and habitat according to the *Superintendent's Compendium* (NPS 2003a) (see"Wildlife" section for more detail).

- Harassing, hunting, capturing or killing any marine mammal, including manatees, is illegal (Boat Ed 2003a).

- PWC would be allowed to beach at any point along the shore not restricted by the above.

Equipment and Emissions. As noted in the introduction, 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 strict standards beginning in model year 1999 (EPA 1996a, 1997). Under this alternative, it is assumed that over time, PWC two-stroke engines would be converted to cleaner direct-injected or four-stroke engines in accordance with the Environmental Protection Agency's rule (40 CFR Parts 89-91, "Air Pollution Control; Gasoline Spark-Ignition and Spark-Ignition Engines, Exemptions"; Rule, 1996). It is the responsibility of the PWC industry to meet these regulations, not the responsibility of individual owners.

Safety and Operating Restrictions. All state and federal watercraft laws and regulations would apply to PWC operators including regulations that address reckless or negligent operation, excessive speed, hazardous wakes or washes, hours of operation, age of driver, and distance between vessels. Boating regulations by state are as follows.

Florida (Boat Ed 2003a; Florida Boating Safety Course 2003):

- Everyone on board or being towed behind a personal watercraft must wear a U.S. Coast Guard-approved Type I, II, III or V personal flotation device (PFD) at all times. Inflatable PFDs are not to be worn on personal watercraft.

- An operator of a personal watercraft equipped with a lanyard-type ignition safety switch must attach the lanyard to his or her person, clothing, or PFD.

- Any person operating a personal watercraft must receive instruction in the safe handling of personal watercraft, and must have a written statement attesting to this.

- Personal watercraft may be operated only during the hours of one half-hour before sunrise to one half-hour after sunset.

- No one under the age of 14 years may operate any personal watercraft. No one under the age of 18 years may rent/lease a personal watercraft.

- A personal watercraft must be operated in a reasonable and prudent manner. It is illegal to:

  - Weave personal watercraft through congested waterway traffic.

  - Swerve at the last possible moment in order to avoid collision (as in spraying another person or boat, or playing "chicken").

  - Jump the wake of another boat unreasonably or unnecessarily close to that boat or when visibility is obstructed.

- Escambia County, Florida: Personal watercraft cannot be operated at any time at more than idle speed within 200 feet of any fishing pier, dock or wharf; or, within 200 feet of the shoreline except within designated PWC operation areas or when in transit to and from the shoreline; or within 200 feet of designated swim areas.

Mississippi (Mississippi Boating Safety Course 2003; Boat Ed 2003b):

- Persons less than 12 years of age shall not operate a personal watercraft unless accompanied by an adult of 21 years of age and they must have completed a boating safety course. Proof of completion of the course must be carried onboard while the vessel is operating.

- Anyone born after June 30, 1980 must successfully complete an approved boating safety course prior to operating any motorized vessel. Proof of completion of the course must be carried on board while the vessel is operating.

- Operation of a personal watercraft at any more than flat-wake speed is restricted within and 100 feet adjacent to any small craft, marina, or public boat launch ramp. Operation is prohibited within 100 feet behind a water skier or another vessel.

- Each person riding on or towed behind a personal watercraft must wear a Type I, II, or III U.S. Coast Guard-approved PFD. It is recommended that those onboard a personal watercraft wear PFDs designed to withstand the impact of hitting the water at high speed.

- Personal watercraft should not be operated in a manner that requires the operator to swerve at the last possible moment to avoid collision. Furthermore, a personal watercraft should not jump the wake of another boat recklessly or unnecessarily close to that boat.

- Operating a personal watercraft while under the influence of alcohol or drugs is illegal.

- Chasing, harassing or disturbing wildlife with your personal watercraft is illegal.

- It is also strongly recommended that personal watercraft are only operated during daylight hours.

- In addition to the requirements above, Mississippi Ordinance No. 16.002 states that on marine waters south of Interstate Highway 10 (I-10):

  - Personal watercraft must have a self-circling device or lanyard-type ignition safety switch with the lanyard attached to the operator's person, clothing or PFD.

  - Personal watercraft must not be operated at an excessive speed within 100 feet of another occupied boat or personal watercraft except in a crossing situation or overtaking in accordance with the navigation rules.

  - Personal watercraft may not jump, or attempt to jump, the wake of another boat or personal watercraft within 100 feet of that boat.

Water patrols and enforcement, in conjunction with cooperating agencies, would continue on an irregular basis during the primary PWC use season (Memorial Day to Labor Day).

Visitor education programs would be implemented, including boater safety education.

ALTERNATIVE B – REINSTATE PWC USE UNDER A SPECIAL NPS REGULATION WITH ADDITIONAL MANAGEMENT PRESCRIPTIONS (PREFERRED ALTERNATIVE)

Under alternative B, a special regulation would be written to reinstate PWC use at the national seashore. Alternative B would include the management actions listed under alternative A, as well as additional management prescriptions to protect natural and cultural resources, to mitigate PWC safety concerns, to provide for visitor health and safety, and to enhance overall visitor experience.

Areas of Use/Restrictions. In addition to the areas of use and restrictions listed under alternative A, the following would also apply throughout the park:

- A flat-wake zone would be established 300 yards from all park shorelines at the low-water mark with the exception of:
  - At the West Ship Island Pier a flat-wake zone would extend 0.5 mile from the shoreline and 0.5 mile from either side of the pier
  - Around all designated wilderness boundaries a flat-wake zone would be established 0.5 mile from the shorelines at the low-water mark.
- No PWC operation would be permitted within 200 feet of non-motorized watercraft and people in the water. However, other motorized watercraft would be permitted in this 200-foot area at flat wake speed.
- PWC would be allowed to beach at any point along the shore not restricted by the above.

Equipment and Emissions. As noted under alternative A, over time, PWC two-stroke engines would be converted to cleaner direct-injected or four-stroke engines in accordance with the Environmental Protection Agency's rule (40 CFR Parts 89-91, "Air Pollution Control; Gasoline Spark-Ignition and Spark-Ignition Engines, Exemptions"; Rule, 1996). It is the responsibility of the PWC industry to meet these regulations, not the responsibility of individual owners.

It would be prohibited to operate a personal watercraft in park waters that had manufacturer-installed emissions control equipment removed.

Safety and Operating Restrictions. All state and federal watercraft laws and regulations would apply to PWC operators, including regulations that address reckless or negligent operation, excessive speed, hazardous wakes or washes, hours of operation, age of driver, and distance between vessels, as described under alternative A.

Education/Enforcement. The following prescriptions would be added to management strategies:

- Enhance PWC user and boater education through interpretive talks, onsite bulletins, and brochures given to PWC registrants and visitors who rent personal watercraft.

- Enhance enforcement of federal regulations pertaining to harassment of marine mammals through ongoing water patrols (*Marine Mammal Protection Act, Endangered Species Act*).

ALTERNATIVES CONSIDERED BUT NOT ANALYZED FURTHER

Park Service staff discussed and formulated other management strategies that potentially could resolve PWC issues and meet the park's objectives for visitor use and resource management. The following strategies were discussed and considered, but are not analyzed further for the reasons outlined below:

- **Water-depth determined flat-wake zone**. Determine a flat-wake speed zone by means of water depth. For example, flat wake in less than two feet of water. It was decided that this would be impractical as not all vessels have a depth meter, and would also be unenforceable by park staff.

- **PWC number limits**. Limit the number of PWC users in the national seashore through a permitting lottery system. Setting a carrying capacity would be costly, would require additional staffing to enforce, and would exclude some people from using their PWC in the national seashore if they did not receive a permit during the year.

- **Access points**. Establishing access (landing) points for personal watercraft along beaches was discussed, but dismissed because it would intensify use in those areas and protection of park resources would be better accomplished with a 300-yard flat-wake speed zone.

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 NEPA:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

- Ensure for all Americans a 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 summarizes the extent to which each alternative meets Section 102(1) of NEPA 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.

The no-action alternative would ensure a safe, healthful, productive, and aesthetically and culturally pleasing area for visitors to access without the threat of PWC users introducing noise and safety concerns. The no-action alternative would attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences by continuing the prohibition of PWC use within all waters of the national seashore. However, the no-action alternative would not maintain an environment that supports diversity and variety of individual choice, nor would it achieve a balance between population and resource use that permits a wide sharing of amenities.

Alternative A would satisfy the majority of the six requirements detailed above; however, alternative A would not assure safe, healthful, productive, and aesthetically pleasing surroundings by allowing PWC use in areas frequented by non-PWC recreationists. Of the alternatives analyzed, alternative A would not attain the widest range of beneficial uses of the environment while minimizing degradation, risk of health or safety, or other undesirable and unintended consequences because of the potential impacts of PWC use to visitor experiences, natural resources, and other opportunities in the national seashore. For this reason, alternative A is not the environmentally preferred alternative.

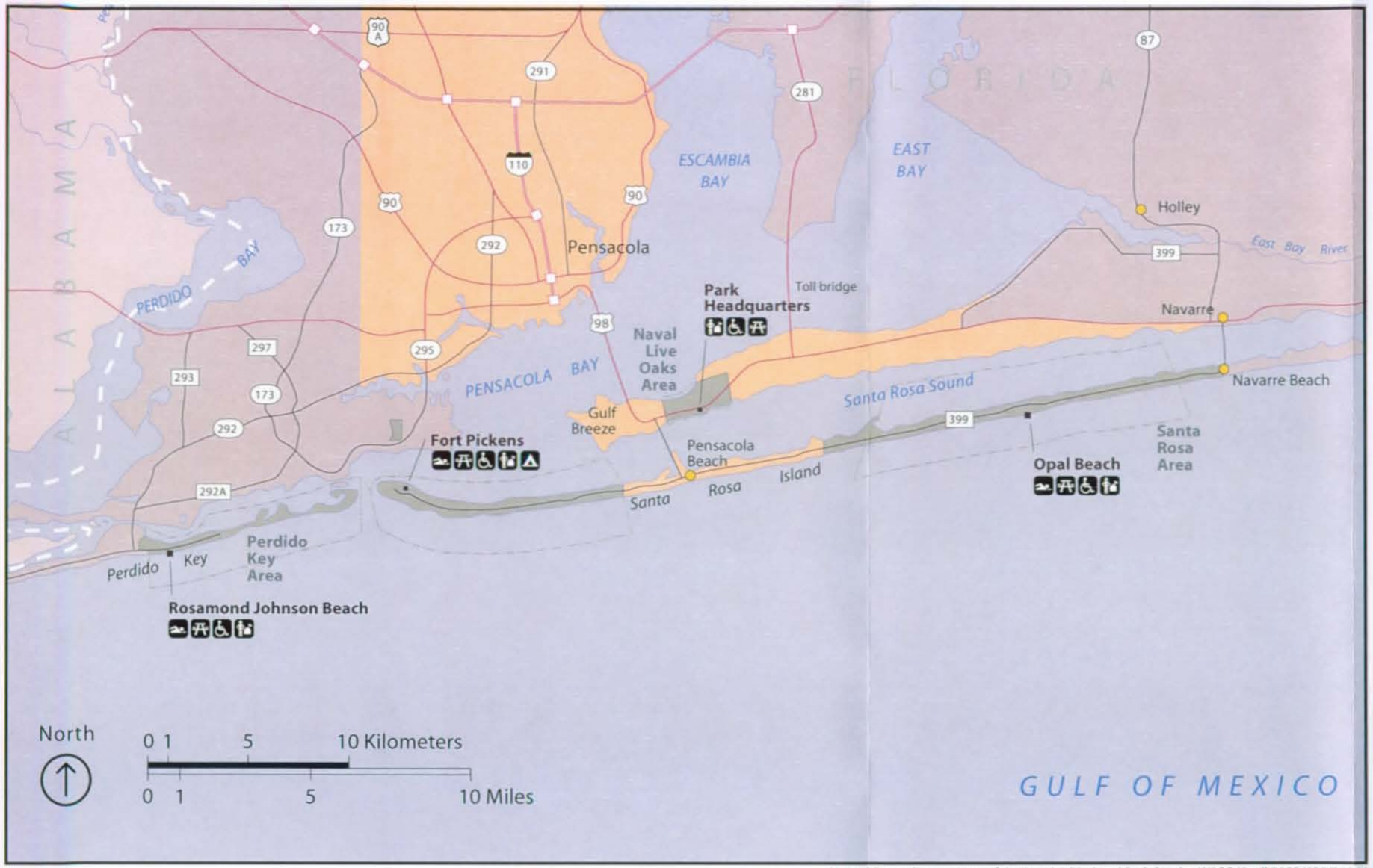
Alternative B would have limited impacts on the national seashore's natural resources through protection of shoreline areas with flat-wake zoning prescriptions. In addition, the implementation of the flat-wake zoning under alternative B would meet park goals with respect to the protection of visitor experience and safety by implementing these restrictions in areas of high visitor activity. This alternative would support visitor enjoyment by allowing access to national seashore amenities by PWC users while accommodating recreationists and meeting resource management objectives. This alternative would accommodate recreational opportunities for visitors while protecting sensitive natural resources within the national seashore. Alternative B is designed to meet the NPS general prohibition on PWC use for the protection of park resources and values, while providing recreational opportunities for PWC users.

Based on this analysis, alternative B is considered the environmentally preferred alternative by best fulfilling park responsibilities as trustee of sensitive habitat; by assuring safe, healthful, productive, and aesthetically and culturally pleasing surroundings; and by attaining a wider range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.

GULF ISLANDS NATIONAL SEASHORE

Florida District

No-Action Alternative: Continue the Prohibition of PWC Use at Gulf Islands National Seashore.



United States Department of the Interior/National Park Service WASO/April 2003/635/20044

LEGEND

- National Seashore
- National Seashore Boundary
- Swimming area
- Picnic area
- Wheelchair accessible
- Ranger station
- Campground
- Boat launch

VICINITY



GULF ISLANDS NATIONAL SEASHORE

Mississippi District

No-Action Alternative: Continue the Prohibition of PWC Use at Gulf Islands National Seashore.

MISSISSIPPI

49

To New Orleans

D'Iberville

10

110

Biloxi

90

Ocean Springs

Davis Bayou

Gautier

Moss Point

Pascagoula

Gulfport

Passenger ferry (no cars)

MISSISSIPPI SOUND

Cat Island

Ship Island Pass

West Ship Island

East Ship Island

Dog Keys Pass

Horn Island

Horn Island Pass

Petit Bois Island

Fort Massachusetts

North

0 1 5 10 Kilometers

0 1 5 10 Miles

GULF OF MEXICO

United States Department of the Interior/National Park Service WASO/April 2003/635/20045

LEGEND

- National Seashore
- National Seashore Boundary
- Swimming area
- Picnic area
- Wheelchair accessible
- Ranger station
- Campground
- Boat launch

VICINITY

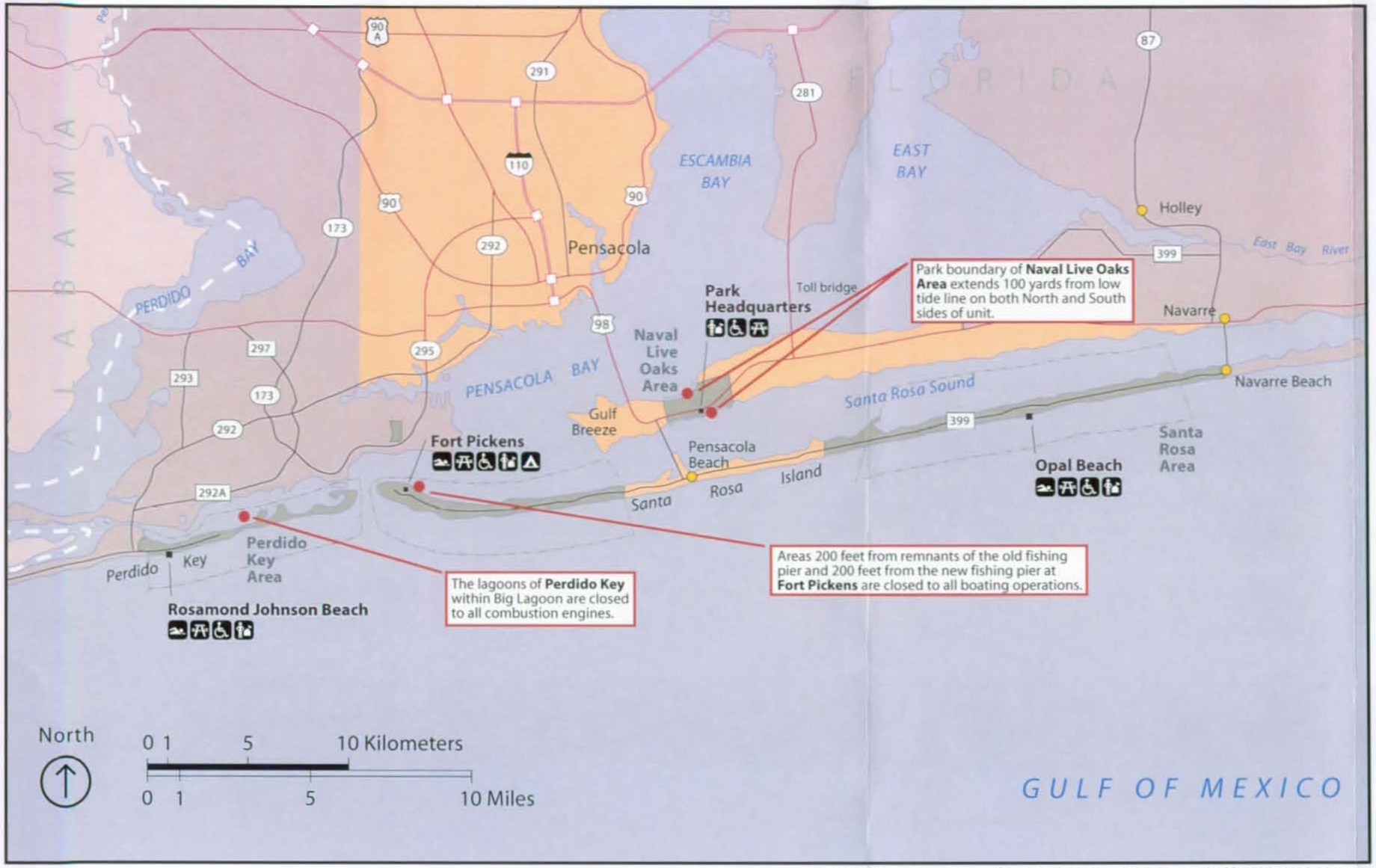


GULF ISLANDS NATIONAL SEASHORE

Florida District

Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed.

Under Alternative A, a special regulation would be written to allow PWC use in park waters as managed prior to April 22, 2002.



United States Department of the Interior/National Park Service WASO/April 2003/635/20040

LEGEND

- National Seashore
- National Seashore Boundary
- Swimming area
- Picnic area
- Wheelchair accessible
- Ranger station
- Campground
- Boat launch

VICINITY

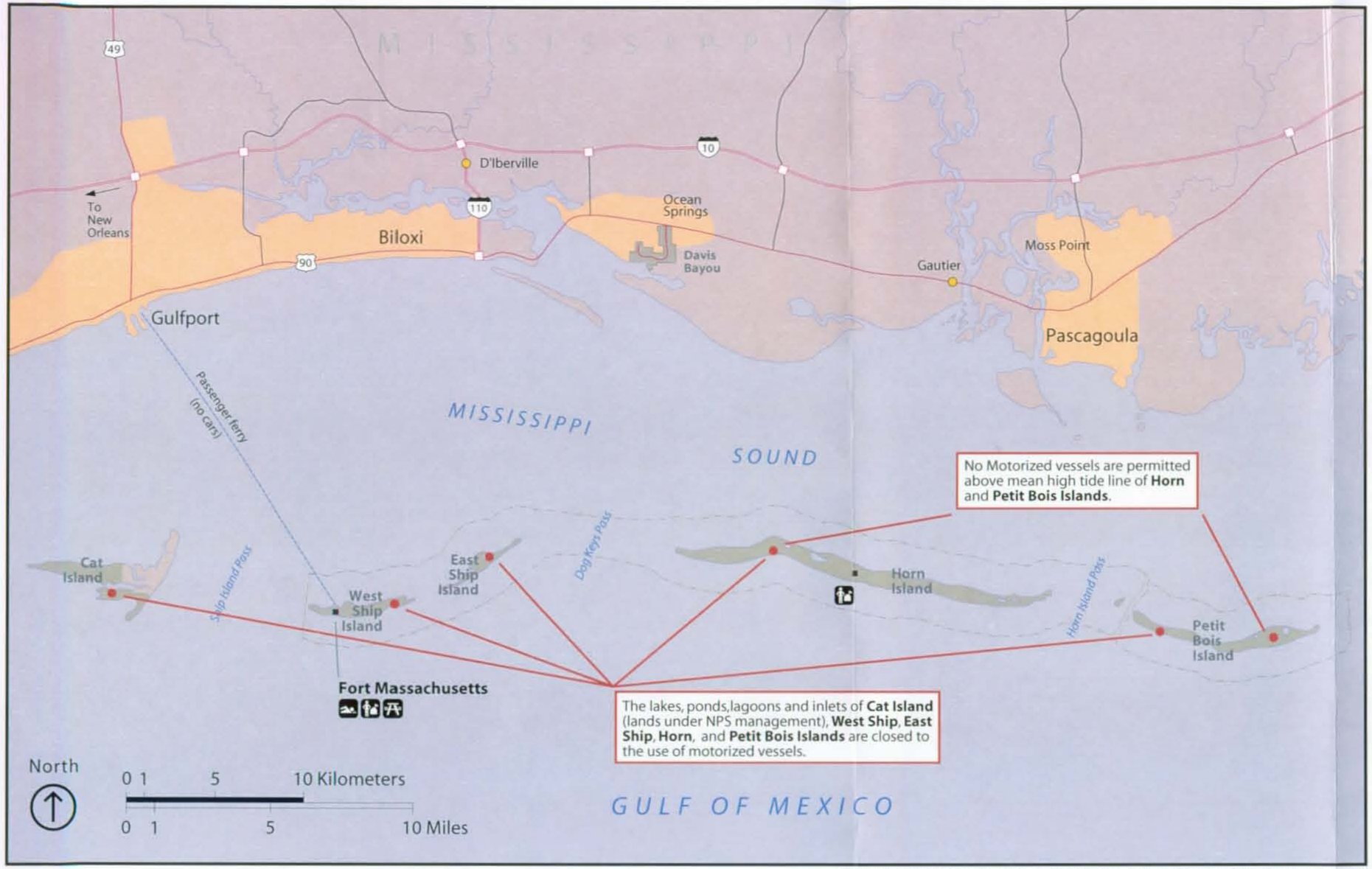


GULF ISLANDS NATIONAL SEASHORE

Mississippi District

Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed.

Under Alternative A, a special regulation would be written to allow PWC use in park waters as managed prior to April 22, 2002.



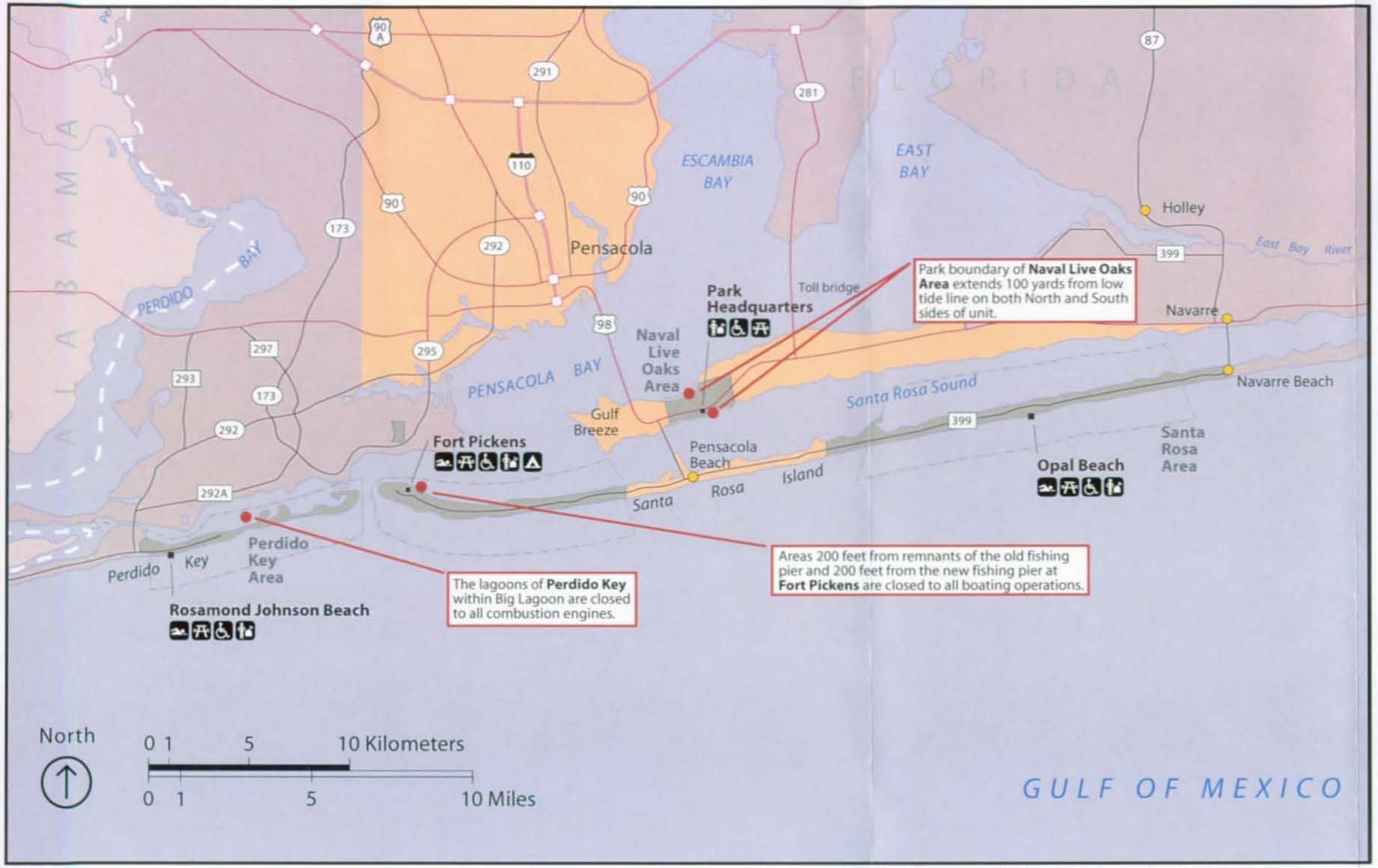
United States Department of the Interior/National Park Service WASO/April 2003/635/20041

LEGEND

- National Seashore
- National Seashore Boundary
- Swimming area
- Picnic area
- Wheelchair accessible
- Ranger station
- Campground
- Boat launch

VICINITY





United States Department of the Interior/National Park Service WASO/April 2003/635/20042

LEGEND

- National Seashore
- National Seashore Boundary
- Swimming area
- Picnic area
- Wheelchair accessible
- Ranger station
- Campground
- Boat launch

GULF ISLANDS NATIONAL SEASHORE

Florida District

Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions.

In addition to the areas of use and restrictions listed under Alternative A, the following would also apply throughout the park:

- a flat wake zone 300 yards from all park shorelines at the low-water mark, except as noted.

VICINITY



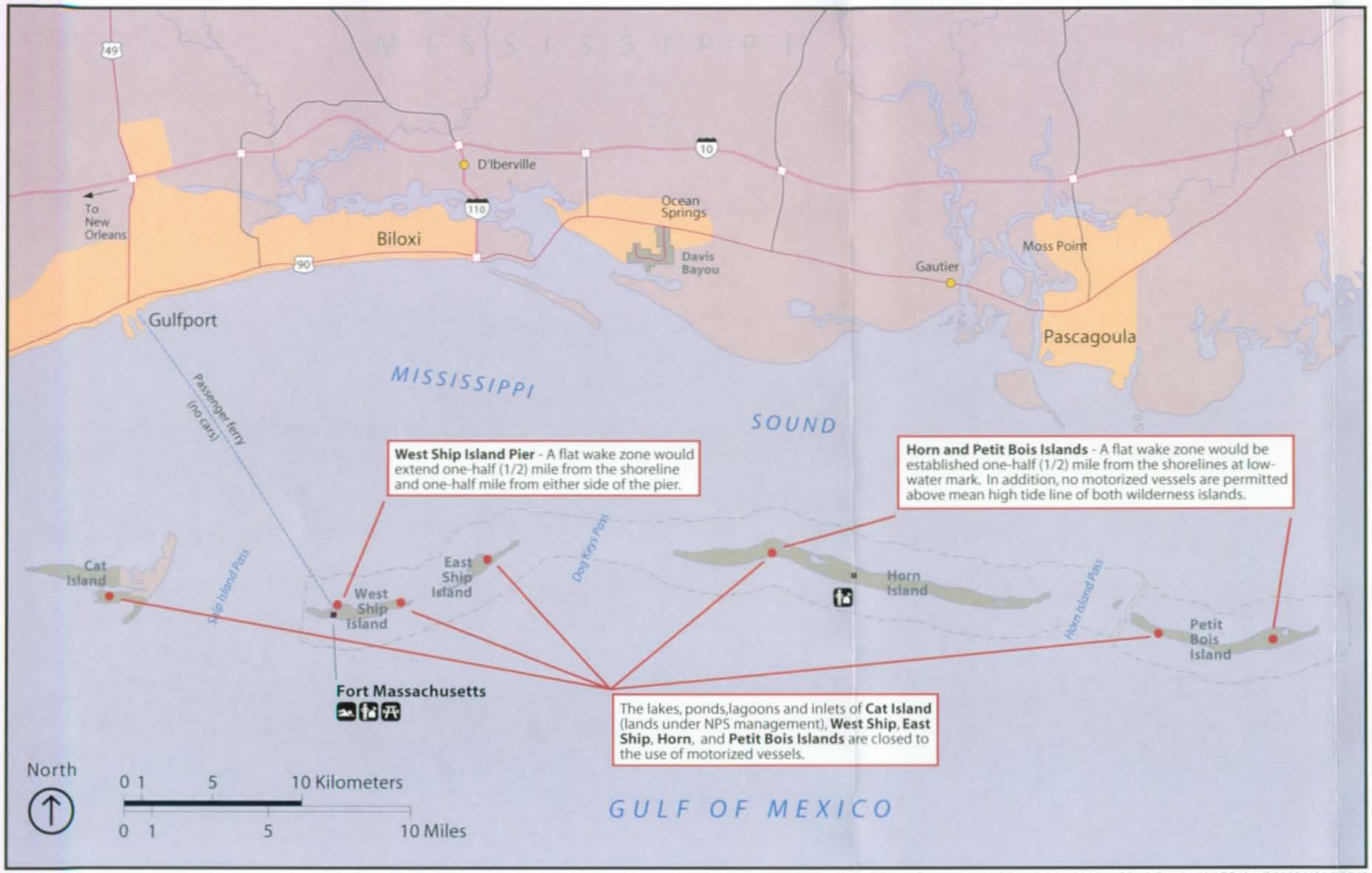
GULF ISLANDS NATIONAL SEASHORE

Mississippi District

Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions.

In addition to the areas of use and restrictions listed under Alternative A, the following would also apply throughout the park:

- a flat wake zone 300 yards from all park shorelines at the low-water mark, except as noted herein.



United States Department of the Interior/National Park Service WASO/April 2003/635/20043

LEGEND

- National Seashore
- National Seashore Boundary
- Swimming area
- Picnic area
- Wheelchair accessible
- Ranger station
- Campground
- Boat launch

VICINITY



TABLE 3: SUMMARY OF ALTERNATIVES

PWC Management Action	No-Action Alternative: Continue Prohibition of PWC Use in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Wake Restrictions	Not applicable.	Restrictions as described in the *Superintendent's Compendium* (NPS 2003a) (numerous closures for all motorized vessels within the park boundary) for vessel operation as follows: • Operation in excess of 5 mph or creating a wake is prohibited within 500 feet of the Davis Bayou launch ramp, the West Ship Island Pier, the Horn Island Pier, the Fort Pickens Pier, within the buoyed flat-wake zone at Spoil (Sand) Island, and within the posted area on the north side of Perdido Key near the Fort McRee site.	In addition to the speed restricted areas outlined in alternative A, the following would also apply throughout the park: A flat-wake zone would be established 300 yards from all park shorelines at the low water mark, with the exception of: • At West Ship Island Pier a flat-wake zone extending 0.5 mile from the shoreline, and 0.5 mile from either side of pier; • At all designated wilderness boundaries a flat-wake zone would be established 0.5 mile from the shorelines at low-water mark. Applicable only in waters managed by the National Park Service.
Use Area	Personal watercraft would not be allowed within park waters.	Restrictions as described in the Superintendent's Compendium (NPS 2003a) (numerous closures for all motorized vessels within the park boundary) that include: • Access above the mean high tide line on the designated wilderness islands of Horn and Petit Bois, • The lakes, ponds, lagoons and inlets of East Ship Island, West Ship Island, Horn Island, Petit Bois Island and Cat Island (lands under NPS management), • The lagoons of Perdido Key within Big Lagoon (closed to all combustion engines), • The areas 200 feet from the remnants of the old fishing pier and 200 feet from the new fishing pier at Fort Pickens.	In addition to the restrictions outlined in alternative A, the following would also apply throughout the park: • No PWC operation would be permitted within 200 feet of non-motorized watercraft and people in the water.
PWC Numbers	None.	No limits.	No limits.
Equipment and Emissions	Not applicable.	PWC two-stroke engines would be converted to cleaner direct-injection or four-stroke engines in accordance with the EPA rule regulating industry emission standards. Engine restrictions would not apply to PWC owners.	PWC two-stroke engines would be converted to cleaner direct-injection or four-stroke engines in accordance with the EPA rule regulating industry emission standards. Engine restrictions would not apply to PWC owners; however, it would be prohibited to operate a personal watercraft that had manufacturer-installed emissions control equipment removed

PWC Management Action	No-Action Alternative: Continue Prohibition of PWC Use in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Safety/Operating Restrictions			
Location / Age Limitations	Not applicable.	**Mississippi State** (MS) – Per state boating regulations, persons under 12 years of age shall not operate a personal watercraft unless accompanied by an adult of 21 years of age; Anyone born after June 30, 1980 must successfully complete an approved boating safety course. **Florida State** (FL) – Per state boating regulations no one under age 14 may operate any personal watercraft; no one under 18 years of age may rent or lease a personal watercraft.	Same as alternative A.
Flotation Device	Not applicable.	**MS** – All PWC riders shall wear U.S. Coast Guard approved Type I, II, or III personal flotation device. **FL** — All persons on board or being towed behind a personal watercraft must wear a USCG approved Type I, II, III, or IV personal flotation device; No inflatable PFDs to be worn on a personal watercraft.	Same as alternative A.
Time Restriction	Not applicable.	**MS** – Recommended that personal watercraft only operate during daylight hours. **FL** – Personal watercraft may be operated only during the hours of one-half hour before sunrise and one-half hour after sunset.	Same as alternative A.
Reckless Behavior	Not applicable.	**MS** – PWC operation is restricted to a flat wake speed within 100 feet of any small craft, marina or public boat ramp; It is illegal to operate while under the influence of alcohol or drugs; It is illegal to chase, harass or disturb wildlife. **FL** – Personal watercraft must be operated in a reasonable manner. It is illegal to weave through congested waterways, swerve at the last possible moment to avoid a collision (spraying another person or playing "chicken"), or jump the wake of another boat unreasonably close to that boat.	Same as alternative A.

PWC Management Action	No-Action Alternative: Continue Prohibition of PWC Use in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Lanyard / Cut-off	Not applicable.	**MS** – Personal watercraft must have self-circling device or lanyard-type engine cut-off switch (MS requirements on marine waters south of I-10). **FL** – An operator of a personal watercraft equipped with a lanyard-type ignition safety switch must attach the lanyard to his or her person, clothing, or PFD.	Same as alternative A.
Education	Information regarding the closure will be available to the public.	Visitor education programs would be implemented, including boater safety education.	Enhance visitor and boater education through interpretive talks, onsite bulletins, and brochures given to PWC registrants and visitors who rent personal watercraft. Enhance enforcement of federal regulations pertaining to harassment of marine mammals through ongoing water patrols.

TABLE 4: SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Impact Topic	No-Action Alternative: Continue Prohibition of PWC Use in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Water Quality	Continuing the prohibition on PWC use within the national seashore boundary would result in no impacts to water quality of park waters in the Florida or Mississippi districts from non-PWC motorboats. Personal watercraft would not contribute emissions to the national seashore. On a cumulative basis, other motorized vessels would continue to have negligible adverse impacts on the national seashore's water quality due to their discharge of organic pollutants. Implementation of this alternative would not result in an impairment of water quality.	Under alternative A, water quality impacts from PWC use based on ecotoxicological and human health benchmarks would be negligible for all pollutants in all areas of the national seashore in 2002. In 2012, although PWC use is projected to increase, all water quality impacts from PWC use are expected to remain negligible due to reduced emission rates of newer technology engines. In 2002, personal watercraft contribute approximately 30% of the cumulative emissions from all motorized watercraft, and in 2012, personal watercraft contribute approximately 50% of the cumulative emissions. Despite the addition of personal watercraft, cumulative water quality impacts from all motorized watercraft under alternative A based on ecotoxicological and human health benchmarks would still be negligible for all pollutants in all areas of the national seashore in 2002 and 2012. In 2012, cumulative water quality impacts from watercraft are expected to be lower than in 2002 due to reduced emission rates. Implementation of the alternative would not result in an impairment of water quality.	Under alternative B, water quality impacts from PWC use based on ecotoxicological and human health benchmarks would be negligible adverse for all pollutants in all areas of the national seashore in 2002. In 2012, although PWC use is projected to increase more rapidly than non-PWC use, all water quality impacts from PWC use are expected to remain negligible due to reduced emission rates of newer technology engines. In 2002, personal watercraft contributed approximately 30% of the cumulative emissions from all motorized watercraft, and in 2012, personal watercraft contribute approximately 50% of the cumulative emissions. Impacts would still be negligible for all pollutants in all areas of the national seashore in 2002 and 2012. At most, cumulative impact threshold volumes would constitute less than 5% of the volume available to personal watercraft. In 2012, even with increased motorcraft use, cumulative water quality impacts from all watercraft are expected to be lower than in 2002 due to reduced emission rates. Implementation of this alternative would not result in an impairment of water quality.
Air Quality			
Impact to Human Health from Airborne Pollutants Related to PWC Use	Continuing the ban on personal watercraft at Gulf Islands National Seashore would have no impacts on human health for PWC related CO, PM_{10}, HC, and NO_x emissions for the year 2002 and 2012 for both the Florida and Mississippi districts of the national seashore. Cumulative adverse impacts to human health from airborne pollutants in both 2002 and 2012 in the Florida District would range from negligible for PM_{10} and NO_x to moderate for CO. Cumulative adverse impacts to human health from airborne pollutants in 2002 in the Mississippi District would range from negligible for PM_{10}, NO_x, and HC, to minor for CO. Increased CO emissions and slightly increased NO_x emissions in 2012 would result from increased boating activity and the	Alternative A would result in negligible adverse impacts to human health related to the PWC airborne pollutants CO, PM_{10}, HC, and NO_x for the year 2002 in the Florida District. The risk from PAH would also be negligible. In 2012 in the Florida District, there would be increases in CO, PM_{10}, HC, and NO_x emissions, and the impact level for these pollutants would remain negligible, the same as in 2002. Alternative A would result in negligible adverse impacts to human health related to the PWC airborne pollutants CO, PM_{10}, HC, and NO_x for the year 2002 in the Mississippi District. The risk from PAH would also be negligible. In 2012 in the Mississippi District, there would be increases in CO,	Because no reduction in PWC use is expected, Alternative B would result in the same air quality impacts to human health from PWC emissions as alternative A. The additional management prescriptions would not noticeably affect PWC emissions as compared to Alternative A, therefore; the total increase in emissions resulting from Alternative A shown in tables 40 and 41 for the Florida and Mississippi districts, respectively, is the same for Alternative B. Negligible adverse impacts from PWC emissions for CO, PM_{10}, HC, and NO_x would occur for 2002 and 2012 in both the Florida and Mississippi districts. The risk from PAH would also be negligible in 2002 and 2012.

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	conversion to new technology engines. However, with improved emission controls, future emissions of HC would continue to decline. The reductions in HC emissions from conversion to cleaner engines would contribute to a reduced impact to regional ozone levels in 2012. All impacts would be long term. The risk from PAH would also be negligible in 2002 and 2012. Implementation of this alternative would not result in an impairment of air quality.	PM_{10}, HC, and NO_x emissions and the impact level for these pollutants would remain negligible, the same as in 2002. The total increase in emissions resulting from Alternative A for all pollutants is shown in tables 40 and 41 for the Florida and Mississippi districts, respectively. Cumulative emission levels from all boating use in the Florida District would be negligible for PM_{10} and NO_x and moderate for CO and HC in 2002 and 2012. Cumulative emission levels from all boating use in the Mississippi District would be negligible for PM_{10}, HC, and NO_x in 2002 and 2012. Cumulative emission levels for CO would be minor in 2002 and would increase to moderate in 2012. Overall, alternative A would have negligible adverse impacts to existing air quality conditions, with future reductions in PM_{10} and HC emissions due to improved emission controls. Overall, PWC emissions of HC are estimated to be less than 1% of the cumulative boating emissions in 2002 and 2012 in both districts. All impacts would be long term. Implementation of this alternative would not result in an impairment of air quality.	Cumulative adverse impacts from PWC and other boating emissions at the national seashore would be the same as for alternative A. In the Florida District, adverse impacts to human health from air pollutants in 2002 would be negligible for PM_{10} and NO_x and moderate for CO and HC. In 2012, levels would remain negligible for PM_{10} and NO_x, and moderate for CO and HC. In the Mississippi District, impacts would be minor for CO and negligible for PM_{10}, HC, and NO_x, in 2002. In 2012, CO impact would increase to moderate; and impacts for the other pollutants would remain at 2002 levels. Regional ozone emissions would improve due to a reduction in HC emissions. This alternative would have negligible adverse impacts to human health air quality conditions, with future reductions in PM_{10} and HC emissions due to improved emission controls. The PWC contribution to emissions of HC is estimated to be less than 1% of the cumulative boating emissions in 2002 and 2012. All impacts would be long term. Implementation of this alternative would not result in an impairment of air quality.
Air Quality Related Values from PWC Pollutants	Under the no-action alternative, personal watercraft would not contribute emissions at the national seashore and there would be no impacts to air quality related values from personal watercraft in both 2002 and 2012. Cumulatively, there would be moderate long-term adverse impacts to air quality related values from all watercraft in the Florida District in 2002 and 2012, and minor long-term adverse impacts to air quality related values in the Mississippi District in 2002 and 2012. These conclusions are based on regional SUM06 values, the lack of existing or anticipated local ozone or visibility effects, and the calculated pollutant emission levels. Implementation of this alternative would not result in an impairment of air quality related values.	Minor adverse impacts to air quality related values from PWC would occur in both 2002 and 2012 in both districts of the national seashore. Emissions of each pollutant would be less than 50 tons per year in both 2002 and 2012. Compared to the no-action alternative, projected emission increases are shown in table 47. Moderate adverse impacts from cumulative emissions from motorized boats and PWC in the Florida District and minor adverse impacts to air quality related values from cumulative emissions from motorized boats and PWC would occur in both 2002 and 2012 in the Mississippi District. These conclusions are based on pollutant emissions, no observed visibility impacts or ozone-related plant injury in the national seashore, and regional SUM06 values, with very little influence from existing or forecast national seashore watercraft operations. All impacts would be long term.	The impacts of alternative B on air quality related values would be the same as alternative A. Emissions of each pollutant would be less than 50 tons per year in both 2002 and 2012. Compared to the no action alternative projected emission increases are shown in table 47. Minor adverse impacts to air quality related values from PWC would occur in both 2002 and 2012 in both districts of the national seashore. In both 2002 and 2012, adverse impacts from cumulative emissions from motorized boats and PWC would be moderate in the Florida District, and minor in the Mississippi District. This conclusion is based on calculated levels of pollutant emissions, regional SUM06 values, and the lack of observed visibility impacts or ozone-related plant injury in the national seashore. Implementation of this alternative would not result in an impairment of air quality related values.

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		Implementation of this alternative would not result in an impairment of air quality related values.	
Soundscapes	The soundscape at the national seashore would not be impacted by the use of personal watercraft within the national seashore. Cumulative impacts of boating noise and ambient noise levels would range from negligible to minor, depending on the location, within the unit, the time of day, and the time of year. Impacts would typically be short in duration (i.e., a passing motorboat) but over the long-term. Projected increased PWC use levels outside of the park boundaries would not increase the severity of noise impacts. Implementation of this alternative would not result in an impairment of the park's soundscape.	Noise from personal watercraft would be short-term in duration but would be expected to occur over the long-term. Impacts would be negligible to moderate adverse depending on the location, within the unit, the time of day, and the time of year. Impacts would be related to the number of personal watercraft operating as well as the sensitivity of other visitors, and would be highest during summer weekends and holiday periods that are potential times of peak use. Based on current engine noise levels, impacts to the soundscape would increase by 2012, along with the projected increase in PWC use. However, engine technology may be quieter in the future, lessening the increase in noise levels. Cumulative adverse noise impacts from personal watercraft and other watercraft, commercial boats, and aircraft would be negligible to moderate, and would predominate on busy days during the high use season. Impacts would be short in duration but occur over the long-term because of the high volume of annual boating use, and could increase with increased boating use in the future. Impacts may increase in 2012 due to the projected increase in motorized boat use within the national seashore. Implementation of this alternative would not result in an impairment of the park's soundscape.	Noise from personal watercraft would be short-term in duration but would be expected to occur over the long-term. Impacts would be negligible to minor adverse depending on the location, within the unit, the time of day, and the time of year. Flat-wake zoning would reduce noise levels from PWC in shoreline areas, specifically those areas around Horn and Petit Bois Islands. Impact levels would relate to the number of personal watercraft operating as well as the sensitivity of other visitors and could potentially increase by 2012 based on noise levels of newer engine technology. Cumulative adverse noise impacts from personal watercraft and other watercraft, commercial boats, and aircraft would be negligible to moderate. Impacts would be short in duration but occur over the long-term because of the high volume of annual boating use, and could increase with increased boating use in the future. Implementation of this alternative would not result in an impairment of the park's soundscape.
Shoreline and Submerged Aquatic Vegetation	PWC operators would not be allowed to operate in the national seashore, and negligible no impacts would occur to shoreline or submerged aquatic vegetation from PWC use. Direct and indirect adverse cumulative impacts to shoreline vegetation resources from non-PWC watercraft activity and other visitor uses would continue, and would be minor to moderate to both marsh and dune communities. Cumulative impacts to seagrass beds would result from propeller scarring and sediment resuspension and would be adverse, direct and indirect, minor to moderate, and short- and long-term because most seagrass habitats could still be accessed. Impacts	Reinstating PWC use within the national seashore would cause minor to moderate short- to long-term adverse impacts from physical disturbance, wave action, or visitor access to emergent shoreline vegetation communities, including marshes or dune environments. PWC use would have adverse impacts to seagrass habitats in both the Florida and Mississippi districts that are direct and indirect, minor to moderate, and short- and long-term, because shallow water habitats in the park are the preferred areas for PWC use, particularly in the Perdido Key and Mississippi Sound areas.	PWC use would cause negligible adverse impacts to shoreline vegetation from physical disturbance and wave action, and minor adverse impacts from visitor access to emergent shoreline vegetation communities. PWC use under alternative B would have impacts to seagrass habitats that are direct and indirect, minor, and short- and long-term, because shallow water habitats in the national seashore are the preferred areas for PWC use, particularly the Perdido Key and Mississippi Sound areas. The flat-wake zoning would restrict PWC impacts to about one-half of the potential seagrass habitat in Florida and

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	would potentially be higher in 2012 than in 2002. Implementation of this alternative would not result in an impairment of shoreline or submerged aquatic vegetation.	Cumulative adverse impacts would include effects from all visitor activities, including PWC use and other motorized vessels, and would be minor to moderate to shoreline and submerged aquatic vegetation communities. Projected increases in PWC and other motorized vessel use within the national seashore would potentially result in higher levels of impacts to vegetation communities in 2012. Implementation of this alternative would not result in an impairment of shoreline or submerged aquatic vegetation.	one-quarter of the potential seagrass habitat in Mississippi. Therefore, alternative B would have fewer adverse impacts to shoreline and submerged aquatic vegetation than alternative A. Cumulative impacts to shoreline vegetation would include effects from all visitor activities, including PWC use and other motorized vessels, and would be minor to moderate. Cumulative impacts to seagrass habitats associated with use by all motorized vessels would be minor to moderate locally, as motorboat use could continue to cause propeller scarring and sediment resuspension and its effects. Impacts would potentially be higher in 2012 relative to 2002 due to projected increases in PWC and other motorized watercraft use. Implementation of this alternative would not result in an impairment of shoreline or submerged aquatic vegetation.
Wildlife and Wildlife Habitats	PWC use would continue to be prohibited in the waters of Gulf Islands National Seashore, and there would be no impacts from PWC related disturbance to aquatic or terrestrial wildlife and wildlife habitat. Cumulative adverse impacts on wildlife and wildlife habitat would result from other motorized watercraft use and visitor shoreline activity. Non-PWC motorized watercraft would be expected to have short-term, minor, direct and indirect adverse impacts to aquatic wildlife species and habitats. Motorized watercraft in conjunction with shoreline visitor activities would cause short-term negligible impacts to terrestrial mammals and minor, mostly short-term impacts to avian species that utilize the shoreline for foraging, wading and nesting. Long-term effects to breeding individuals and colonies would be unlikely to occur due to restricted access to nesting areas. Impacts in 2012 would likely be higher than 2002 levels due to the projected increase in motorized watercraft use within the national seashore. Implementation of this alternative would not result in impairment to aquatic or terrestrial wildlife or wildlife habitat.	Reinstating PWC use in park waters is expected to have short term, minor to moderate, direct and indirect adverse impacts to aquatic wildlife species and habitats. PWC use would contribute short-term negligible to minor adverse impacts to terrestrial mammals within the national seashore. Avian species with primary habitat located in shoreline areas would be more susceptible to impacts and PWC use would cause mostly short-term minor to moderate adverse impacts to these species. Cumulative impacts would include PWC related effects in addition to those from other motorized vessel use and shoreline visitor activities. Cumulative impacts would include short term, minor to moderate adverse impacts to aquatic species, short- to long-term minor to moderate impacts to avian species and negligible to minor short-term impacts to terrestrial mammals. Impacts in 2012 would likely be higher relative to 2002 levels due to the projected increase in PWC and other motorized watercraft use within the national seashore.	Under alternative B, flat-wake zoning prescriptions would minimize impacts to shoreline wildlife within the national seashore. Reinstating PWC use in park waters while establishing a flat-wake zone is expected to have short term, minor, direct and indirect adverse impacts to aquatic wildlife species and habitats. PWC use would contribute negligible short-term adverse impacts to terrestrial mammals, and negligible to minor mostly short-term adverse impacts to avian species with primary habitat located in shoreline areas. Cumulative impacts to aquatic and avian wildlife associated with all types of motorized vessel use are expected to be short-term, minor, direct and indirect, and adverse. There would be a slight potential for some long-term impacts to avian species if nesting individuals are disturbed to an extent that would cause individuals to relocate. Cumulative impacts to terrestrial wildlife would be negligible to minor and short term. Impacts in 2012 would likely be higher relative to 2002 levels due to the projected increase in PWC and other motorized watercraft use within the national seashore.

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		Implementation of this alternative would not result in impairment to aquatic or terrestrial wildlife or wildlife habitat.	Implementation of this alternative would not result in impairment to aquatic or terrestrial wildlife or wildlife habitat.
Aquatic Fauna	Continuing the prohibition on PWC use within park waters would ensure that aquatic fauna are not affected by PWC noise impacts originating from within park boundaries. Noise from PWC that are operating adjacent to park waters may have a negligible impact on aquatic fauna. Impacts to aquatic fauna in park waters from cumulative impacts including non-PWC motorized watercraft noise under the no-action alternative are expected to be adverse, minor to moderate, and short in duration but occurring over the long-term.	Reinstating PWC use in national seashore waters is expected to have long-term, moderate adverse impacts to aquatic fauna. Cumulative adverse impacts would result from PWC use in combination with other motorized vessels, and would be long-term, moderate. Implementation of this alternative would not result in an impairment to aquatic fauna.	Reinstating PWC use in park waters and establishing a flat-wake zone is expected to have long-term, minor to moderate, adverse impacts to aquatic fauna. Adverse cumulative noise impacts to aquatic fauna would be long-term and minor to moderate. Implementation of this alternative would not result in an impairment to aquatic fauna.
Threatened, Endangered, or Other Special Status Species	PWC users would not be allowed to operate within national park waters of the national seashore, precluding PWC related effects to special status species and habitat. Cumulative impacts from other visitor activities within the national seashore may affect but would not likely adversely affect any federally or state listed threatened, endangered, or other special concern species or primary habitat areas to. Special status plant species within the national seashore may be affected by visitor disturbance, but adverse effects are unlikely due to occurrences that are isolated from visitor use areas, or protection of sensitive habitat areas by seasonal or permanent closure to human activities (see table 53). Implementation of this alternative would not result in an impairment of threatened or endangered species.	Prior mandated closures of sensitive habitat areas throughout the national seashore would provide a measure of protection against adverse impacts from PWC use to many special status species. In addition, the timing and location of PWC use differ from special status species occurrences within the national seashore, further minimizing adverse effects to these species. PWC use may affect but is unlikely to adversely affect special status aquatic animal species, terrestrial or avian species, special status plant species. PWC use would have no effect on the white-top pitcher plant. Cumulative impacts from visitor activities, including PWC use and other visitor activities, within the national seashore may affect but are not likely to adversely affect federal or state listed terrestrial or aquatic animal or plant species or other special status wildlife or plant species (see table 54). Implementation of this alternative would not result in an impairment of threatened or endangered species.	Reinstating PWC use within the national seashore and establishing a PWC flat-wake zone would minimize the likelihood of adverse effects on threatened or endangered species in the national seashore boundaries from PWC use. PWC use may affect, but would be unlikely to adversely affect, any federally or state-listed species. In combination with prior mandated closures of sensitive habitat areas, the extension of flat-wake zoning to a minimum of 300 yards from the shoreline under alternative B would serve as a measure of protection against impacts from PWC use to terrestrial and avian special status species. PWC use would have no effect on the white-top pitcher plant. Cumulative impacts to special status species from non-PWC sources would be the same as under alternative A. PWC use would contribute slightly to cumulative effects, but PWC or other visitor use and activities would not be likely to cause adverse impacts to special status species within the national seashore (see table 55). Implementation of this alternative would not result in an impairment of threatened or endangered species.

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Visitor Use and Experience	The no-action alternative would have a long-term, minor to moderate, beneficial impact on the experiences of most park visitors because PWC use would continue to be banned. Conversely, the experiences of the few PWC users within the park would be adversely affected and these visitors would experience long term, minor, and adverse impacts because of the restrictions. Cumulative impacts would result from all visitor activities within the national seashore and from the effects of other users and development/construction within the immediate areas. These impacts would be negligible to minor and adverse over the short and long term. Impacts would potentially increase with projected increase in boating and other visitor use of the national seashore.	Under alternative A, PWC users would experience long-term, minor, beneficial impacts because they would be permitted to ride at the seashore. Motorized and non-motorized boaters would experience long-term, adverse, negligible to minor to moderate impacts due to an increase in the number of vessels operating in the same space. Impacts to swimmers would be long-term, adverse, and minor to moderate. Impacts to divers would be also long-term and adverse, but negligible due to the distribution of PWC in the Florida District, where divers tend to concentrate. Anglers would experience long-term, minor to moderate adverse, impacts. PWC use would have long-term, negligible to minor to moderate, adverse impacts on the experience of camping and hiking visitors. Visitors desiring a wilderness experience on Horn and Petit Bois islands would likely experience long-term, moderate, adverse impacts from PWC use. Overall impacts to all non-PWC visitors would be long-term, adverse, and negligible to moderate. Cumulative impacts would be moderate and adverse in the short and long term.	Alternative B would provide overall beneficial impacts on PWC users, because they would be allowed to recreate with a personal watercraft in the national seashore, although PWC users would be required to comply with additional restrictions. Impacts of PWC use on motorized and non-motorized boaters would be negligible to minor, long-term, adverse. Impacts to swimmers would also be long-term, adverse, and minor. Impacts to divers, snorkelers, and anglers would be long-term and adverse, but negligible. PWC use would have long-term, negligible to minor, adverse impacts on the experience of all camping and hiking visitors. Overall PWC use would result in long-term, adverse, negligible to minor impacts to non-PWC users. Cumulative impacts would be long-term, adverse, and minor.
Visitor Conflicts and Safety	Personal watercraft would not be reinstated at Gulf Islands National Seashore, providing continued beneficial impacts related to conflicts and visitor safety. Cumulative impacts would be negligible to minor in the long term.	Impacts to motorized and non-motorized boaters would be long-term, adverse, and minor as boaters and PWC operators tend to favor similar waters. Impacts to swimmers in both districts would be long-term, adverse, and minor to moderate. Impacts to divers and snorkelers would be long-term, adverse, and negligible due to the distribution of PWC in this district and the small number of divers and PWC that visit the park. Anglers would experience long-term, adverse, negligible to minor impacts. Impacts to campers and hikers would be long-term, adverse, and negligible to minor. Cumulative impacts related to visitor conflicts and safety would be minor adverse for all user groups in the short and long term, particularly near the high-use areas.	Impacts to PWC users would be long-term, beneficial, and minor. Impacts to motorized and non-motorized boaters would be long-term, adverse, and negligible to minor. Swimmers would likely experience long-term, adverse, and minor impacts. Anglers in all areas of the park would likely experience long-term and adverse, but negligible impacts due to additional PWC restrictions. PWC use would have long-term, minor, adverse impacts on the experience of all camping and hiking visitors due to restrictions contained under alternative B and distribution of types of visitor activities. Cumulative impacts would be adverse and minor over the short term and long term.

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Cultural Resources	Continuing the ban on PWC use within national seashore waters would have no impacts on archaeological and submerged sites. Adverse cumulative impacts would be minor to major, depending on the accessibility of the resource and the potential for illegal collection or damage. Implementation of this alternative would not result in an impairment of cultural resources.	PWC use within the national seashore could have minor adverse impacts on listed or potentially listed archaeological sites from possible illegal collection and vandalism. Minor adverse impacts on listed or potentially listed archaeological sites are possible as a result of erosion. Cumulative impacts from visitor use on archaeological resources that are readily accessible could be minor to moderate adverse, due to the number of visitors and the potential for illegal collection or destruction. Implementation of this alternative would not result in an impairment of cultural resources.	Restricting areas of use and the establishment of a flat-wake speed zone, would serve as a measure to minimize impacts on potentially listed archaeological resources from possible illegal collection and vandalism. Cumulative impacts from other activities on archaeological resources that are readily accessible could be minor to moderate and adverse, due to the number of visitors and the potential for illegal collection or destruction. Implementation of this alternative would not result in an impairment of cultural resources.
Socioeconomic Effects	There are no incremental costs associated with the no-action alternative. There would be no change in consumer surplus, producer surplus, or welfare.	Because the national recreation area would still be open to PWC, the National Park Service expects this alternative to result in a net benefit relative to the no-action alternative.	Alternative B is considered to provide the greatest level of net benefits.
National Seashore Management and Operations			
Conflicts with State and Local Ordinances and Policies	There would be no conflict with state regulations or local ordinances as a result of the no-action alternative. Continuing the ban on PWC use within the national seashore would not affect the enforcement of state boating regulations.	There would be no conflict with state regulations or local ordinances as a result of reinstatement of PWC use within the national seashore under alternative A. PWC use within the national seashore would not affect the enforcement of state boating regulations.	There would be no conflict with state regulations or local ordinances as a result of reinstatement of PWC use with additional management prescriptions within the national seashore. Managed PWC use within the national seashore would not affect the enforcement of state boating regulations.
Impact to Park Operations from Increased Enforcement Needs	The no-action alternative would cause no impacts to the enforcement needs of the seashore resulting from the continued ban of PWC use. If seashore visitation numbers increase over time, the need for additional enforcement rangers could also increase. Depending on park visitation increases, potential cumulative impacts to enforcement operations within the national seashore would be long-term and negligible to minor adverse.	Impacts under alternative A would be long-term and minor to moderate adverse due to the need for additional law enforcement capability within the national seashore to enforce national seashore specific management restrictions in addition to existing federal and state boating regulations.	Impacts to park operations would be long-term and minor to moderate adverse, due to the need for additional law enforcement capability within the national seashore to enforce additional management prescriptions as well as existing federal and state boating regulations.

TABLE 5: ANALYSIS OF HOW ALTERNATIVES MEET OBJECTIVES

Issue	Objective	No-Action Alternative: Continue Prohibition of PWC Use in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Water Quality				
A typical conventional (i.e., carbureted) two-stroke PWC engine discharges as much as 30% of its fuel unburned directly into the water (NPS 1999; 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 1999). 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 1998b). (As described in appendix C, an estimated discharge rate of 3 gallons per hour is used in the water quality impact calculations.)	PWC emissions that enter the water in Gulf Islands should be managed to prevent any additional degradation of water quality	Fully meets objective.	Meets objective with conversion to cleaner engines that will occur based on EPA industry requirements.	Meets objective with conversion to cleaner engines that will occur based on EPA industry requirements.
Some research shows PWC emissions adversely affect water quality via harmful phototoxic effects on ecologically sensitive plankton and other small water organisms (EPA 1998; Oris et al. 1998; Landrum et al. 1987; Mekenyan et al. 1994; Arfsten et al. 1996). The primary concern is aquatic life and food chains in shallow water ecosystems.	Protect all marine and estuarine organisms from PWC disturbances so that the viability of dependent species is conserved.	Fully meets objective.	Meets objective with conversion to cleaner engines that will occur based on EPA industry requirements.	Meets objective with conversion to cleaner engines that will occur based on EPA industry requirements.
Other potential water quality issues include indirect effects on threatened and endangered species sensitive to water quality changes and degradation; effects on other fish, and maintaining water quality standards that satisfy Outstanding Florida Waters designation.	Manage PWC emissions to maintain national seashore water quality necessary to retain designation as an Outstanding Florida Waters area.	Fully meets objective.	Meets objective with conversion to cleaner engines that will occur based on EPA industry requirements.	Meets objective with conversion to cleaner engines that will occur based on EPA industry requirements.
Air Quality				
Pollutant emissions such as nitrogen oxides and volatile organic compounds from PWC use, 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 with conversion to cleaner engines that will occur based on EPA industry requirements.	Meets objective with conversion to cleaner engines that will occur based on EPA industry requirements.

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Soundscapes				
Noise limits established by the National Park Service require vessels to operate at less than 82 dB at 82 feet. Personal watercraft may be more disturbing than other motorized vessels because of rapid changes in acceleration and direction of noise (EPA 1974).	Manage noise from PWC use in all areas of the park so that visitors' health, safety, and visitor experience is not adversely affected.	Fully meets objective.	Does not meet objective in areas where other recreationists may be sensitive to noise from personal watercraft.	Meets objective due to the 300 yard flat-wake zoning around park shorelines and the one half mile flat-wake zone around designated wilderness islands.
Same issue statement as above.	Manage PWC use to perpetuate an undisturbed environment that possesses an atmosphere of solitude	Fully meets objective.	Does not meet objective in areas of concentrated PWC use near visitors seeking solitude.	Meets objective due to the 300 yard flat-wake zoning around park shorelines and the one half mile flat-wake zone around designated wilderness islands.
Wildlife and Wildlife Habitat				
Some research suggests that personal watercraft have a greater impact on waterfowl and nesting birds 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 and flush other waterfowl from habitat, thus, causing stress and associated behavior changes. Collisions with waterfowl and wildlife may also be of concern.	Protect birds, waterfowl and marine mammals from the effects of PWC-generated noise, especially during nesting seasons.	Fully meets objective.	Meets objective in sensitive areas closed seasonally by *Superintendent's Compendium.*	Meets objective due to the 300 yard flat-wake zoning around park shorelines and the one half mile flat-wake zone around designated wilderness islands.
Some research suggests that personal watercraft impact wildlife through interruption of normal activities, alarm or flight; avoidance and displacement of habitat; and effects on 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 personal watercraft can access sensitive shorelines disrupting riparian habitat areas critical to wildlife.	Protect fish and wildlife species and their habitat from disturbances by personal watercraft.	Fully meets objective.	Meets objective in sensitive areas closed seasonally by *Superintendent's Compendium.*	Meets objective due to the 300 yard flat-wake zoning around park shorelines and the one half mile flat-wake zone around designated wilderness islands in addition to seasonal closures of sensitive areas mandated by *Superintendent's Compendium.*

Issue	Objective	No-Action Alternative: Continue Prohibition of PWC Use in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Same issue statement as above.	Protect fish and wildlife from the adverse effects that result from the bioaccumulation of *contaminants* emitted from PWC.	Fully meets objective.	Meets objective with conversion to cleaner engines that will occur based on EPA industry *requirements*.	Meets objective with conversion to cleaner engines that will occur based on EPA industry *requirements*.
Threatened and Endangered Species				
Similar to wildlife, personal watercraft may affect federally listed or other species of concern through interruption of normal activities; alarm or flight; avoidance and displacement of habitat; and effects on reproductive success. In addition, the machine's engine's location, submerged under the water, *muffles* the 'warning' sounds some species depend on to escape from eminent danger.	Protect threatened, endangered and species of special concern and their habitats from disturbances from personal watercraft.	Fully meets objective.	Meets objective in sensitive areas closed seasonally by *Superintendent's Compendium*.	Meets objective in sensitive areas closed seasonally by *Superintendent's Compendium*.
Shoreline Vegetation				
Personal watercraft are often able to access areas where most other watercraft cannot go. This access may lead to disturbance of vegetation resources, including sensitive plant species. In addition, personal watercraft may land on the shoreline, allowing visitors to access inland areas where sensitive vegetation and plant species may also exist.	Manage PWC use to protect sensitive shoreline and submerged vegetation from PWC activity and access.	Fully meets objective.	Meets objective in sensitive areas closed seasonally by *Superintendent's Compendium*.	Meets objective in sensitive areas closed seasonally by *Superintendent's Compendium*.
Visitor Experience				
Some research suggests that personal watercraft are viewed by some segments of the public as a 'nuisance' due to their noise, speed, and overall environmental effects while others believe personal watercraft are no different from other watercraft and have a 'right' to enjoy the sport.	Manage PWC use to prevent conflicts between PWC users and other water recreationists.	Meets objective. PWC users have areas outside the park to use personal watercraft.	Does not meet objective. Some conflict exists between PWC operators and other park visitors at the national seashore.	Meets objective with flat-wake restrictions to minimize conflicts between personal watercraft and other national seashore users.
Same issue statement as above.	Manage PWC use to avoid conflict with wilderness and backcountry experience.	Fully meets objective.	Does not meet objective. Some conflict exists between PWC operators and other park visitors at the national seashore.	Meets objective with flat-wake restrictions to minimize conflicts between personal watercraft and other national seashore users.

Issue	Objective	No-Action Alternative: Continue Prohibition of PWC Use in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Visitor Conflicts and Safety				
The National Transportation Safety Board reported that in 1996 personal watercraft represented 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; but also it is a function of the PWC operation, i.e., no brakes or clutch. When drivers let up on the throttle to avoid a collision, manual steering becomes difficult.	Minimize or reduce the potential for PWC user accidents.	Fully meets objective.	Meets objective with voluntary education programs including boater safety education.	Meets objective with voluntary education programs including boater safety education.
Due to their ability to reach speeds in the 60-mph range and their ability to access shallow-draft areas, personal watercraft can create wakes that pose a conflict and safety hazard to other users, such as canoeists, kayakers, fishermen, and windsurfers.	Manage PWC use in park waters to provide safe recreating for PWC and other users.	Fully meets objective.	Does not meet objective. Some conflict exists between PWC operators and other park visitors at the national seashore.	Meets objective by establishing flat-wake zoning around shoreline users in addition to continued voluntary education programs on boater safety.
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/launch in areas less accessible to most motorized watercraft.	Manage PWC use and access to protect cultural resources.	Meets objective.	Meets objective with continuation of existing regulations protecting cultural resources. All watercraft and all people are prohibited from some sensitive areas.	Meets objective with continuation of existing regulations protecting cultural resources. All watercraft and all people are prohibited from some sensitive areas.
Socioeconomics				
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 and 2000.	Enhance communications with local communities regarding the management of personal watercraft.	Meets objective. Local businesses have not been affected by the PWC ban.	Meets objective.	Meets objective.
National Seashore Management and Operations				
PWC use may require additional park staff to enforce standards, limits, or closures because of increased accident rates and visitor conflicts. Enforcement capabilities are currently limited at the national seashore and enforcement of additional regulations may pose a challenge.	Minimize impacts to national seashore operations from increased enforcement needs.	Meets objective.	Does not meet objective. Additional staff may be required due to anticipated increase in PWC numbers.	Does not meet objective. Additional staff may be required due to anticipated increase in PWC numbers.

Issue	Objective	No-Action Alternative: Continue Prohibition of PWC Use in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
Some states and local governments have taken action, or are considering taking action, to limit, ban, and 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.	Meets objective.	Meets objective. No conflicts with other regulatory agencies.	Meets objective. No conflicts with other regulatory agencies.

AFFECTED ENVIRONMENT

PHYSICAL CHARACTERISTICS OF GULF ISLANDS NATIONAL SEASHORE

Gulf Islands National Seashore is located in the northeastern portion of the Gulf of Mexico and includes a widely spaced chain of barrier islands extending nearly 160 miles from Cat Island in Mississippi to the eastern end of Santa Rosa Island in Florida. Other islands in the national seashore include Horn, Petit Bois, East Ship, and West Ship islands in Mississippi and a section of Perdido Key in Florida. The national seashore also includes mainland tracts at Pensacola Forts and Naval Live Oaks Reservation near Pensacola, Florida and Davis Bayou, adjacent to Ocean Springs, Mississippi. More than 80% of Gulf Islands National Seashore consists of submerged lands.

Coastal barrier islands, such as those located in Gulf Islands National Seashore, are unique land forms that provide protection for diverse aquatic habitats and serve as the mainland's first line of defense against the impacts of severe coastal storms and erosion. Located at the interface of land and sea, the dominant physical factors responsible for shaping coastal landforms are tidal range, wave energy, and sediment supply from rivers and older, pre-existing coastal sand bodies. Relative changes in local sea level also profoundly affect coastal barrier island diversity. Six characteristics define coastal barrier islands, including (U.S. Fish and Wildlife Service [USFWS] 2000):

- Subject to the impacts of coastal storms and sea level rise
- Buffer the mainland from the impact of storms
- Protect and maintain productive estuarine systems which support the nation's fishing and shellfishing industries
- Consist primarily of unconsolidated sediments
- Subject to wind, wave, and tidal energies
- Include associated landward aquatic habitats which the non-wetland portion of the coastal barrier island protects from direct wave attack

Coastal barrier islands protect the aquatic habitats between the barrier island and the mainland. Together with their adjacent wetland, marsh, estuarine, inlet, and nearshore water habitats, coastal barriers support a tremendous variety of organisms. Millions of fish, shellfish, birds, mammals, and other wildlife depend on barriers and their associated wetlands for vital feeding, spawning, nesting, nursery, and resting habitat.

The national seashore islands are significant in their east/west orientation, ample supply of reworked sand, and susceptibility to hurricane. These elements combine to make them extremely dynamic, constantly changing environments that provide habitats and ecosystems, which, if properly cared for, can be natural laboratories for observing relatively rapid natural changes on populations of plants and animals. Their isolated nature has also provided a degree of protection for a variety of rare, threatened, or endangered wildlife and plant species.

WATER RESOURCES

Sensitive aquatic systems around Gulf Islands National Seashore that may be affected by water quality include submerged aquatic vegetation and associated fauna, marshes, and nektonic communities (fish,

reptiles, and marine mammals). The following section describes existing water quality conditions that have a direct impact on these aquatic systems.

SURFACE WATER

Florida District. The Florida District of Gulf Islands National Seashore is in the Pensacola Bay and Perdido Bay watersheds of Florida and Alabama. Major tributaries to Pensacola Bay and Perdido Bay are the Escambia, Blackwater, Yellow, and Perdido Rivers. The Florida District extends north to the south boundary of the intracoastal waterway in the area north of Santa Rosa Island and Big Lagoon. Pensacola Bay, Big Lagoon, and the area north of Santa Rosa Island are connected to the Gulf of Mexico through Pensacola Pass, a 0.75-mile-wide natural opening with a maximum depth of 60 feet. The portion of the area north of Santa Rosa Island, adjacent to the national seashore, is approximately 2 miles wide and waters within park jurisdiction in the sound average approximately 9 feet in depth. Big Lagoon is a 0.75-mile-wide lagoon connected to Perdido Bay, and waters under park jurisdiction average approximately 7.5 feet in depth. The national seashore southern boundary extends one mile out into the Gulf of Mexico, where jurisdictional waters average 15 feet in depth off of Perdido Key, 20 feet off of Fort Pickens, and over 30 feet off of the Santa Rosa area.

Due to its location in the northern Gulf of Mexico, the Gulf Islands National Seashore has tides that are primarily diurnal, i.e., usually only one high water and one low water per day. At the Pensacola Bay entrance, the maximum tidal range is 2.6 feet (NOAA 2002c) and the maximum current speed is 4.1 knots (NOAA 2003a). Annual water temperature in Pensacola Bay ranges from 56° to 86°F (NOAA 2002b). The salinity of waters around the park varies seasonally and tidally. The average salinity in Big Lagoon and the area north of Santa Rosa Island ranges from 15 to 25 parts per thousand, while Gulf-side waters are saltier, averaging salinities of 30 to 35 parts per thousand (FDEP 2003d).

The Pensacola Bay system includes more than 140 square miles of surface waters in Escambia, East, Blackwater, and Pensacola Bays. The area north of Santa Rosa Island consists of approximately 40 square miles of surface water and is one of the few waterbodies within the Pensacola Bay watershed that contains moderately diverse seagrass beds. Fort Pickens Aquatic Preserve, established in 1970, encompasses approximately 34,000 acres of submerged lands surrounding the western end of Santa Rosa Island and the eastern end of Perdido Key and extends three miles offshore (FDEP 1999). The preserve's primary purpose is to preserve the biological resources in the area and maintain these resources in an essentially natural condition.

The Florida Department of Environmental Protection designated waters within Gulf Islands National Seashore as "Outstanding Florida Waters" (OFW) (FDEP 2002b). This designation grants special protection to Florida waters based on their natural attributes. Florida Department of Environmental Protection cannot issue permits for direct or indirect pollutant discharges that would degrade ambient water quality of an OFW. Permit requests for new dredging and filling in an OFW must undergo an intensive review to determine if they are clearly in the public interest. Elements of the public interest include the conservation of fish and wildlife, erosion and shoaling, navigation, fishing, recreation, and marine productivity. Exceptions to OFW protection include permitted activities preceding OFW designation, restoration of existing seawalls, and activities not regulated by the Florida Department of Environmental Protection for water quality protection purposes (i.e., fishing, river setback ordinances, and boat speeds). Temporary lowering of water quality during construction or activities to enhance public usage or maintain pre-existing activities may be allowed with certain restrictions.

Mississippi District. The barrier islands of West and East Ship, Horn, and Petit Bois are 6 to 14 miles from the mainland and physically separate the Mississippi Sound from the Gulf of Mexico, except for a

series of shallow passes between the islands. As in the Florida District, the Mississippi Sound has tides that are primarily diurnal. The maximum tidal range at the Mississippi islands is 3.2 feet, and the average tidal range is 1.7 feet (NOAA 2002c). The waters surrounding these islands have a salinity in excess of 25 parts per thousand, except during the spring rainy season when waters in the Mississippi Sound range from 15 to 25 parts per thousand (NOAA 2003b).

Waters under park jurisdiction in the Mississippi Sound average 11 feet in depth, while Gulf-side jurisdictional waters are slightly deeper, averaging about 14½ feet in depth. The Gulfport ship channel runs through Ship Island Pass, which separates Ship and Cat islands and is 5.5 miles wide with a maximum depth of 35 feet. Dog Key Pass lies between Horn and the Ship islands and has a maximum depth of 32 feet, but is less than 10 feet deep for most of its 5.5-mile width. Horn Island Pass, which contains a navigational channel to Pascagoula, runs between Horn and Petit Bois islands and has a maximum depth of over 40 feet, though it is less than 10 feet deep for most of its 3.5-mile width. Petit Bois Pass runs between Petit Bois and Dauphin islands, and has a maximum depth of 22 feet, but is 5 to 10 feet deep for most of its 5.5-mile width.

WATER QUALITY

Florida District. The waters surrounding the Florida District of the national seashore have been impacted by numerous non-point and point source pollution resulting in a reduction of natural biodiversity and productivity. Non-point sources include urban stormwater runoff, agricultural runoff, marinas, boat traffic, the drainage of wetlands, and seepage of contaminated groundwater into surface waters. Due to the proximity to the Gulf intracoastal waterway and the Pensacola Ship Channel, the park experiences some of the heaviest boat traffic (industrial, military, and recreational) in northern Florida. Point sources include effluent from two sewer outlets near Pensacola, septic systems on Gulf Breeze peninsula, a chemical plant and coal-fired electric power plant on the Escambia River, a paper mill on the Perdido River, the American Creosote Works superfund site, the port of Pensacola, and Pensacola Naval Air Station, which contains a number of superfund sites.

Gulf Islands National Seashore waters around the Perdido Key and Fort Pickens areas are classified by Florida as being suitable for recreational purposes and for the maintenance of well balanced fish and wildlife populations, but do not have water quality suitable for shellfish harvesting. Most of the waters north of the Santa Rosa Island have suitable water quality for shellfish harvesting. None of the waters within the Florida District of the national seashore are under a fish consumption advisory, with the exception of a "no consumption" mercury advisory for large king mackerel throughout the Gulf of Mexico (FDOH 2003).

Mississippi District. Because the islands in the Mississippi District of the Gulf Islands National Seashore are between 6 and 14 miles offshore and are undeveloped, the water quality has not been substantially impacted by human activities. The primary pollution sources include mainland urban stormwater and agricultural runoff, recreational boating, and commercial shipping in the intracoastal waterway and navigational channels in the passes. There are over 20 marinas along the Mississippi Sound in Jackson and Harrison counties.

Park waters in the Mississippi District are classified by Mississippi as being suitable for shellfish harvesting, with the exception of the areas including and surrounding the navigational channels running through the passes between the islands (MDEQ 2000). No park waters are under a fish consumption advisory, with the exception of a "no consumption" mercury advisory for large King mackerel throughout the Gulf of Mexico (MDEQ 2000).

REGIONAL WATER QUALITY PROGRAMS

A number of water quality monitoring programs exist in the Pensacola Bay area. Most of these programs serve to ensure clean swimming and shellfishing waters and therefore the focus is on monitoring bacterial levels. Other programs monitor potentially harmful algal blooms (HABs) and water quality in the tributaries of the Pensacola Bay Watershed. Florida coastal counties conduct beach water sampling every week, specifically for the purpose of monitoring waters for enterococci and fecal coliform bacteria. Gulf Islands National Seashore staff conducted a baseline water quality monitoring program in the area north of Santa Rosa Island and adjacent waters of Pensacola Bay in the late 1990s. No water quality monitoring for hydrocarbons has occurred within the park.

The Mississippi Department of Marine Resources, as the shellfish control agency, is responsible for the jurisdictional monitoring and classification of Mississippi's shellfish growing waters. The proliferation of toxic or nuisance species known as harmful algal blooms is rare in the Mississippi Sound, so monitoring is conducted only when observations indicate a bloom may be taking place. Mississippi coastal counties conduct beach water quality monitoring programs, but because the Mississippi islands are offshore they are not monitored. No water quality monitoring for hydrocarbons has occurred within the park.

National Shellfish Sanitation Program (NSSP)

This program requires all coastal states involved in interstate shellfish harvest and sale to classify their coastal waters to safeguard the public health from the consumption of contaminated shellfish.

Coastal waters are classified by the Florida Department of Agriculture and Consumer Services (DACS) based on sanitary, hydrographic, meteorological, and bacteriological surveys. The Department of Agriculture and Consumer Services routinely monitors fecal coliform and water quality parameters at established stations in each of Florida's shellfish harvesting areas to provide maximum utilization of shellfish resources and to reduce the risk of shellfish-borne illness. Much of Pensacola Bay and Santa Rosa Sound are conditionally approved shellfish harvesting areas, with exceptions generally in areas surrounding marinas, harbors, and wastewater treatment plants.

The Mississippi Department of Marine Resources (DMR) classifies coastal waters based on sanitary, hydrographic, meteorological and bacteriological surveys. The Department of Marine Resources routinely monitors fecal coliform and water quality parameters in each of the state's shellfish harvesting areas to provide maximum utilization of shellfish resources and to reduce the risk of shellfish-borne illness. Most of the waters surrounding the Mississippi barrier islands in the Mississippi Sound and the Gulf of Mexico are approved non-commercial shellfish harvesting areas, with the exception of the navigational channels and surrounding areas between the islands.

Harmful Algal Bloom Monitoring

The Florida Marine Research Institute (FMRI) monitors patterns and trends in the proliferation of toxic or nuisance species known as harmful algal blooms (HAB), as required by the National Shellfish Sanitation Program (see above). Water samples are regularly taken at various distances offshore along the coast of Florida and analyzed for the presence of organisms that cause fish and shellfish poisoning. Any waters affected by harmful algal blooms are closed by the Department of Agriculture and Consumer Services.

Harmful algal blooms occasionally appear in the Gulf of Mexico, but are rare in Mississippi Sound. The Department of Marine Resources undertakes HAB monitoring, as required by the National Shellfish

Sanitation Program (see above), when conditions and observations indicate the possibility of a bloom event. When harmful algal blooms occur, the Department of Marine Resources, in conjunction with the Gulf Coast Research Laboratory, closes any affected waters, conducts sampling, and provides daily monitoring reports. In the fall of 1996, concentrations of the red tide organism were sufficient to cause a public health risk, and, consistent with the NSSP regulations, all Mississippi oyster growing waters were closed.

Florida State and County Beach Water Quality Monitoring

Under Florida's Healthy Beaches Program, county health departments conduct beach water sampling every week specifically for the purpose of monitoring waters for bacteria (enterococci and fecal coliform bacteria). High concentrations of these bacteria may indicate the presence of microorganisms that could cause disease, infections, or rashes to bathers. County health departments issue health advisories or warnings when high bacteria concentrations are confirmed. The Santa Rosa County Health Department conducts sampling at seven beach sites near park waters, and the Escambia County Heath Department conducts sampling at eight beach sites. The Florida Department of Environmental Protection monitors water quality on a weekly basis at an additional four sites in and around park waters. Other water quality parameters monitored include temperature, salinity, dissolved oxygen, chlorophyll, water color, turbidity, and nutrients.

The Bream Fisherman Association Ambient Monitoring Project in Florida

The Florida Department of Environmental Protection and the Bream Fisherman Association cooperatively conducted a water quality monitoring program focused on the rivers of the Pensacola watershed from 2000 to 2002. Sampling trips targeted specific basins within the Blackwater, Yellow, Perdido and Escambia Rivers, with only one station near park waters (Big Lagoon). Twelve trips were undertaken per year, throughout the year, sampling 46 individual stations. The water quality parameters investigated were: fecal and total coliform bacteria, conductivity, color, turbidity, nutrients, and biological oxygen demand. The project has documented baseline water quality information in some waterbodies, and has continued long term ambient trend monitoring in others.

Gulf Islands National Seashore Florida District Water Quality Study

Gulf Islands National Seashore conducted a surface water quality monitoring program during 1996 and 1997 in the area north of Santa Rosa Island and the adjacent waters of Pensacola Bay to provide a baseline database for subsequent environmental assessments in the sound. Recent residential and commercial development in the vicinity of Santa Rosa Island has increased the possibility of nutrient and bacterial contamination in the sound. Among the potential sources of nutrient and bacterial contamination are septic systems, wastewater treatment facilities, fertilizer runoff, and recreational activities at beaches and campgrounds. Temperature, salinity, dissolved oxygen, pH, and turbidity were measured at 52 sites within and adjacent to the national seashore in the area north of Santa Rosa Island. While the investigation indicated spatial and temporal variability in surface water chemistry, there was no indication of chronic water quality problems in the area (ICER 1998).

FEDERAL REGULATIONS AND STANDARDS

The Environmental Protection Agency has developed national recommended water quality criteria for priority pollutants in ambient water for the protection of aquatic life and human health (EPA 2002b). These criteria have been adopted as enforceable standards by most states. The *Clean Water Act* and *Federal Water Pollution Control Act* regulate and protect all national waters. Under these laws all states must submit a 305(b) report, which characterizes the quality of their waters on a watershed level, and a 303(d) list, which establishes which specific water bodies do not meet the federal or state water quality standards for their designated use(s). The watersheds are rated as follows:

Category I: Watersheds are in need of restoration and do not meet clean water and natural resource goals.

Category II: Watersheds are meeting goals and may need action to maintain standards.

Category III: Watersheds have pristine or sensitive aquatic conditions (most of these are designated as wilderness, wild and scenic rivers, or outstanding natural resource waters).

Category IV: Watersheds do not have sufficient data to make an assessment.

STATE REGULATIONS AND STANDARDS

Florida District

The *Clean Water Act* requires that the surface waters of each state be classified according to designated uses. Florida has five classes with associated designated uses, which are arranged in order of degree of protection required:

Class I: Potable Water Supplies

Class II: Shellfish Propagation or Harvesting

Class III: Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife

Class IV: Agricultural Water Supplies

Class V: Navigation, Utility and Industrial Use

If a water body does not meet the state designated use standards, it is considered impaired and is placed on the 303(d) list. The EPA's 303(d) list of impaired waters (EPA 1998b) lists some of Pensacola Bay's waters as impaired due to pathogens, metals, organic enrichment/low dissolved oxygen, and suspended solids. Waters around the Perdido Key and Fort Pickens areas are Class III waters, suitable for recreational purposes and for the maintenance of well-balanced fish and wildlife populations, but do not have water quality suitable for shellfish harvesting. Most of the waters north of Santa Rosa Island are Class II waters, with water quality suitable for shellfish harvesting.

Mississippi District. Surface waters are classified and assigned various use classifications by MDEQ based on existing utilization of the water body, along with any expected future uses. The use classifications used by the state of Mississippi are as follows:

- Public Water Supply
- Recreation
- Fish and Wildlife
- Shellfish Harvesting
- Ephemeral

If a water body does not meet the state designated use standards, it is considered impaired and placed on the 303(d) list. The EPA's 303(d) list of impaired waters (EPA 1998c) lists the coastline of the Mississippi Sound as impaired due to pathogens, arsenic, pH, and toxics, but the waters of the sound surrounding the national seashore are classified as Shellfish Harvesting, with the exception of the navigational channels. Table 6 shows the water body classifications.

AIR QUALITY

Gulf Islands National Seashore is subject to federal, state of Florida, and state of Mississippi air regulations. National ambient air quality standards (NAAQS) have been established by the Environmental Protection Agency. Current standards are set for sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter equal to or less than 10 microns in size (PM_{10}), fine particulate matter equal to or less than 2.5 microns in size ($PM_{2.5}$), and lead (Pb). These pollutants are collectively referred to as criteria pollutants, and are shown in table 7.

The Bureau of Ambient Monitoring Sources within the Division of Air Resource Management of the Florida Department of Environmental Protection is responsible for monitoring and evaluating ambient air quality within the state of Florida through a combination of state and federal regulations (FDEP 2003a). The state of Florida has adopted the NAAQS except for more restrictive SO_2 standards, as shown in table 7.

TABLE 6: WATER BODY CLASSIFICATIONS AT GULF ISLANDS NATIONAL SEASHORE

Water Body	Watershed	State Use Designation	303(d) Listed Impairment	Federal Designation: EPA Watershed Category
Pensacola Bay	Pensacola Bay	Class II/III	Pathogens, Metals, Organic Enrichment/Low Dissolved Oxygen, and Suspended Solids	Category II
Area North of Santa Rosa Island	Pensacola Bay	Class II/III		Category II
Big Lagoon	Perdido Bay	Class III		Category II
Mississippi Sound	Mississippi Coastal	Shellfish Harvesting	Organic Enrichment/Low Dissolved Oxygen	Category II

Source: Florida Data: FDEP 2000, 2002b; EPA 1998b.
Mississippi Data: MDEQ 1995; 1998 EPA 1998c.

TABLE 7: NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	National Standard[a,b]		Purpose
		Primary[c,e]	Secondary[d,e]	
Carbon monoxide (CO)	1-hour 8-hour	35 ppm/ (40 mg/m^3) 9 ppm (10 mg/m^3)	— —	Prevent high levels of carboxy-hemoglobin
Nitrogen dioxide (NO_2)	Annual Arithmetic Mean	0.053 ppm (100 µg/m^3)	Same as primary	Prevent breathing difficulties, reduce smog and acid rain formation, and improve visibility
Particulate matter (PM_{10})	24-hour Annual Arithmetic Mean	150 µg/m^3 50 µg/ m^3	Same as primary	Prevent chronic diseases of the respiratory tract and improve visibility
Fine Particulate matter ($PM_{2.5}$)[f]	24-hour Annual Arithmetic Mean	65 µg/ m^3 15 µg/ m^3	Same as primary	Prevent chronic diseases of the respiratory tract and improve visibility
Ozone (O_3)[f]	1-hour 8-hour	0.12 ppm (235 µg/ m^3) 0.08 ppm (157 µg/ m^3)	Same as primary	Prevent breathing difficulties, eye irritation, and biological effect on sensitive species
Sulfur dioxide (SO_2)[g]	3-hour	—	0.50 ppm (1,300 µg/ m^3)	Prevent increased respiratory damage, acid rain, and crop damage and improve visibility
	24-hour	0.14 ppm (365 µg/ m^3)	—	
	Annual Arithmetic Mean	0.03 ppm (80 µg/ m^3)	—	
Lead (Pb)	Quarterly Average	1.5 µg/ m^3	Same as primary	Prevent impaired production of hemoglobin

Source: (EPA 2003b, 2003e, 2003f; FDEP 2003d; MDEQ 2002).

µg/m^3 = micrograms per cubic meter; ppm = parts per million; dash (-) indicates no standard.

a. National Ambient Air Quality Standards (other than O_3, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year.

b. Annual standards never to be exceeded; short-term standards not to be exceeded more than once per year unless noted.

c. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

d. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

e. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 millimeters (mm) of mercury. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibar). Ppm in this table refers to ppm by volume or micromoles of pollutant per mole of gas.

f. New federal 8-hour O_3 and fine particulate matter standards were promulgated by the EPA on July 18, 1997. Subsequent litigation delayed implementation, although 8-hour O_3 averages are being calculated, and $PM_{2.5}$ monitoring networks are in place and growing. A federal appeals court decision on March 26, 2002 removed the last hurdles to implementation by the EPA. The EPA plans to make nonattainment area designations for $PM_{2.5}$ in December 2004, based on 2001-2003 data. A draft quality assurance plan for implementation of the 8-hour O_3 standard indicates that attainment designation may occur in April 2004. The federal 1-hour O_3 standard continues to apply in areas that violated the standard.

g. Florida SO_2 standards: 3-hour primary standard 1300 µg/m^3 (0.5 ppm); 24 hour standard 260 µg/m^3 (0.10 ppm); annual average 60 µg/m^3 (0.02 ppm).

The Air Division of the Office of Pollution within the Mississippi Department of Environmental Quality (MDEQ) is responsible for regulating air quality in the Mississippi stretch of Gulf Islands National Seashore through federal regulations. The state of Mississippi has adopted the NAAQS for the criteria pollutants, and has also adopted a state odor standard that states: "There shall be no odorous substances in the ambient air in concentrations sufficient to adversely and unreasonably: (1) affect human health and well-being; (2) interfere with the use or enjoyment of property; or (3) affect plant or animal life. In determining that concentrations of such substances in the ambient air are adversely and unreasonably affecting human well-being or the use or enjoyment of property of plant or animal life, the factors to be considered by the Commission will include, without limiting the generality of the foregoing, the number of complaints or petitioners alleging that such a condition exists, the frequency of the occurrence of such substances in the ambient air as confirmed by the Department of Environmental Quality staff, and the land use of the affected area" (MDEQ 2002).

No air quality monitoring stations are located within the park boundaries. In Florida, O_3 is monitored at three locations in Pensacola. One of these monitors is at the Naval Air Station (NAS) Pensacola, which is near the Fort Barrancas Visitor Center and north of the Fort Pickens Visitor Center and Perdido Key. O_3 is also monitored at Gulf Breeze, which is west of the Naval Live Oaks area of the national seashore. In 2001 and 2002, O_3 concentrations were within the NAAQS at these stations. As of 2003, the 8-hour O_3 standard, which was promulgated in 1997, is not yet being enforced. Data collected at NAS Pensacola shows that the 8-hour standard was exceeded in 1998 through 2001, but not in 2002. NO_2, PM_{10}, $PM_{2.5}$, and SO_2 are also monitored in the Pensacola area. Concentrations of these pollutants are less than NAAQS.

In Mississippi, O_3 is monitored at Gulfport, approximately 14 miles northwest of West Ship and East Ship islands. PM_{10} is monitored at Pascagoula, approximately 10 miles north of Horn and Petit Bois islands. The Davis Bayou area of the national seashore is midway between Gulfport and Pascagoula, approximately 13 to 15 miles from each location respectively. O_3 and PM_{10} concentrations at these stations were less than NAAQS in 2001 and 2002 (EPA 2003a).

Areas are classified under the Federal *Clean Air Act* as either "attainment" or "non-attainment" areas for each criteria pollutant based on whether the NAAQS have been achieved or not. When an area has been designated as an attainment area after having been non-attainment, it is also classified as a maintenance area. The Florida District of the Gulf Islands National Seashore is in an attainment area for all criteria pollutants; however, as noted above, O_3 levels in the Pensacola area have approached nonattainment levels. The Mississippi District of the Gulf Islands National Seashore is in an attainment area for all criteria pollutants (EPA 2003d).

The national seashore is designated as a Class II airshed. This designation was established by Congress to facilitate the implementation of air quality provisions of the *Clean Air Act* and allows a moderate increase in certain air pollutants. The *Clean Air Act* requires that the National Park Service comply with all federal, state, and local air pollution control laws (Section 118). The United States Fish and Wildlife Service manages Breton Islands National Refuge/National Wilderness Area, located 40 miles south of East Ship and West Ship islands. Breton Islands is a Class I airshed.

The National Park Service maintains records of ozone levels measured as SUM06, which provide an indication of overall regional ozone exposure. The SUM06 data are based on the 3-month highest measured values averaged over a 5-year period and obtained during daylight hours. Data compiled by the NPS Air Resources Division show the SUM06 ozone index in the Gulf Islands National Seashore area at 16 to 20 ppm-hours in Florida and 21 to 25 ppm-hours in Mississippi. Based on air quality monitoring considerations for the Gulf Coast network, SUM06 values of 8 to 12 ppm-hours may cause foliar injury to natural ecosystems, and values of 10 to 15 ppm-hours may cause growth effects on tree seedlings in

natural forest stands. Therefore, based on the SUM06 values, there is a potential for ozone damage to native vegetation (NPS 2002a). Gulf Islands National Seashore staff report that ozone damage to plants has not been observed.

In the eastern part of the United States, the principal contributor to reduced visibility is sulfates, which are principally formed from industrial emissions of SO_2. A secondary, but important contributor is fine particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$) (EPA 2003g). In the area of Gulf Islands National Seashore, visibility is generally good, but park staff report that the area does experience hazy days.

SOUNDSCAPES

Soundscapes include both natural and human components. Natural soundscapes would include all naturally occurring sounds such as waves on the shoreline, birds calling, wind blowing, or the sound of thunder. It also includes "natural quiet" that occurs in the absence of natural or human caused sound. The opportunity to experience natural sounds is an enjoyable part of some visitors' experience at the national seashore.

NATURAL AND HUMAN NOISE LEVELS

Noise is generally defined as an unwanted or intrusive sound. Sounds are described as noise if they interfere with an activity or disturb the person hearing them. Sound is measured in a logarithmic unit called a decibel (dBA). 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. These "A-weighted" sounds are identified by the symbol dBA. Table 8 illustrates common sounds and the measured sound level.

TABLE 8: SOUND LEVEL COMPARISON CHART

Decibels	How it Feels	Equivalent Sounds	Sound Levels at Various Locations in Gulf Islands National Seashore
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; conversation stops	Air compressor at 20 feet; garbage trucks and city buses; power lawnmower; diesel truck at 25 feet	Aircraft from various military installations flying over head
90	Intolerable for phone use	Steady flow of freeway traffic; 10 HP outboard motor; garbage disposal	
80		Muffled personal watercraft at 50 feet; automatic dishwasher; near drilling rig; vacuum cleaner	Standing on the beach on a windy day; touring a visitors center on a busy day
70		Drilling rig at 200 feet; window air conditioner outside at 2 feet	Park entrance roads on a busy day
60	Quiet	Window air conditioner in room; normal conversation	Hiking the Perdido Key Discovery Trail
50	Sleep interference	Quiet home in evening; drilling at 800 feet; bird calls	
40		Library	
30		Soft whisper	In a tent, camping on Petit Bois Island at night
20		In a quiet house at midnight; leaves rustling	

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

For the average human a 10-dBA increase in the measured sound level is subjectively perceived as being twice as loud, and a 10-dBA 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 dBA. There is generally a 6-dBA reduction in sound level for each doubling of distance from a noise source due to spherical spreading loss (e.g., if the sound level at 25 feet from a personal watercraft was 86 dBA, the sound level at 50 feet would be expected to be 80 dBA, at 100 feet 74 dBA, etc.).

WATERCRAFT NOISE LEVELS

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 at 50 feet from the vessel, while other sources attributed levels as high as 102 decibels without specifying distance. None of this literature fully described the method used to collect noise data. To improve the watercraft noise database, 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 personal watercraft and outboard motors are similar in the noise generated. Maximum PWC noise levels at 25 meters (82 feet) ranged between 68 to 76 dBA. Noise levels for other motorboat types of similar horsepower as the personal watercrafts measured during that study ranged from 65 to 77 dBA at 25 meters (82 feet). The larger boats, characterized as V8 'muscle' boats, had noise levels of 85 to 86 dBA at 25 meters (82 feet).

Personal watercraft, unlike motorboats, are highly maneuverable and can be used for stunts and acrobatics, often resulting in quickly varying noise levels due to changes in acceleration and exposure of the jet exhaust when crossing waves. The frequent change in pitch and noise levels, especially if operated close to land, make the noise from personal watercraft more noticeable to human ears (Asplund 2001).

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.

GULF ISLANDS NATIONAL SEASHORE SOUNDSCAPE

Human-caused sounds at Gulf Islands National Seashore include motorized watercraft, personal watercraft, automobiles, aircraft, and electronic devices such as radios and horns. Human sounds are not unexpected or necessarily inappropriate at the national seashore, but are a part of the overall soundscape in an area where water activities, picnicking, camping, sightseeing, and other recreation uses are part of the purpose of the park. Appropriateness of human sounds is evaluated by considering visitor expectation, management guidelines, resource sensitivity, and park purpose.

Areas of concentrated PWC use at Gulf Islands National Seashore are Perdido Key in the Florida District and West Ship Island in the Mississippi District. In other portions of the Florida District, personal watercraft traverse the shoreline. Other motorized boats operate throughout national seashore waters. Water skiing is specifically permitted on both the north and south sides of the Santa Rosa, Fort Pickens, and Perdido Key areas. Watercraft towing persons are limited to flat-wake and 5-mile-per-hour limits within 500 feet of designated swim beaches, within 500 feet of the Fort Pickens Pier, and in the designated flat-wake zone at the east end of Perdido Key, near the Fort McRee site. There are no specific park or state regulations that limit watercraft use for the purpose of noise abatement, but the flat-wake zones cause some noise reduction at the islands, as motorboats operating at lower speeds are generally quieter than those operating at full throttle.

In the Florida areas of the seashore, aircraft from Pensacola Naval Air Station, Whiting Field, and Eglin Air Force Base are frequent sources of noise. Search and rescue helicopters and Special Forces training exercises are conducted over the seashore. Large tugboats can be heard traveling through the intracoastal waterway. Additionally, ambient noise levels are affected by the transportation network in and around certain areas of the park. For example, traffic noise from the Highway 98 bridge connecting Pensacola and Gulf Breeze can be heard from the Naval Live Oaks area (H. Snyder, NPS, pers. communication, October 30, 2003).

In the Mississippi district, aircraft from Keesler Air Force Base in Biloxi often fly over the area. In addition, major shipping channels to Pascagoula and Gulfport are located near the seashore and boats can be heard.

In Mississippi, most personal watercraft used in the national seashore are towed by larger boats to the offshore islands for day use. PWC access out to the islands is limited due to their location 6 to 14 miles from the mainland, drastic weather changes, and large ships in the intracoastal waterway shipping channels. Water skiing is specifically permitted on both the north and south side of the Mississippi barrier islands. However, watercraft are limited to flat-wake and 5-mph limits within 500 feet of designated swim beaches, within 500 feet of the Ship Island and Horn Island piers, and in the buoyed, flat-wake zone at Spoil Island (also known as Sand Island). There are no specific park or state regulations that limit watercraft use for the purpose of noise abatement, but the flat-wake zones cause some noise reduction at the islands, as motorboats operating at lower speeds are generally quieter than those operating at full throttle.

Noise sensitive activities that may occur throughout the national seashore include boat and shoreline fishing, sea kayaking, canoeing, wilderness hiking, camping, beach combing, and wildlife watching. Noise related to personal watercraft and other vessels, and sounds related to other human activity, are highest during the summer months due to inclement fall and winter weather.

VISITOR RESPONSES TO PWC NOISE

Many factors affect how an individual responds to noise. Primary acoustical factors include the sound level, its frequency, and the 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 they respond to noise. For example, to PWC users who are picnicking near the water's edge and can hear the sounds of personal watercraft, the sound may not be bothersome; but non-PWC users in the same location may be annoyed by the sound.

In general, PWC usage within the Florida District of the park was concentrated in the Perdido Key area. During the summer months, most areas of PWC use consisted of 6 or 7 personal watercraft, while on a peak use day, PWC activity in the Perdido Key area might have comprised 25 personal watercraft. The reason for the higher use in the Perdido Key area is the sheltered nature of the area and the proximity to residences with launching facilities. On a high use day in the Mississippi District, popular shoreline areas, including the West Ship Island Pier and the north side of Spoil Island, could experience noise from 25 personal watercraft.

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 in such a way that the motor discharges noise below and above the water surface. To national seashore visitors this irregular noise may seem 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 (approximately 80 dBA at 50 feet). 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. At the national seashore, most non-PWC watercraft do not operate at full throttle or high speed for the majority of the average trip. According to park staff, noise complaints have been received about personal watercraft.

The opportunity to experience the natural soundscape is part of the visitor experience. The park's natural soundscape contributes to a positive visitor experience and is a direct or indirect component of why many people visit the national seashore. The Gulf Islands Wilderness, established by Congress, includes Horn and Petit Bois Islands in the Mississippi district. The Wilderness Act's definition of wilderness includes terms such as "undeveloped Federal land retaining its primeval character and influence," "protected and managed so as to preserve its natural conditions," and having "outstanding opportunities for solitude" (Public Law 88-577).

VEGETATION

The terrestrial vegetation composition within the national seashore results from variations in salt spray, sand deposition, wind flow, erosion, and human and meteorological disturbances. Communities within the national seashore include dunes, forests, salt marshes, and bayous.

Florida District. The dune-strand environment includes series of primary sand dunes up to 10–20 feet in height and adjacent areas that are parallel to the Gulf of Mexico. The dune-swale environment consists of isolated or connected dunes interspersed with low, wetland areas called swales. Dunes are dry and sandy, though swales are occasionally flooded with fresh rainwater and their soil remains moist even during dry periods. Tree species in the dune-swale are shrub-like. Gulf beaches are located to the south of the primary dunes, while the north face of the primary dune joins the dune-swale.

The salt marsh environment consists of salt-tolerant wetland plants growing along the sound and bay shores. It is divided into three general zones: high marsh, brackish marsh, and tidal marsh. High marsh areas are only inundated during the highest tides, but stay moist due to the salt-marsh grass ability to provide shade and reduce the rate of evaporation. The brackish marsh environment contains a combination of salt and fresh waters, and water levels fluctuate with the tides. The most productive of the marsh zones, tidal marshes are inundated twice daily. Dominant salt marsh vegetation within the national seashore is composed of black rush, marsh spike grass, and saltwort (NPS 2003b).

Mississippi District. The Mississippi District of the national seashore also contains a wide variety of habitats, one of which, the salt marsh environment, is described in the "Florida District" section above. The two main environments within the Mississippi unit include the barrier island ecosystem, which comprises salt marsh, beach-dune, interdunal, upland woody, and pineland communities; and the Davis Bayou ecosystem, which comprises upland and lowland hardwood and pine ecosystems. The barrier island ecosystem is found on East Ship, West Ship, Cat, Horn, and Petit Bois islands.

The beach dune community, the only ecosystem impacted by PWC activity, is composed of two separate plant associations. Hardy pioneer plants, mainly sea oats, are found in the harsher foredune area. The roots of sea oats serve as the anchoring system for the dunes. A more diverse plant community, including

beach grass, bunch grass, prickly-pear cactus, and golden aster, is found on the protected lee side of the dunes.

SHORELINE VEGETATION

Fresh and salt marsh communities constitute the majority of wetland areas in the national seashore. Marsh wetlands form in low spots or inlets throughout the national seashore. Salt concentration levels in the marshes relate to the proximity of the marsh to the salt water of the Gulf. Fresh water marsh areas are often isolated or associated with ponds, swales, or abandoned mosquito control ditches (Hoggard 2003a). True freshwater marshes are fed by rainwater, as opposed to tidal activity that supports salt marshes.

Salt marsh communities are located in protected shoreline areas on northern shorelines of all the islands within the national seashore. Salt marsh areas can be scattered and small, but some are more extensive, such as Big Sabine at Santa Rosa Island, the Fort Pickens ponds, and marshes on the east and west ends of Perdido Key (Hoggard 2003a). In the Mississippi District, the marshes that are most vulnerable to disturbance are the ponds and lagoons on East and West Ship and Cat Island, and along the east side of the Davis Bayou channel (Hopkins 2003a). In many locations within the national seashore, beaches consist of a thin ribbon of sandy beach backed by marsh areas.

Shoreline vegetation is limited on the majority of shorelines due to continual wave induced erosion and visitor activity. Vegetation that is present along shorelines is often dominated by sea oats due to their capability of withstanding the high salt environment. Soil and sand disturbances can cause intense wash-over disturbance.

Balduinia angustifolia is associated with large, mature dune ridges occurring behind the foredunes of barrier islands and sandy coastal margins, and supports a solitary bee species (*Hesperapis oraria*) that is limited to the northern coastal margins of the Gulf of Mexico and is the only species of *Hesperapis* known to occur east of the Mississippi River. The bee is noteworthy in its association with a mesic biome and a coastal environment and its restriction to *B. angustifolia* as a single floral host. Located along the aprons of dunes and around the perimeters of dune swales, the plant represents a major component of this island community. Since the bee depends on *B. angustifolia,* it may be an important pollinator of this plant at these coastal locations. Both the bee and the floral host have been documented on three of the seven islands within the national seashore (Hoggard 2003c). A lack of distribution and abundance data places both *H. oraria* and *B. angustifolia* at risk from inadvertent adverse impacts through visitor use and other park activities at potential habitat sites. Future designation of *B. angustifolia*, and potentially *H. oraria,* as a federal special status species may be required (Hoggard 2003c).

SUBMERGED AQUATIC VEGETATION

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, submerged aquatic vegetation beds are considered special aquatic sites (40 CFR 230 Section 404 (b)(1) Guidelines – Protection of Wetlands and other Waters of the United States). At Gulf Islands National Seashore, submerged aquatic vegetation beds consist of several species of seagrasses. Seagrasses are very important in stabilizing bottom sediments and improving water clarity by trapping the fine particles that would otherwise remain suspended by wave and current action. Seagrasses bind shallow water sediments with their roots and rhizomes and baffle wave and current energy with their leafy canopy.

Seagrasses form the basis of the food web in clear water systems and provide important nursery habitat for many species. Larval and juvenile forms of fishes and invertebrates find protection in seagrass beds and many species of fish, mammals, turtles, and birds use these areas as feeding habitat. Further, the seagrass beds occurring within Gulf Islands National Seashore and surrounding waters are vital nursery areas for Gulf of Mexico fisheries.

Florida District. Gulf Islands National Seashore Florida District waters contain approximately 1,930 acres of potential seagrass habitat in the Perdido Key area and waters north of Santa Rosa Island (NPS n.d.). Potential seagrass habitat within the national seashore consists of shallow areas less than seven feet deep with stable sediments and slow currents. The primary seagrass species in park waters are turtle grass, manatee grass, shoal grass, and widgeon grass (FDEP 2003c). In 1949, seagrass beds in the Pensacola Bay system were extensive, but by 1975, these beds were documented to have receded or disappeared (FDEP 1998). In Perdido Bay, seagrass decline within the whole system was nearly 50% from 1940 to 1987, with some specific areas experiencing seagrass coverage losses of greater than 80% (Handley 2003). Seagrass decline in these areas was attributed to increased turbidity caused by harbor and intracoastal waterway dredge and fill activities, boat traffic, shoreline modification, reduced water quality from residential, commercial, and industrial development, and hurricane-related effects. Big Lagoon in the Perdido Key area and the area north of Santa Rosa Island are the only water bodies within the Pensacola Bay watershed that still contain moderately diverse seagrass beds. Because of the decline of these seagrass beds in recent years, the FDEP's Ecosystem Restoration Section has been conducting a seagrass restoration program in Pensacola Bay. Part of this program includes a seagrass monitoring program to establish baseline data for seagrass beds in Big Lagoon and the area north of Santa Rosa Island (FDEP 2001). The occurrence and distribution of seagrasses in the Florida District of Gulf Islands National Seashore are detailed in table 9.

Sargent et al. (1995) conducted a statewide seagrass mapping project to document propeller scarring of seagrass meadows by motorboats. More than 20% of seagrass beds in Escambia and Santa Rosa counties exhibited light to moderate scarring. In Big Lagoon, scarring of seagrass beds was found to be moderate to heavy. Subsequently, the operation of combustion engines in Spanish Cove and Langley Point was prohibited. Boaters can enter, but only while using paddles, sails, poles, or electric motors (NPS 2003a). Commercial fishing and shrimp trawling have been prohibited in park waters since 1996 (Hoggard 2003b).

Mississippi District. The Mississippi District of Gulf Islands National Seashore contains approximately 3,300 acres of potential seagrass habitat (NPS n.d.). As in the Florida District, potential seagrass habitat in the Mississippi Sound side of the barrier islands consists of stable sediments, slow currents, and a water depth of seven feet or less. Manatee grass and shoal grass are the dominant seagrasses found in the shallow water on the northern side of the Mississippi barrier islands where they are protected from the high wave energy of the open Gulf of Mexico (Handley 2003). As in Florida, seagrass distribution has declined noticeably over the past several decades. The largest concentration of seagrasses was found on the north side of Horn Island, where 417 acres in 1956 declined to 138 acres by 1987, and to only 14 acres by 1992 (Handley 2003). Like Florida, seagrass losses along the Mississippi barrier islands has been attributed to natural causes such as hurricanes and changes in salinity, as well as anthropogenic-causes related to water quality reductions from boating activities, dredging, and other development pressures. The occurrence and distribution of seagrasses in the Mississippi District of Gulf Islands National Seashore are detailed in table 10.

TABLE 9: SEAGRASS HABITAT IN THE FLORIDA DISTRICT GULF ISLANDS NATIONAL SEASHORE

Florida District	Seagrass Habitat (acres)
Big Lagoon (Perdido Key area)	640
Fort Pickens	422
Santa Rosa area	772
Naval Live Oaks	94
Total	1,928

TABLE 10: SEAGRASS HABITAT IN THE MISSISSIPPI DISTRICT GULF ISLANDS NATIONAL SEASHORE

Mississippi District	Seagrass Habitat (acres)
Ship Island (East and West)	1,104
Horn Island (including Spoil Island)	1,458
Petit Bois Island	729
Total	3,291

WILDLIFE AND WILDLIFE HABITAT

MARINE MAMMALS

Twenty-nine marine mammals are native to the Gulf of Mexico: 28 species of whales and dolphins and one sirenian, the Florida manatee (TMMSN 2003). Three species commonly occur at Gulf Islands National Seashore: the bottlenose dolphin, Atlantic spotted dolphin, and the Florida manatee (NPS 2003b). Descriptions of the two dolphin species are provided below. The manatee is discussed in the Threatened and Endangered Species section. Whales are rare transients in the national seashore waters.

Bottlenose dolphins are the most common marine mammal documented in the waters of the national seashore, both in Florida and Mississippi. There appear to be two ecotypes of the bottlenose – a coastal, inshore form and an offshore form (Mead and Potter 1990). The inshore stock is genetically divergent from the offshore stock (Curry and Smith 1997). In addition, studies relying on identification of individual dolphins suggest that bottlenose dolphins inhabiting many of the bays, sounds, and other estuaries adjacent to the Gulf of Mexico form discrete communities. The geographic nature of these areas suggests that each community exists as a functioning unit of its ecosystem.

Adults range from approximately 6 to 12 feet long and weigh from 330 to 1,430 pounds. Bottlenose dolphins are opportunistic feeders taking a wide variety of fish, cephalopods (i.e., squid and octopus), and shrimp. The group size can range up to 10 individuals. They are most abundant during the spring in the inshore waters. Waring et al. (1997) estimated the population size of bottlenose dolphin in Pensacola Bay to be 33 individuals and the population size of bottlenose dolphin in Mississippi Sound to be 1,401 individuals. Gulf Islands National Seashore has no monitoring data for bottlenose dolphins within the national seashore.

Atlantic spotted dolphins occur commonly in nearshore Gulf-side waters. Group size ranges from five to fifteen individuals and is generally at the lower range in inshore populations. Individuals generally move closer to shore during the summer months. Adults range from approximately 5 to 7.5 feet long and weigh

from 220 to 310 pounds. The species feeds on small cephalopods, fish, and benthic invertebrates (Perrin et al. 1994). Gulf Islands National Seashore has no monitoring data for Atlantic spotted dolphins within the seashore.

TERRESTRIAL MAMMALS

Upland animal species are somewhat limited in number on barrier islands due to the lack of diversity in vegetation and difficulty of access from mainland areas. No large terrestrial animals are common in the national seashore.

Common smaller native species found in the Florida and Mississippi districts include marsh rabbit, eastern cottontail rabbit, opossum, squirrel, skunks, gray fox, raccoon, eastern wood rats, hispid cotton rats, eastern moles, southeastern pocket gophers, short-tailed shrews, and a variety of bats. River otters can also be found in both districts in the canals near Fort Pickens in Florida and in Horn and Petit Bois islands and Davis Bayou in Mississippi. Non-native species found in both districts include Norway rat, armadillo, coyotes, red fox, and black rat (NPS 2003b, 2003c). In the Mississippi District, nutria, an introduced rodent species that spends the majority of time in or near the water, is also present on Horn and Petit Bois, East Ship, West Ship, and Cat islands.

AMPHIBIANS AND REPTILES

Lizards found in the national seashore include the eastern glass lizard, anole, sand lizard, ground lizard, and the five lined skink (NPS 2003c). Reptiles which may occur in the marine portions of the park include: American alligator, alligator snapping turtle, loggerhead sea turtle, leatherback sea turtle, green sea turtle, and Kemp's ridley sea turtle. The above marine species are listed as protected species under federal and/or state regulations and are discussed and described in detail in the "Threatened and Endangered Species" section.

AQUATIC INVERTEBRATES AND FISH

Several species of shellfish that are of commercial, recreational, and ecological importance occur in Gulf Islands National Seashore waters, including blue crabs, shrimp, and stone crabs. Water bottoms around the seashore in the Florida and Mississippi districts are important nursery areas for most species of shellfish. Blue crabs are caught recreationally. Three species of shrimp (brown shrimp, white shrimp, and pink shrimp) occur at various seasons and life stages in seashore waters. Commercial shrimping is not allowed within the national seashore boundaries. Stone crab juveniles are common in the Pensacola Bay system waters and Gulf stone crab adults and juveniles are common in Mississippi Sound waters. Bay scallops, whose range once extended to Pensacola, are now rare in areas west of St. Joseph Bay (FFWCC 2001a). In addition, oysters grow in ponds and lagoons where salinity is low enough to limit predators and disease. In Florida, the Florida Department of Agriculture and Consumer Services establish shellfish harvest areas. In Mississippi, shellfish harvest areas are established by the Mississippi Department of Marine Resources, Commission on Marine Resources.

The seasonal distribution patterns of commercially and recreationally important shellfish species in Florida and Mississippi, as provided by distribution maps prepared by the National Marine Fisheries Service (n.d.), are summarized below.

Florida

- Brown shrimp: Adults highly abundant during the increasing salinity season in May – August and not present at other times of year. Juveniles are highly abundant during the increasing salinity season in May – August; highly abundant during the high salinity season in September – November; and generally not present at other times of year.
- Gulf stone crab: Rare at all times as both adult and juvenile.
- Pink shrimp: Adults are rare or not present at all times of year. Juveniles are common year round.
- Stone crab: Adults are not present at all times of year. Juveniles are common during the increasing salinity season in May – August and during the high salinity season in September – November.
- White shrimp: Adults are common in all months except the high salinity season from September – November. Juveniles are common in the low salinity months from February – April and the decreasing salinity months from December – January; abundant in the increasing salinity months in May – August; and common to abundant in the high salinity months from September – November.

Mississippi. Brown, white and pink shrimp, in order of abundance, are harvested in the Mississippi Sound.

- Brown shrimp: Adults and juveniles are highly abundant in the increasing salinity season of May – July and abundant in the high salinity season in August – October and low salinity season from February – March. Both life stages are common in the decreasing salinity season in November – January.
- Gulf stone crab: Adults and juveniles are common year round.
- Pink shrimp: Adults and juveniles are common year round.
- Stone crab: Adults are rare year round. There is no data for juveniles.
- White shrimp: Adults and juveniles are abundant May – January and common from February – March.

FISH

More than 200 species of fish occur within the waters of Gulf Islands National Seashore (NPS 2003b, 2003c). Because the estuarine and marine habitats (e.g., seagrass beds and unvegetated soft bottoms) encompassed within the two districts of the national seashore are similar and in relatively close proximity, the following discussion applies to both districts, except where noted. Species vary according to seasonal abundance (see table 11).

TABLE 11: GENERAL SEASONAL ABUNDANCE FOR FISH AND SHELLFISH AT GULF ISLANDS NATIONAL SEASHORE

Season	Common Species
Spring (March – May)	Bluefish, cobia, croaker, grouper, pompano, sea trout, snapper, blue crab, and shrimp
Summer (June – September)	Saltwater mullet, bluefish, croaker, pompano, sea trout, snapper, blue crab, shrimp
Fall (October – November)	Flounder, saltwater mullet, bluefish, croaker, grouper, red fish, sea trout, snapper
Winter (December – February)	Flounder, king mackerel, bluefish, croaker, grouper, saltwater mullet, red fish, sea trout, snapper

The most abundant fish are anchovies. Silversides are abundant in the shallow nearshore waters. These small species, among others, provide food for larger predators. The killifish, sailfin molly and mosquito fish live in ponds and lagoons, and along the beaches. Myriad larval and young fish occupy the shallow waters around the islands and find food and protection in the seagrass beds. These include most of the important sport and commercial species that spawn further offshore and spend the early parts of their lives in estuarine nursery areas.

Several commercially and recreationally important species occur within the waters of the national seashore. Speckled sea trout spawn around the islands and are often the most sought after sport fish. The channel bass, sand sea trout, kingfish, jack, flounder, mackerel, bluefish, pompano, snapper, and many other species provide excellent surf and troll fishing. Cobia, locally known as lemon fish, and tarpon are among the large game fish. Mullet are abundant and are taken by cast net.

Several species of sharks occur in seashore waters, including hammerhead, bonnethead, Atlantic sharpnose, bull, and blacktip. Several species of rays, including Southern stingrays, manta rays, and spotted eagle rays, occur as well. Southern stingrays are the most abundant and commonly feed and rest in shallow waters.

Essential Fish Habitat

The 1996 *Magnuson-Stevens Act* requires cooperation among the National Marine Fisheries Service (NMFS), fishing participants, and federal and state agencies to protect, conserve, and enhance essential fish habitats. Essential fish habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 USC 1802(10)). ESF occurs for several species of fish in the Florida and Mississippi districts of Gulf Islands National Seashore. ESF has not yet been designated for most species occurring in the Gulf of Mexico (GMFMC 1998).

NOAA's Estuarine Living Marine Resources (ELMR) Program developed a database on the distribution, relative abundance, and life history characteristics of ecologically and economically important fishes and invertebrates in the nation's estuaries. Based on ELMR data, NOAA has designated ESF for more than 30 estuaries in the northern Gulf of Mexico for a number of species of finfish and shellfish. ESF occurs for several species of fish and shellfish in and around Gulf Islands National Seashore waters. Table 12 provides a summary of essential fish habitat for key species that occur in Pensacola Bay and Mississippi Sound.

Additional invertebrates of ecological importance exist within the waters of Gulf Island National Seashore, although essential fish habitat has not been designated for these species. These species include horseshoe crab, mole crab, fiddler crab, hermit crab, coquina, several species of conch, oyster drill, and various copepods, isopods, and amphipods (Hoggard 2003d).

TABLE 12: SPECIES WITH ESSENTIAL FISH HABITAT IN PENSACOLA BAY AND THE MISSISSIPPI SOUND

Species	Area of Presence
Brown shrimp	Both
Gray snapper	Both
Gulf stone crab	Both
Pink shrimp	Both
Red drum	Both
Spanish mackerel	Both
Spiny lobster	Mississippi Sound
White shrimp	Both

Source: NOAA 2002a.

BIRDS

Gulf Islands National Seashore has over 280 species of birds that use the islands for loafing, nesting, feeding, wintering, or migratory rest stops. These birds include songbirds, waterfowl, wading birds, birds of prey, marine birds, and shorebirds. Sandpipers, herons, egrets, ospreys, marsh wrens, terns, gulls, and several species of rails are just a few species that utilize the island habitats. Some of these birds are listed in table 13. The magnificent frigatebird can sometimes be seen in the summer months, especially in stormy weather.

Florida District. Shorebird nesting, foraging, and loafing areas are located along the north and south shorelines of all Florida District islands as well as along both the north and south shores of the Naval Live Oaks area. In addition, great blue heron and night heron nesting and roosting habitats are located on Perdido Key. Blue heron nest on Santa Rosa Island, while osprey nest on Santa Rosa Island, Petit Bois Island, Horn Island, and Naval Live Oaks area (Hoggard 2003d).

Mississippi District. Horn and Petit Bois islands are important nesting areas for large colonies of least terns, sandwich terns, black skimmers, and royal terns. The largest nesting colonies of sandwich, royal and gull-billed terns in the state are located on Spoil Island. Gull-billed and Caspian terns, as well as numerous shorebirds, also nest on the Mississippi District islands. At least fourteen species of waterfowl utilize these areas as over-wintering grounds, the most numerous being coot and scaup. Ospreys and eagles nest on Horn, Petit Bois, and East Ship islands in the slash pine habitats (NPS 2003c). Clapper rail, indigenous to salt marshes, and night heron nest and roost in Davis Bayou.

In addition, the national seashore implements seasonal closures that are reviewed on an annual basis to protect valuable shorebird habitat from impacts resulting from public use, including PWC activity. The following locations are used by nesting shorebirds and are closed to all public use and access as indicated below and in the *Superintendent's Compendium* (NPS 2003a):

Florida District.

(a) That portion of Santa Rosa Island, from the eastern end of Opal Beach to the park boundary at Navarre Beach, which is designated by posted signs, from May 1 through September 30 of each year.

(b) That portion of Santa Rosa Island, from the park boundary at Pensacola Beach to Fort Pickens Ranger Station, which is designated by posted signs, from May 1 through September 30 of each year.

TABLE 13: GENERAL SEASONAL ABUNDANCE OF BIRDS IN GULF ISLANDS NATIONAL SEASHORE

Season	Common Species
Spring (March – May)	Common loon, pied-bill grebe, double-crested cormorant, blue-winged teal, lesser scaup, red breasted merganser, clapper rail, black-bellied plover, American coot, killdeer, willet, ruddy turnstone, sanderling, spotted sandpiper, dunlin, laughing gull, common nighthawk, chuck-will's widow, red-bellied woodpecker, least tern, pine warbler, common yellowthroat
Summer (June – August)	Cattle egret, green heron, yellow-crowned night-heron, clapper rail, willet, laughing gull, royal tern, least tern, mourning dove, eastern screech owl, common nighthawk, chuck-will's widow, red-bellied woodpecker, northern flicker, great crested flycatcher, eastern kingbird, purple martin, marsh wren, pine warbler, common yellowthroat, eastern towhee
Fall (September – November)	Green heron, broad-winged hawk, clapper rail, American coot, black-bellied plover, killdeer, willet, spotted sandpiper, ruddy turnstone, sanderling, western sandpiper, dunlin, laughing gull, royal tern, mourning dove, eastern screech owl, red-bellied woodpecker, common yellowthroat, yellow warbler, white-eyed vireo, pine warbler, eastern towhee
Winter (December – February)	Common loon, double-crested cormorant, lesser scaup, common goldeneye, bufflehead, clapper rail, black-bellied plover, killdeer, willet, ruddy turnstone, sanderling, American coot, dunlin, laughing gull, royal tern, mourning dove, red-bellied woodpecker, downy woodpecker, blue jay, tufted titmouse, brown-headed nuthatch, brown thrasher

(c) That portion of Perdido Key adjacent to the Perdido Key Road, which is designated by posted signs, from May 1 through September 30 of each year.

Mississippi District.

(a) That portion of Spoil Island within the Mississippi District, which is designated by posted signs, from May 1 through September 30 of each year.

(b) The north shore of Horn Island encompassing the sand spit at the east side of the Big Lagoon entry, extending 1,500 yards to the east, which is designated by posted signs, from May 1 through September 30 of each year.

(c) The north shore of Horn Island approximately 0.5 mile west of the east tip, which is designated by posted signs, from May 1 through September 30 of each year.

(d) The north shore of Horn Island at the mouth of Ranger Lagoon, which is designated by posted signs, from May 1 through September 30 of each year.

(e) The 0.25-mile section of the west tip of East Ship Island, excluding the beach, which is designated by posted signs, from May 1 through September 30 of each year.

(f) The area at the west tip of West Ship Island, from the western-most dune ridge to the western tip, excluding the surf line, which is designated by posted signs, from May 1 through September 30 of each year.

Determination: These areas are used each year by nesting shorebirds. These closures are necessary to protect shorebirds, eggs, and chicks from human disturbance. Less restrictive measures would permit public access into areas where shorebirds build shallow, highly disguised nests in sand and deposit small, off-white colored eggs, which are extremely difficult to see, resulting in a high probability of the loss of wildlife.

As with shorebirds, park staff implements seasonal closures to protect nesting osprey and bald eagles from visitor disturbance. The following locations are closed to all public use and access as indicated below:

(a) From March 1 through July 31, the north shore of Horn Island in the area known as the Horseshoe, from NPS Marker #7 to NPS Marker #10 is closed as follows: The dunes and vegetated area from the northern base of the dunes to the marsh shall be closed to all entry and use. The Beach shall be closed to camping, picnicking or uses other than walking along the shoreline

(b) From March 1 through July 31, the area within 300 yards of each osprey nest that contains adult or juvenile osprey is closed to all public use.

(c) From October 1 through April 30, the area southeast of Big Lagoon on Horn Island, from NPS Marker #30A to NPS Marker #32 is closed as follows: The dunes and vegetated area from the southern base of the primary dunes for a distance 1,000 yards north of the dunes shall be closed to all entry and use. The beach shall be closed to camping, picnicking or uses other than walking along the shoreline.

Determination: These closures are necessary to protect osprey and bald eagle adults, eggs, and juveniles. These birds are subject to human disturbance that causes the adults to leave the nests allowing for eggs and chicks to perish from overheating and dehydration. Less restrictive measures would permit public access to areas close enough to disturb these birds and result in a high probability of the loss of wildlife.

THREATENED, ENDANGERED, OR SPECIAL CONCERN SPECIES

The U.S. Fish and Wildlife Service lists species as threatened or endangered when they meet criteria detailed under the *Endangered Species Act of 1973*. Candidate species are also designated when there is adequate information regarding threats or vulnerability to warrant issuance of a proposed rule to list, but circumstances preclude rule issuance.

Wildlife species listed by the U.S. Fish and Wildlife Service, or the states of Florida or Mississippi, as threatened or endangered or as species of special concern that may occur in or near Gulf Islands National Seashore are listed in table 14.

MARINE MAMMALS

Florida District. The Florida manatee, a subspecies of the West Indian manatee, is a large gray or brown aquatic mammal native to the United States in Florida, Georgia, and Puerto Rico. Manatees are found in shallow rivers, estuaries, and inshore coastal areas where they feed on seagrasses and other aquatic vegetation. Adult manatees average 10 feet long, weigh 1,000 pounds, and can consume nearly 10% of their body weight in aquatic plants daily (USFWS 2003c). During the winter months, manatees migrate to the warmer waters of south Florida or form large aggregations in natural springs and industrial outfalls where water temperatures are elevated.

Manatees, as air-breathers, spend much time at the water surface, and feeding and resting in shallow seagrass beds and they cannot always dive quickly or deep enough to avoid being struck by boats. Over the past decade, more than 30% of manatee deaths were human-related, primarily from collisions with boats, but also including entanglement in commercial fishing gear, and being crushed in canal locks and floodgates (FFWCC 2001b). A major factor in the decline of the manatee population has been the loss of seagrass beds due to human development impacts to coastal waters of the northern Gulf of Mexico. Natural manatee mortalities have been attributed to strong cold weather fronts and toxic red tide blooms. Because of the decline in manatee populations, the U.S. Fish and Wildlife Service has listed the manatee

TABLE 14: FEDERAL AND STATE LISTED WILDLIFE IDENTIFIED IN GULF ISLANDS NATIONAL SEASHORE

Common Name	Scientific Name	Federal Status	Florida Status	Mississippi Status*
Marine Mammals				
Florida (West Indian) manatee	*Trichechus manatus latirostris*	E	E	SZ
Terrestrial Mammals				
Perdido Key beach mouse	*Peromyscus polionotus trissyllepsis*	E	E	NL
Santa Rosa beach mouse	*Peromyscus polionotus leucocephalus*	NL	SC	NL
Aquatic Reptiles				
American alligator	*Alligator mississippiensis*	T (S/A)	SC	NL
Leatherback sea turtle	*Dermochelys coriacea*	E	E	SZN
Atlantic green turtle	*Chelonia mydas mydas*	E	E	SZN
Kemps ridley sea turtle	*Lepidochelys kempi*	E	E	S1N
Atlantic loggerhead sea turtle	*Caretta caretta*	T	T	S1B, SZN
Alligator snapping turtle	*Macroclemys temorincki*	NL	SC	NL
Terrestrial Reptiles				
Gopher tortoise	Gopherus polyphemus	T (MS)	SC	S2
Fish				
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T	SC	S1
Saltmarsh topminnow	*Fundulus jenkinsi*	NL	SC	NL
Birds				
Brown pelican	*Pelecanus occidentalis*	E (MS)	SC	S1N
American bald eagle	*Haliaeetus leucocephalus*	T	T	S1B, S2N
Piping plover	*Charadrius melodus*	T	T	SZN
Peregrine falcon	*Falco peregrinus*	Delisted 1999	E	SZN
Southeastern snowy plover	*Charadrius alexandrinus tenuirostris*	NL	T	S2B, SZN
Least tern	*Sterna antillarum*	NL	T	S3B
Southeastern American kestrel	*Falco sparverius paulus*	NL	T	NL
Black skimmer	*Rynchops niger*	NL	SC	S3
Reddish egret	*Egretta rufescens*	NL	SC	NL
Little blue heron	*Egretta caerulea*	NL	SC	NL
Snowy egret	*Egretta thula*	NL	SC	NL
Terrestrial Plants				
White-top pitcher plant	*Sarracenia leucophylla*	NL	E	S2S3
Cruise's golden aster	*Chrysopsis gossypina* ssp. *Cruiseana*	NL	E	NL
Godfrey's golden aster	*Chrysopsis godfreyi*	NL	E	NL
Gulf Coast lupine	*Lupinus westianus*	NL	T	NL
Curtiss' sandgrass	*Calamovilfa curtissii*	NL	T	NL
Large-leaved jointweed	*Polygonella macrophylla*	NL	T	NL

E = Endangered; T = Threatened; C = Candidate; SC = Species of Special Concern; S/A = Similar Appearance; NL = Not Listed

* Definition of Mississippi State Status (MHNP 2001) –

- S1: Critically imperiled in Mississippi because of extreme rarity or because of some factor(s) of its biology making it especially vulnerable to extirpation.
- S2: Imperiled in Mississippi because of rarity or because of some factor(s) demonstrably making it very vulnerable to extirpation.
- S3: Rare or uncommon in Mississippi.
- S4: Widespread, abundant, and apparently secure in the state, but with cause for long-term concern.
- S5: Demonstrably widespread, abundant, and secure in the state.
- SZ: Zero occurrences in the state. Not of practical conservation concern in the state, because there are no definable occurrences, although the taxon is native and appears regularly in the state.
- B: Breeding status.
- N: Non-breeding status.

Sources: Mississippi Natural Heritage Program (MHNP 2001) and Florida Natural Area Inventories field guides (Chafin et al. 2000 and Hipes et al. 2001).

as an endangered species (USFWS 2003c). During the 2003 annual manatee count in Florida, 1,299 manatees were counted along Florida's Gulf Coast (FMRI 2003).

In Gulf Islands National Seashore, Florida District, most manatee sightings are in the waters of the Gulf of Mexico, though some individuals have been documented in Pensacola Bay and likely some in the area north of Santa Rosa Island and the Perdido Key area (Hoggard 2003b); the national seashore does not monitor for the species. Manatees are present in national seashore waters in late spring and summer when water temperatures range from the upper 70° to low 80°F.

Mississippi District. In Mississippi, manatees occur along the mainland side of Mississippi Sound, and are rare or absent around the barrier islands, though dead manatees have washed up on the beaches of the barrier islands (Hopkins 2003).

TERRESTRIAL MAMMALS

Florida District. The Perdido Key beach mouse is both a federally listed and state-listed endangered species in Florida. Historically, its habitat was mature coastal barrier sand dunes along the Gulf of Mexico, but it is only present currently in the eastern part of Perdido Key, with critical habitat designated within the Perdido Key area of the Gulf Islands National Seashore, the Perdido Key State Park in Florida, and the Gulf State Park in Alabama. Tropical storms and loss of habitat due to development and habitat fragmentation are the main contributing factors to the current status of the Perdido Key beach mouse (NPS 2003b).

The Santa Rosa beach mouse is a state-listed species of concern in Florida and is found only on Santa Rosa Island in Florida. It inhabits both beach and interior dunes that are vegetated with sea oats and other typical vegetation. Human destruction of habitat and predation by introduced species are potential threats to populations (Nature Serve Explorer 2002). There are a total of three known populations at the extreme ends and middle of the island (NPS 2001a).

Mississippi District. There are no special status terrestrial mammals within the Mississippi District of the national seashore.

AQUATIC REPTILES

Florida District. The American alligator is a large reptile reaching lengths of 6 to 12 or more feet and is blackish in appearance with pale crossbands on the back and vertical markings on the sides. Alligators inhabit rivers, swamps, estuaries, lakes, and marshes in the southeastern United States from North Carolina to Texas. Both adults and young feed on a variety of animals, including fish, turtles, and other aquatic organisms.

Formerly on the federal endangered species list, the American alligator is now considered fully recovered and is listed as threatened due to similarity of appearance (USFWS 2003c). Although American alligator populations have responded well to protection, and regulated hunting is now allowed in most states within the alligator's range, several species of crocodiles and caymans similar in appearance to the alligator are still endangered. For this reason, The U.S. Fish and Wildlife Service regulates the legal trade of alligator skins and products in order to protect endangered crocodile and cayman species with skin that is similar in appearance. The state of Florida lists the alligator as a species of special concern (FGFWFC 1997). The alligator has no special status in Mississippi.

In Gulf Islands National Seashore, Florida District, American alligator is present in wetlands in the Fort Pickens and Naval Live Oaks areas (Hoggard 2003b). The national seashore occasionally receives reports of alligators sighted on the beach.

The American alligator is capable of swimming in marine waters, as evidenced by its presence at the Mississippi barrier islands where it inhabits wetlands and brackish lagoons (Hopkins 2003). The national seashore does not have any monitoring data for this species.

Four species of sea turtles occur in the waters of Gulf Islands National Seashore: the Atlantic loggerhead, green, Kemp's ridley, and leatherback. Each of these species is listed as federally threatened or endangered (USFWS 2003c, also see table 11). Sea turtle populations have been adversely impacted due to loss and alteration of nesting habitat, increased mortality from boat strikes, and entanglement in commercial fishing gear. Each year numerous adult and sub-adult sea turtles are found dead in the national seashore and surrounding waters. Causes of death include ingestion of commercial fishing longline hooks and line, boat strikes, drowning in commercial fishing gear, and natural causes.

In the Florida District, sea turtles are primarily present in Gulf of Mexico waters. Jellyfish are a common sea turtle prey item and may attract sea turtles into the Perdido Key area and the area north of Santa Rosa Island. Additionally, green turtles may be attracted to feed in the seagrass beds in the Perdido Key area and the area north of Santa Rosa Island.

On a seasonal basis, sea turtles are present in national seashore waters in the spring, summer and fall, until cold weather drives them to warmer southern waters. The national seashore does not have monitoring data on the abundance and distribution of sea turtles in national seashore waters. A loggerhead turtle satellite tagging program in the national seashore has revealed that the loggerhead population is most likely a distinct Gulf of Mexico population separate from the Atlantic population (Hoggard 2003b).

Sea turtles also nest on the beaches within the Florida District of the national seashore during the spring and summer months. The Florida District includes 21 miles of beaches suitable for sea turtle nesting. Loggerhead turtles comprise the majority of sea turtle nesting in the Florida District, although green turtles occasionally nest as well, and one Kemp's ridley nest and one leatherback nest have been documented in recent years. An average of 40 to 50 sea turtles nest in the Florida District annually. Nests are marked, dated, and watched by staff biologists and volunteers. About 60 days after nesting, the turtle hatchlings emerge from the sand and crawl toward the brightest horizon. Hatchlings in the Florida District often crawl in the wrong direction at night due to light pollution from the surrounding developed areas, resulting in high rates of hatchling mortality through predation and desiccation, so national seashore staff and volunteers steer the thousands of hatchlings to the sea. About one-fourth of sea turtle nests in the Florida District are relocated to higher ground, as some turtles nest in areas that are vulnerable to flooding from hurricanes or strong southerly winds.

The alligator snapping turtle is the largest freshwater turtle in the world, reaching a length of more than 2 feet and a weight in excess of 100 pounds. This turtle inhabits rivers, swamps, lakes, and marshes along the coastal plain from Georgia to East Texas, and occasionally enters brackish water. Known for its large head with powerful hooked jaws, the alligator snapping turtle feeds on fish, turtles, and other aquatic animals. The alligator snapping turtle is aquatic, and only nesting females are known to leave the water. In Gulf Islands National Seashore, Florida District, alligator snapping turtles inhabit wetlands at the Fort Pickens area and possibly wetlands at the eastern end of Perdido Key (Hoggard 2003b). The national seashore receives occasional reports of turtle crawls on the beach that leave claw marks, but no monitoring data for the alligator snapping turtle exists. The state of Florida lists the alligator snapping turtle as a species of special concern (FGFWFC 1997); it has no special status in Mississippi (MNHP 2001).

Mississippi District. The Atlantic loggerhead nests during the spring and summer months on Horn, Petit Bois, and East Ship and West Ship islands in the Mississippi District. The entire district includes approximately 63 miles of beaches suitable for sea turtle nesting (NPS 2003c). Monitoring of nesting loggerheads has been sporadic but the number of documented nests ranges from 0 to 14.

TERRESTRIAL REPTILES

Florida District. The gopher tortoise, while not federally listed for Florida, is a species of special concern in the state. Gopher tortoises live in extensive burrow systems in dry upland habitats in longleaf pine sandhills, xeric oak hammocks, scrub, pine flatwoods, dry prairies, and coastal dunes (GTC 2000). Habitat loss is the largest threat to the species. Gopher tortoises are known to occur in inland locations of mainland areas within the Florida district of the national seashore (H. Snyder, NPS, email correspondence, October 29, 2003).

Mississippi District. The gopher tortoise is designated as a threatened species under the Endangered Species Act as well as an imperiled species in Mississippi. Gopher tortoises occur in the coastal plain region of the southeastern United States. Populations in some areas have been severely reduced, including within the region of the national seashore. Gopher tortoise are not known to inhabit the Mississippi district at present (H. Snyder, NPS, email correspondence, October 29, 2003).

FISH

Florida District. The Gulf sturgeon inhabits coastal rivers, bays, and the northern Gulf of Mexico from Louisiana to Florida. Adults range from six to eight feet in length. Adult fish are bottom feeders, eating primarily invertebrates, including brachiopods, insect larvae, mollusks, worms, and crustaceans. Over fishing throughout most of the 20th century resulted in a decline in Gulf sturgeon populations. This decline has been exacerbated by spawning habitat loss associated primarily with the construction of dams, as Gulf sturgeon are anadromous and travel to the upper river reaches where they were hatched to spawn. In 1991, the U.S. Fish and Wildlife Service listed the Gulf sturgeon as a threatened species.

The U.S. Fish and Wildlife Service and National Marine Fisheries Service recently designated critical habitat essential to the conservation of the Gulf sturgeon (USFWS 2003a). Nearshore waters within one nautical mile of the mainland from Pensacola Pass to Apalachicola Bay and the Perdido Key area and the area north of Santa Rosa Island were designated as critical habitat, as they are believed to be important migratory pathways between Pensacola Bay and the Gulf of Mexico for feeding and genetic exchange.

The saltmarsh topminnow is a small fish native to the north-central coast of the Gulf of Mexico of the southern United States, from Galveston Bay, Texas, eastward through Louisiana, Mississippi, Alabama and parts of western Florida. Because the saltmarsh topminnow lives in salt marshes and brackish water, coastal erosion and conversion of marshes to deeper, open water eliminates the marsh surface that, when flooded, provides important feeding, shelter, and possible breeding areas for saltmarsh topminnows. The National Marine Fisheries Service designated the saltmarsh topminnow as a candidate species for protection under the *Endangered Species Act* in 1997. The state of Florida lists the saltmarsh topminnow as a species of special concern (FGFWFC 1997) and Mississippi has no special designation. The saltmarsh topminnow is believed to occur in the Pensacola Bay system (NMFS 2003) and is also likely to occur in the wetlands and marshes of the Mississippi barrier islands.

Mississippi District. Gulf sturgeon critical habitat within Mississippi includes areas within one nautical mile (1.9 km) offshore of the barrier islands of the Mississippi Sound, which are believed to be important feeding habitat for gulf sturgeon. The passes (Ship Island Pass, Dog Keys Pass, Horn Island Pass and Petit Bois Pass are also designated critical habitat (68 FR 13369-13495, 19 March 2003).

BIRDS

Florida District. The American bald eagle is a federally threatened species, state-listed as threatened in Florida, and state-listed critically imperiled (breeding) (S1B) and imperiled (non-breeding) (S2N) in Mississippi. Typical habitat within the national seashore consists of areas with adequate food, perching areas, and nesting sites (USFWS 1999). In Florida, there are no known nesting locations, but bald eagles are often observed in the area. Bald eagles are believed to nest inland and feed in national seashore waters (Hoggard 2003a).

The piping plover is a federally threatened species as well as a state-listed threatened species in Florida. Parts of the national seashore have been designated critical wintering habitat. Habitat is concentrated in open beaches and tidal flats, and piping plovers begin arriving in July and remain into the following May (NPS 2001a). Full surveys have not been conducted, but within the Florida District, piping plovers are known to winter in tidal flat areas on Perdido Key and on the north side of Santa Rosa Island.

The peregrine falcon was delisted in 1999 from a federally threatened species and is currently monitored to ensure continued recovery. Peregrines are routinely observed perched on beaches during the winter and fall.

The brown pelican, though not federally protected in Florida, is a state species of special concern and is found throughout the district. The brown pelican feeds primarily in shallow waters within 20 miles of the shoreline, rests during the day and roosts at night on sand spits and offshore sand bars, and nests on small coastal islands that provide protection from mammal predators and have sufficient elevation to prevent flooding of nests (USFWS 2003c – species accounts). Pesticide residue (DDT) in prey species (fish) was a primary factor in the decline of the species. Other threats include oil or chemical spills, plant community changes, storms, heavy tick infestations, and inconsistent food availability. Human-caused disturbance of nesting colonies and mortalities related to fishing activities are also threats (USFWS 2003c – species accounts). Brown pelican do not nest in the seashore (H. Snyder, NPS, email correspondence, July 30, 2003).

The southeastern snowy plover is a year-round resident of the national seashore, and is a state-listed threatened species in Florida. Beaches, dry mud or salt flats, and the sandy shores of rivers, lakes, and ponds are the normal habitat for this plover. It nests on the ground of broad open beaches where vegetation is sparse or absent. Nests are often subject to flooding, and the plover faces threats from loss of habitat due to beach development (Nature Serve Explorer 2002). In 2001, 30 southeastern snowy plover nests were monitored; 13 on Perdido Key and 17 in the Fort Pickens area (NPS 2003b). Feeding and loafing areas are also present on the western side of the Santa Rosa area (FDEP 2003c).

The least tern is a state-listed threatened species in Florida. It nests near water, particularly on seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers. The least tern rests and loafs on sandy beaches, mudflats, and salt-pond dikes. The least tern is susceptible to human disturbances, predation, flooding, and loss of habitat (Nature Serve Explorer 2002). Colonies establish and reestablish along the length of the islands, as least terns will nest wherever suitable habitat exists and will relocate when habitat disturbances occur. In the early 1990s, Perdido Key supported a large colony of least terns near the

eastern tip, but after Hurricane Opal, the populations at Fort Pickens and Santa Rosa increased dramatically (Hoggard 2003a).

The southeastern American kestrel is a state-listed threatened species in Florida. Habitat consists of open or partly open areas, though during winter in Florida males use less open habitats than do females. Kestrels nest in the cavities of tall dead trees or in telephone poles. Fluctuation in species numbers is attributed to habitat destruction and loss of nest sites, as well as predation and pesticide use (Nature Serve Explorer 2002). The American kestrel is not likely to be affected by PWC use within the national seashore because suitable habitat is located in inland areas and not directly adjacent to PWC use areas.

The black skimmer is a state-listed species of concern in Florida. Primary habitat for the black skimmer is coastal waters, including beaches, bays, estuaries, and sandbars, as well as tidal creeks that are used for foraging. It primarily nests on sandy beaches, small coastal islands, and dredge spoil islands (Hipes et al. 2001). Within the national seashore, black skimmers share colony sites with least terns. Like the least tern, the black skimmer locates and relocates colonies based on environmental changes and disturbances. In the year 2000 there were approximately 18 black skimmer nests in the Santa Rosa area, while in the year 2001 there were three. In the Fort Pickens area, 2 nests were documents in 2000, 47 nests in 2001, and 38 nests in 2002 (H. Snyder, NPS, email correspondences, October 29, 2003).

The reddish egret, a state-listed species of concern in Florida, has been identified within the national seashore as an uncommon and occasional migratory species (Hoggard 2003a). The reddish egret is generally found in shallow water areas that are saline, hypersaline, or brackish within coastal habitats, including barren sand or mud tidal flats, salt ponds, lagoons, and open red mangrove and black mangrove communities. It occasionally feeds in other habitats including coastal beaches, sparsely vegetated freshwater marshes, and the shores of lakes and reservoirs. Habitat loss and human disturbance are the main factors in the decline of the species (Nature Serve Explorer 2002).

The little blue heron is a state-listed species of concern in Florida. It is found primarily in freshwater habitats in marshes, ponds, lakes, meadows, mudflats, lagoons, streams, mangrove lagoons, and other bodies of calm shallow water. It nests in trees and shrubs to about 4 meters above ground or water, often with other herons, egrets, and ibises. The primary threat to populations is disturbance and development of nesting areas, in addition to weather and shoreline variability (Nature Serve Explorer 2002). The little blue heron is rarely observed in the Naval Live Oaks area, and is likely only migratory in the area, as nesting activity has not been confirmed within the national seashore.

The snowy egret is a state-listed species of concern in Florida. It is found in marshes, lakes, ponds, lagoons, mangroves, and shallow coastal habitats. It often nests with other colonial water birds in trees or shrubs, and occasionally on the ground or in marsh vegetation. The main threat to the snowy egret is from loss and degradation of wetland habitats (Nature Serve Explorer 2002). The snowy egret is not known to nest within the national seashore, but it is found within park saltmarsh environments (Hoggard 2003a).

Mississippi District. The brown pelican is a year-round resident of the national seashore, and is listed as an endangered species by the U.S. Fish and Wildlife Service in Mississippi and elsewhere, except for the Atlantic Coast, Florida, and Alabama. It is also a state-listed critically imperiled (non-breeding) species within Mississippi. The brown pelican is protected in the Mississippi District of the national seashore, where it is known to occur in the Davis Bayou area, East Ship and West Ship islands, Horn Island, Petit Bois Island, and Cat Island (GEMS n.d.).

Bald eagles nest on Horn Island, where reintroduction efforts were begun in 1985 (NPS 2003c). There have been reports of nesting activity on Cat Island as well. Immature and non-nesting individuals are seen

regularly in the area, especially along the mainland, but are not regularly monitored. Nesting pairs are located along the mainland coast of Mississippi (Hopkins 2003a).

The piping plover holds Mississippi state status in addition to its federally threatened status and habitat is located in open beaches and tidal flats throughout the district. Critical habitat for wintering piping plover has been designated on the Mississippi barrier islands.

The peregrine falcon is a winter resident in the area and can be seen on all Mississippi District islands from fall to spring (Hopkins 2003).

In addition to species with federal status, shorebirds and waterbirds with special status in the state of Mississippi include the southeastern snowy plover and piping plover.

The southeastern snowy plover is a state-listed imperiled (breeding) species in Mississippi and is present on East and West Ship islands, Horn Island, Petit Bois Island, and Cat Island.

The least tern is state-listed rare or uncommon (breeding) within Mississippi and is present on East and West Ship islands, Horn Island, Petit Bois Island near the west end, and Cat Island (GEMS n.d.). The black skimmer is a state-listed vulnerable species in Mississippi and nesting colonies are located on East and West Ship islands, Horn Island, and Cat Island.

PLANT SPECIES

Florida District. The white-top pitcher plant is a state-listed endangered species in Florida, and a state-listed imperiled to rare species in Mississippi. It is a carnivorous plant that is found in wetland areas such as bogs, savannas, hydric pine flatwoods, and lake edges (University of Florida 2002; Nature Serve Explorer 2002). The rare white-top pitcher plant is unique to the Gulf Coast of Mexico and found only between the Apalachicola and Mississippi rivers and occurs in the Florida District within the Perdido Bay area (FDEP 2002b).

Cruise's golden aster is a state-listed endangered species in Florida, but is sometimes locally abundant in dune communities with nutrient-poor, well-drained sandy soil. It faces threats due to development and consequent habitat loss (Nature Serve Explorer 2002). It is found throughout the Florida District, though not in large numbers. Within the national seashore, the plants are threatened by foot traffic (Hoggard 2003a). Habitat ranges from coastal grasslands, dunelets, dune ridges, tall dunes with rosemary, and scrub (Hoggard 2003a).

Godfrey's golden aster is a state-listed endangered species in Florida. It is found in mobile dunes on the coast, openings in scrub, and roadsides on the Gulf Coast Islands of the west Florida panhandle (Nature Serve Explorer 2002). It occurs throughout the Florida District of the national seashore in similar numbers to the Cruise's golden aster, and faces similar threats (Hoggard 2003a).

Gulf Coast lupine is a state-listed threatened species in Florida, though it can be locally abundant. The main threat to species survival stems from development and consequent loss of habitat (Nature Serve Explorer 2002). Lupine found within the national seashore was determined not to be Gulf Coast lupine, though it does occur in pockets nearby in Escambia and Santa Rosa counties (Hoggard 2003a).

Curtiss' sandgrass is a state-listed threatened species in Florida. Habitat includes sand pine scrub and longleaf pine sandhills. The main threat to species survival stems from development and consequent loss of habitat. It is found within the national seashore in the Naval Live Oaks area (Hoggard 2003a).

Large-leaved jointweed is a state-listed threatened species in Florida. It is found in the sands of the Florida Panhandle on sand pine-oak scrub ridges (Center for Plant Conservation n.d.). The main threat to species survival stems from development and consequent loss of habitat. Within the national seashore, it is found mostly on the mainland in coastal bluffs and sand pine scrub environments, including portions of Naval Live Oaks.

Mississippi District. There are no federal special status plant species found within the Mississippi District of the national seashore. The white-top pitcher plant is a state listed imperiled to rare species in Mississippi.

Visitor Use and Experience

Gulf Islands National Seashore is located in the northeastern portion of the Gulf of Mexico and includes a widely spaced chain of barrier islands extending nearly 160 miles from the eastern end of Santa Rosa Island, Florida west to Cat Island, Mississippi. The nearest sizeable cities from park headquarters in Gulf Breeze, Florida are Pensacola, Florida (7 miles; population 60,160), Tallahassee, Florida (200 miles; population 157,000), and Montgomery, Alabama (179 miles; population 200,000). The nearest sizeable cities from the Ocean Springs, Mississippi visitor center are Pascagoula, Mississippi (20 miles; population 26,000), Mobile, Alabama (60 miles; population 250,000), and Gulfport, Mississippi (25 miles; population 71,000). The nearest large metropolitan areas are New Orleans, Louisiana (93 miles; population 1.3 million), Atlanta, Georgia (400 miles; population 4.1 million) and Houston, Texas (415 miles; population 1.9 million).

Annual Visitor Use

An average 4.9 million people visit Gulf Islands National Seashore each year. The national seashore is the most heavily visited seashore in the National Park System, and is one of the 10 most heavily visited areas in the National Park System (NPS 1997b). The national seashore is the nearest salt water beach to most of the nation's midsection, so recreational beach use is the primary recreation experience of most visitors. Cultural and historical features are also major visitor attractions. The largest portion of the visitation originates from within a 500-mile radius, and includes visitors from the states of Georgia, Alabama, Florida, Mississippi, Tennessee, Louisiana, Texas, and Arkansas. General observations from park staff indicate most day-use visitors are Gulf Coast residents (NPS 1978).

Visitor Distribution

Visitor data for 1985 to 2002 indicate that recreation visitation to the barrier islands can vary greatly from month to month and year to year (table 15). Hurricanes can close bridges and destroy piers, beaches and visitor facilities, impacting visitation patterns. Annual visitor numbers averaged 4.5 million over the last 10 years. Monthly visitor use has been documented from 1979 through 2002, and while the national seashore is open year-round, the highest visitor use occurs during the months of May through August (nearly 50% of annual recreation visits). June and July generally receive the highest levels of visitation, averaging 591,000 monthly between 1997 and 2002 (approximately 27% of annual visits). December and January generally have the lowest visitation with an average of 217,000 visits per month during the same years (NPS 2002f).

TABLE 15: AVERAGE ANNUAL RECREATION VISITATION AT GULF ISLANDS NATIONAL SEASHORE, 1985–2002

Year	Number of Visitors	Percentage Change from Previous Year
1985	9,880,814	—
1986	7,646,201	-23
1987	4,826,892	-37
1988	5,197,899	8
1989	4,458,368	-14
1990	4,873,730	9
1991	4,987,978	2
1992	5,427,729	9
1993	5,456,294	0.5
1994	5,069,495	-7
1995	4,520356	-11
1996	2,581,037	-43
1997	4,697,014	82
1998	4,293,301	-9
1999	4,597,270	7
2000	4,590,595	0
2001	4,549,900	-0.1
2002	4,561,862	0

Source: NPS 2002f.

Based on staff observations, the typical annual peak use days are holiday weekends, particularly Memorial Day weekend. Use patterns tend to reflect the summer vacation season and are also affected by weather patterns. The diverse attractions of the separate units tend to smooth out the seasonality; for example, in winter, auto camping at Davis Bayou and Fort Pickens remains attractive, whereas beach use on the Mississippi islands declines. Use at West Ship Island is very low in the winter months when the tour boat is not operating, but smaller winter declines in visitation are seen in Florida where roads lead to all units.

The Florida District receives approximately 75% of the recreation visitors though visitation fluctuates from year to year. In 2002, the Mississippi District received over 791,000 recreation visits, about 17% of the park total. In 1996, Mississippi received 47% of the total park visits. On average, however, the Mississippi District has accounted for approximately 25% of total visits over the last ten years.

VISITOR USE PROFILE

In 1993, a visitor use study was conducted at the national seashore by the University of Southern Mississippi, and in 1993, results were analyzed by the Hospitality and Tourism Department of Virginia Polytechnic Institute and State University. About 64% of visitors to both districts traveled less than 500 miles and 38% traveled less than 100 miles, indicating that more than one-third of the respondents are local rather than distant travelers. Nearly 70% of the respondents stayed overnight in the Florida District and 34% indicated that the seashore was their major destination. In the Mississippi District, 63% stayed overnight and 42% indicated that the seashore was their major destination (Jurowski and Uysal 1993a, 1993b).

ISLAND VISITATION

Florida District. The units of the national seashore in Florida provide unique lengths of sandy beaches. However, a long history of accessibility to adjacent private lands by automobile has resulted in substantial commercial and private land development in close proximity to the park boundaries. In contrast, there are still more than 40 miles of undeveloped stretches of Santa Rosa Island shoreline (facing the Gulf of Mexico and sound-side waters) that offer solitude and extremely attractive, gently sloping beaches. The Florida units are accessible by car and therefore are accessible to large numbers of visitors year-round.

Mississippi District. The Mississippi islands within the national seashore provide over 60 miles of sandy shoreline – on both the Gulf of Mexico and Mississippi Sound sides. These offshore barrier islands constitute virtually all of the naturally maintained sandy shoreline on the Mississippi Coast. In addition to beach recreation potential, these barrier islands offer unique natural history interpretive opportunities. A tour boat takes visitors to West Ship Island from Gulfport, Mississippi during the months of March through October. Island visitation statistics are shown in table 16.

Since the Mississippi islands are not linked to the mainland by road, they still provide a primitive undeveloped character that is almost unprecedented in public parkland located so close to intensely developed and populated areas. Horn and Petit Bois received National Wilderness designation in 1978, protecting two of the last undisturbed barrier islands along the Atlantic Ocean and Gulf of Mexico.

VISITOR ACTIVITIES

Nature, history, and recreational opportunities abound at the national seashore. Congress established Gulf Islands National Seashore in 1971 with the purposes of providing recreation for visitors and to protect the wildlife, barrier islands, fertile coastal salt marshes, dense maritime forests, historic structures, and archaeological sites along the shores of the Gulf of Mexico. Also protected in the seashore are prehistoric shell mounds and fortifications dating from the 1820s up to the 1940s. While more than 80% of the park consists of submerged lands, the barrier islands, sparkling blue waters, and snow-white sand beaches are the main attraction for most visitors. Common activities at the seashore include picnicking, beachcombing, hiking, automobile camping, backcountry use and primitive camping, bird watching, and sport fishing (NPS 1978). Water-related activities include the use of powerboats, canoes, sailboats, sailboards, fishing boats, and kayaks. Because PWC use may affect these and other visitor activities, they are discussed below.

TABLE 16: VISITOR NUMBERS MISSISSIPPI ISLANDS - 2001 AND 2002

Mississippi Islands	2001 Recreational Visitors	2002 Recreational Visitors
Ship Islands via Tour Boat	58,589	62,720
Ship Islands via Recreational Boat	51,436	25,454
Horn Island via Recreational Boat	37,276	30,668
Petit Bois via Recreational Boat	19,483	15,140
Total	166,784	133,982

Source: NPS 2002f.

Swimming

The most outstanding recreational resources at the national seashore are the wide, gently sloping beaches of unusually fine white sand and clear blue-green water coupled with a mild climate. Swimming and sunbathing are the most common visitor activities, and swimming is allowed at all beaches. Surfing occurs at Gulf Islands National Seashore, but not in large numbers due to the shallow beach gradient and gentle nature of the waves. The Superintendent's Compendium prohibits swimming in waters within 200 feet of the West Ship Island Pier, all waters within the Davis Bayou area, and waters within 200 feet of the Fort Pickens Pier.

Florida District. Almost all of the Fort Pickens and Santa Rosa Island areas in Florida are traversed by public roads, and swimmers have easy access to all beaches. Opal Beach at Santa Rosa, Langdon Beach at Fort Pickens, and Johnson Beach at Perdido Key provide lifeguarded swim beaches and the Okaloosa area facility provides concentrated swimming opportunities. Beach use occurs at the Naval Live Oaks area, but at relatively low levels on both shorelines.

Mississippi District. West Ship Island serves almost the entire demand in the Mississippi District for high-density beach use and swimming, as it is the only island served by tour boat. West Ship Island has a 1,500-foot boardwalk that extends from the boat dock on the north side of the island to the south side of the island where there is a designated swim beach, bathhouse, indoor and outdoor showers, concessioner snack bar, and pavilion (NPS 2002d). Private boaters can access West Ship, East Ship, Spoil (also known as Sand), Petit Bois, and Cat islands for swimming.

Diving

Scuba diving and snorkeling are common in park waters. Several shipwreck sites near Fort Pickens and sea grass beds in the area north of Santa Rosa Island are popular diving spots. However, divers constitute a very small population of visitors at the national seashore (Snyder 2003).

Camping

Automobile camping is available year-round in Florida near Fort Pickens (a 200-site campground) and in Mississippi at Davis Bayou (a 51-site campground). Florida received an average of 134,700 overnight stays in 2001 and 2002, and Mississippi received an average of 36,500 overnight stays. A youth group camping area is located in the Naval Live Oaks unit in Florida close to the shoreline. There is also a group camping area in the Fort Pickens area, but it is farther from the shoreline.

Florida District. In Florida, primitive camping is allowed on the east end of Perdido Key beginning 0.5 mile east of the end of Johnson Beach Road. Most campers arrive by small boat on the north side of the island. The eastern end of the island can be reached by hiking three hours from the end of the road (NPS 2001a).

Mississippi District. The Mississippi islands of East Ship, Horn, Spoil, and Petit Bois experience year-round overnight camping visitation. These islands averaged 6,700 wilderness, backcountry, and boat campers during 2001 and 2002. No camping is allowed on West Ship Island; boaters may anchor offshore, but they must be off the island and pier by sunset. There are no designated campsites on the Mississippi islands. Most camping occurs on the east and west tips of the islands where there is easy boat access onto the shore, breezes to keep the insects away, and good access to the south shoreline. On summer weekends, nearly all beaches on the islands are used by visitors. The most heavily used areas for

camping on East Ship Island are at the west tip and along the protected north shore. On Petit Bois, the west end of the island away from the channel experiences heavy camping activity. Ocean Springs is due north from the west end of Horn Island, and thus Horn Island experiences heavy use. Camping is popular on the entire eastern end along most of the north shore, and on the western end of Horn Island.

Fishing

Gulf Islands National Seashore is a popular fishing area; two-thirds of the park is underwater and there are miles of beaches that have easy access for surf fishing. There is substantial fly and surf fishing along the shorelines at the national seashore. Fly fishing generally occurs on the sound side and surf fishing on the Gulf side. A break and sand bar is common off the south shore of Santa Rosa Island; this shallow area is commonly used by surf fishermen, and is also frequented by personal watercraft users. Areas off both ends of West Ship Island and the West Ship Island Pier are also popular fishing spots, as is the east end of East Ship Island. Fort Pickens in Florida has a fishing pier that reaches out into the bay and sees daily high use. In Mississippi, a fishing pier overlooks the Davis Bayou channel that leads to the Mississippi Sound. Spear fishing is also allowed in the park.

Hiking/Backpacking/Wilderness Experience

There is extensive hiking and walking throughout both districts of Gulf Islands National Seashore. Beach walking is a popular activity at the national seashore. On Horn Island, the Cross Island Trail serves as an access corridor across the island.

In 1978, Congress designated Horn and Petit Bois islands as wilderness areas, protecting two of the last undisturbed barrier islands along the Atlantic Ocean and Gulf of Mexico. The *Wilderness Act* provides that designated wilderness areas must have primeval character without permanent habitation or improvements, be primarily influenced by the forces of nature, have outstanding opportunities for unconfined types of recreation, and contain features of scenic, ecological, scientific, educational, or historical value. People visit the wilderness islands to have a more primitive experience than what is offered in other recreational areas, and at areas of the national seashore that see heavier use, such as Santa Rosa and Perdido Key area. The natural sounds of the barrier island environment are a prime component of the national seashore experience; especially in remote areas of the park. A carnival beach atmosphere including restaurants, casinos and organized beach activities can be experienced along the nearby Gulf Coast, but opportunities for wilderness experiences exist only at Horn and Petit Bois islands.

Horn and Petit Bois islands are accessible by boat (landing below the high water line) for day and overnight use. In 2001, Horn Island averaged 1,389 boats per month in June and July, and Petit Bois Island averaged 680. In 2002, Horn averaged 1,504 boats per June and July and Petit Bois averaged 775.

Shoreline Use

Most park use occurs along the shorelines of the islands (NPS 2001a). The land/water interface offers outstanding opportunities for exploring the unique natural, cultural, and recreational resources of the park. All shorelines are open to use, including for boat landing, except during seasonal closures for wildlife protection and dune restoration. The *Superintendent's Compendium* (NPS 2003a) notes areas of closure to over-sand foot traffic for protection of relict dunes and shorebird and sea turtle habitat. In Florida roads lead to all areas of the park and in Mississippi all islands are accessible by boat. Shorelines use includes swimming, fishing, picnicking, boating, walking, beachcombing, and wildlife viewing and bird watching. On an average summer weekend, nearly all sandy shoreline on the islands is being used by visitors.

Concessions

There are no concessions that rent personal watercraft in the park. Several businesses rent personal watercraft outside of the park boundary, including near the boat ramp in Santa Rosa, near Navarre Bridge, and near the south end of the area north of Santa Rosa Island toll bridge. Most local PWC rental operations do not allow their machines to leave prescribed areas, and their PWC usually do not operate in park waters (NPS 2001a).

General Watercraft Use (Motorboats, Canoes and Kayaks)

Motorcraft and other watercraft have been used in Gulf Islands National Seashore since it was established in 1971. Although boating is not mentioned in the park's enabling legislation, it is recognized as a mode of access for park visitors. The islands have been visited by private boaters and fishermen for many decades. In the Florida District of the park there is a boat launch at the Okaloosa area and a boat launch for small vessels at the Perdido Key area, and Davis Bayou has the only boat launch in the Mississippi District. Boats are permitted to land on all park shores except those closed by the *Superintendent's Compendium* (NPS 2003a).

Boating numbers do not exist for the Florida District of the park. Peak numbers of motorized boats to the Mississippi islands occur in June and July. In June and July 2001, an average of 5,660 boats per month visited the islands and in 2002, 3,713 boats were recorded at the islands. The slowest day could have zero boats in park waters due to inclement weather. Total boating numbers for Mississippi in 2001 and 2002 are shown in table 17.

Boating use occurs in all park waters, although the north sides of the islands experience more use than the south sides. The most concentrated use in Mississippi is near the east and west tips of the islands, around the West Ship Island Pier, and along the entire north shore of Spoil Island. In Florida, Perdido Key has the most concentrated boating use, and recreational fishing boats are common along the Gulf shore of Santa Rosa Island. Many boats cross through park waters in Florida to access Pensacola Bay and the area north of Santa Rosa Island.

Nonmotorized boat activity includes canoes, sea kayaks, sailboats, and sailboards. Escambia County is proposing a canoe trail that transits park waters in the Florida district of the Seashore. This trail would be located within 200 feet of the shoreline (Snyder 2003). This calm water area was heavily used by personal watercraft and is currently used by other boats, especially on weekends. In the summer, sailboats often sail out to the islands, anchor off the north sides, and stay for the weekend. Although the park has no specific data about the number of canoeists and kayakers at Gulf Islands, park staff believe fewer canoeists and kayakers visit the seashore than PWC users. No documented complaints have been received from canoeists and kayakers regarding PWC interactions (Snyder 2003).

TABLE 17: TOTAL BOATING NUMBERS FOR MISSISSIPPI IN 2001 AND 2002

Mississippi Islands	2001 Recreational Boats	2002 Recreational Boats
East and West Ship Islands	11,690	5,785
Horn Island	8,471	6,970
Petit Bois Island	4,428	3,441
Total	24,589	16,196

Source: NPS 2002f.

PWC Use and Distribution

Personal watercraft use emerged at Gulf Islands National Seashore in the 1980s. Although PWC use was a small percentage of total boat use within the national seashore, park staff believes that use had increased over the five years prior to the closure. If reinstated, PWC use at the national seashore is not expected to decrease. In fact, an increase in usage would be expected as more residents purchase personal watercraft and tourism continues to grow.

Prior to the closure to personal watercraft in April 2002, no specific controls for personal watercraft had been implemented at Gulf Islands National Seashore. Personal watercraft were recognized as a Class A motorboat and were treated as any other such vessel. All regulations that apply to any registered vessel operating in waters of Florida and Mississippi that are regulated by the NPS applied to personal watercraft (NPS 2001a).

Personal watercraft were permitted throughout the national seashore, except as follows: no motorized vessels are permitted above the mean high tide line on the designated wilderness islands of Horn and Petit Bois; the lakes, ponds, lagoons and inlets of East Ship Island, West Ship Island, Horn Island, Petit Bois Island, and Cat Island (lands under NPS management) are closed to the use of motorized vessels; the lagoons of Perdido Key within Big Lagoon are closed to all combustion engines; and the areas 200 feet from the remnants of the old fishing pier and 200 feet from the new fishing pier at Fort Pickens are closed to all boating operations. There are also seasonal closures to watercraft to protect nesting shorebirds and other sensitive wildlife and relict dunes.

Perdido Key in Florida and East Ship and West Ship islands in Mississippi have the most concentrated boating use within the national seashore. Many area residents in both states have boat docks and own boats or personal watercraft, and visit the national seashore.

Florida District. In Florida, the park is situated between the Gulf of Mexico and the Pensacola Bay system. Although the Gulf offers almost unlimited area for personal watercraft use, most operation occurs within the bay. In 2000, personal watercraft comprised 12.5% of all registered vessels statewide. In the Florida District of the park, it is estimated that personal watercraft comprised 0.5% of recreational boating (NPS 2001a). Personal watercraft traversed along the north shoreline of Santa Rosa Island while very few traversed the south, or Gulf, shoreline. In general, PWC usage within the Florida District of the park was concentrated in the Perdido Key area. During the summer months, most areas of PWC use consisted of 6 or 7 personal watercraft per month, while on a peak-use day PWC activity in the Perdido Key area might have comprised 25 personal watercraft. The reason for the higher use in the Perdido Key area is the sheltered nature of the area and the proximity to residences with launching facilities.

Mississippi District. The Mississippi portion of the park separates the Gulf of Mexico from the Mississippi Sound. Personal watercraft account for 6% of the registered boats in Mississippi, and it is estimated that they comprised approximately 4% of recreational boating in the Mississippi District of the park (NPS 2001a). The islands are situated between 6 to 14 miles from the mainland, weather conditions can change quickly, and large ships use the intracoastal waterway shipping channels. These factors combined to limit PWC use in the Mississippi District as transportation to the islands, and use of Gulf-side waters was almost nonexistent except immediately adjacent to the islands. Observations of PWC use indicate that they were mainly used for recreational riding and not for transportation (NPS 2001a). Most personal watercraft used in the Mississippi District of the park were towed by larger boats from the Pascagoula/ Biloxi/Gulfport, Mississippi, area. The primary use season reflects overall visitation patterns, with use decreasing during the winter months.

PWC use areas are similar to general motorboat use areas. Personal watercraft were concentrated mostly on the east and west tips of the islands, around the West Ship Island Pier, and the entire north side of Spoil Island.

VISITOR SATISFACTION

A visitor survey conducted in 2002 revealed that 85.7% of the respondents felt that the overall quality of the park was very good or good (NPS 2002e). A study by Virginia Polytechnic Institute in 1993 showed that overall visitor satisfaction levels were relatively high and stable at all park sites, indicating that respondents were generally pleased with their experience at the national seashore (Jurowski 1993a, 1993b).

As a result of public scoping meetings held at the park in January 2003, the park received 341 correspondences in the form of e-mails, comment forms, and letters regarding PWC use in the park. A total of 206 commenters supported the ban on personal watercraft within park waters and 87 opposed the ban. The main issues of concern for those that supported the ban were PWC effects on soundscapes, PWC effects on visitor safety and experience, PWC effects on wildlife, and pollution from personal watercraft. Generally, commenters that opposed the ban indicated that having some access to the islands on a personal watercraft was important, but they understood that some restrictions might be necessary in order to protect resources.

VISITOR CONFLICTS AND SAFETY

VISITOR CONFLICTS

Many of the activities undertaken by visitors to the Gulf Islands National Seashore are compatible. For example, swimming, sea kayaking, fishing, and picnicking are possible along the shoreline and produce little or no conflict between visitors. However, boating near swimmers, anglers and non-motorized vessels can pose a safety conflict for both parties, and, as discussed in the "Soundscapes" section, noise generated by personal watercraft can also affect visitor experiences.

Complaints regarding the behavior of PWC operators and the noise pitch changes associated with PWC use are common from land-based visitors. Beachcombers, birdwatchers, anglers, campers, and those seeking the solitude and natural beauty of the park have voiced complaints. A common observation was the apparent reckless conduct of PWC operators. Swimmers, anglers, and other boaters have expressed safety concerns (NPS 2001a). Complaints about the noise and odor generated by personal watercraft have also been received from the public.

PWC use is common in the shallow, protected break and sand bar areas that the surf fishermen use. Personal watercraft also tend to congregate around piers where other visitors gather. These tendencies create potential conflict with other boaters, fishermen, and people swimming off boats. Power boaters have complained about personal watercraft jumping their wakes, and generally not knowing standard boating regulations, such as rights-of-way. Park rangers have also received complaints about the smell of PWC exhaust.

VISITOR SAFETY

Florida District. In Florida in 2000, personal watercraft comprised 12.5% of all registered vessels statewide and accounted for 32% of all boating accidents (NPS 2001a). In the Florida District of the park, it is estimated that personal watercraft comprised 0.5% of recreational boating. In the Florida District in 2000, 44 boating violation citations were issued, 36% of which were to personal watercraft. Park staff regularly observed personal watercraft being operated carelessly and recklessly in congested boating and swimming areas and among anchored boats. Many of these violations went unreported since they are observed from the beach and enforcement is not possible. Currently, the law enforcement staff is 40% below normal staffing levels and water enforcement has been reduced (NPS 2001a).

In Florida counties that include Gulf Islands National Seashore waters, PWC accidents were as follows: In 1999 there were 52 PWC-related accidents and in 2000 there were 35 PWC related accidents. This is the only record of accidents, and is available for the Florida District only. Numbers refer to the counties in general, including within Gulf Islands National Seashore.

Florida boating violation statistics for the 2002 period were eight contacts, no violations, no written warnings, and six verbal warnings. A "contact" includes any type of formal or informal contact with a vessel – including safety checks, checking fish coolers, or simply providing park information to visitors. "Violations" are written warnings or citations, and "accidents" involve damage to property or persons.

Mississippi District. An analysis of park boating violations in Mississippi from 1997 to September 2001 reveals that 58% of the violations involved a personal watercraft. Most PWC violations involved prohibited operations (i.e., reckless operation, wake jumping, operating under the influence, and flat-wake speed zone violations). From January through September 2002 in the Mississippi District of the park, there were 170 boating violations, of which 70 were personal watercraft. Similar percentages resulted over the previous six years (NPS 2001a).

Boating violations in Mississippi District of the national seashore for 1997–2002 are as follows:

2002 – 70 PWC violations out of 170 total boating violations (41%)
2001 – 84 PWC violations out of 177 total boating violations (47%)
2000 – 97 PWC violations out of 175 total boating violations (55%)
1999 – 137 PWC violations out of 287 total boating violations (48%)
1998 – 166 PWC violations out of 246 total boating violations (67%)
1997 – 165 PWC violations out of 242 total boating violations (68%)

As a result of the PWC Administrative Determination in October 2001, PWC use in Gulf Islands National Seashore waters was banned in April 2002 (NPS 2001a). In 2002, 70 contacts with personal watercraft were made in Mississippi, resulting in 2 violations, 10 written warnings, and 49 verbal warnings.

RELATED FEDERAL AND STATE PWC REGULATIONS

Both Florida and Mississippi have PWC specific regulations, but the regulations vary between states. Both states have some boater education requirements, minimum operator-age requirements, hours of operation restrictions, and wildlife protection regulations. Escambia County, Florida and Mississippi State have specific idle speed zones, but Florida does not have statewide flat-wake regulations.

CULTURAL RESOURCES

BACKGROUND

Gulf Islands National Seashore has witnessed over 2,500 years of human habitation. The variety of middens within the park and the known history of the Gulf Coast sites indicate an established Native American Indian culture until first contact, 1590. By first settlement, 1599, local Native American Indian populations were reduced to the point of near extirpation through epidemic diseases introduced by Europeans and attacks by aggressive tribes located in the Mobile Bay area. Early Spanish mission establishment in the early 1600s was followed by invasion of the British and Creek Indian forces in the 1700s. The Creeks, later known as the Seminoles, occupied areas previously inhabited by the Spanish and various Native American Indian tribes.

In the historic period, different countries continued to leave their mark in this section of the Gulf Coast. The first development on the East Ship and West Ship islands dates from the late 1600s French Louisiana period when Biloxi was the regional capital. When the Spanish ceded the lands that would become the state of Florida in 1819, the United States gained one of the best deep-water harbors on the Gulf Coast. Andrew Jackson served as the first governor for the new Florida Territory in 1821 (FDHR n.d.). In the 1830s, the United States began building a critical system of military defensive works. The fortification system, including Fort Pickens, Fort McRee, Fort Barrancas, and the Advanced Redoubt, was designed to protect the Pensacola Navy Yard. National Seashore waters contain many ship wrecks, some dating from the Spanish exploration period (NPS 1978).

ARCHAEOLOGICAL RESOURCES

Gulf Islands National Seashore has about 170 known archaeological sites, spanning a period of almost 2,500 years. Elements include shell middens, cemeteries, shipwrecks, and military fortifications. While the majority of archaeological sites are in the Florida District, prehistoric and historic sites can be found in Mississippi as well.

Erosion from both natural and human causes has been identified as a threat to some of these sites. Vandalism has occurred in the Florida and Mississippi districts, both by digging and by carrying off of surface artifacts uncovered by erosion and storm action. For example, in 2002, visitors to one of the Mississippi islands discovered a historic coffin after it became exposed at the water's edge of the Quarantine Station Cemetery site.

The French warehouse site on East Ship Island is on the National Register of Historic Places. Other archaeological sites are contributing elements in park historic districts that are on or potentially eligible for the National Register. The Santa Rosa Pensacola site in the Fort Pickens Area of the park is currently being surveyed and partially excavated to gather documentation preparatory to its nomination as a National Historic Landmark.

SUBMERGED CULTURAL RESOURCES

Although much of the underwater acreage of the park has not been surveyed, especially in the Mississippi District, resources exist park-wide. Surveys in the Florida District have located a number of shipwrecks. Depending on water conditions, parts of these shipwrecks may be visible to divers, snorkelers, or beachcombers. Others are completely below the sediments. The University of West Florida

Archaeological Institute summer field school is currently completing a partial excavation of the Santa Rosa Island Shipwreck inside park waters on the bay side of the Fort Pickens Area.

SOCIOECONOMIC ENVIRONMENT

Gulf Islands National Seashore is a group of barrier islands in the Gulf of Mexico, located off the coasts of Florida and Mississippi, many of which are accessible only by watercraft. The seashore has four visitor centers: the park headquarters at Naval Live Oaks in Gulf Breeze, Florida; the Fort Pickens Visitor Center on Santa Rosa Island, Florida; the Fort Barrancas Visitor Center at the Naval Air Station in Pensacola, Florida; and the William M. Colmer Visitor Center at Davis Bayou in Ocean Springs, Mississippi. The population centers in the region are concentrated along the coast. Inland lands in the region are more rural, with much of the area made up of marsh and open water. Cities and towns located in the area include Destin, Fort Walton Beach, Gulf Breeze, Pensacola, and Pensacola Beach, Florida; Gulf Shores, Alabama; and Pascagoula, Ocean Springs, Biloxi, and Gulfport, Mississippi.

Five counties are located adjacent to the national seashore: Escambia, Santa Rosa, and Okaloosa Counties, Florida; and Jackson and Harrison Counties, Mississippi. The economies of the nearby areas are very diverse, although tourism is a major activity. For all counties except Jackson County, Mississippi, and Okaloosa County, Florida, retail trade is the largest sector of the economy, followed by manufacturing and wholesale trade. Retail trade is also the largest sector of the economy in Okaloosa County, but wholesale trade is the second largest sector of the economy in this county and manufacturing is the third largest. In Jackson County, manufacturing is the largest sector, followed by retail trade and wholesale trade (Census Bureau, 2002). Tourism is an extremely important part of the local economy. However, PWC use in GUIS makes only a small contribution to tourism-related revenues in the regional economy. NPS estimates that PWC users make up approximately 0.1% of total visitation.

Four PWC rental shops and 13 PWC sales/service shops are located in communities near GUIS. Two of these rental shops, both in Pensacola Beach, Florida, indicated that none of their customers use GUIS, and that they had not been affected by the PWC ban at the national seashore. One of other firms, located in Pensacola Beach, indicated it has experienced only minor impacts as a result of the PWC ban. This firm no longer offers long-term rentals (rentals more than 1 hour) to reduce the possibility that customers would enter areas of the park that have been closed. The other firm was not able to be contacted, but was assumed to have experienced similar minor impacts. No firms renting PWC near the Mississippi District were identified.

Four firms selling personal watercraft were identified in Fort Walton Beach, Florida; four in Pensacola, Florida; one in Gulf Shores, Alabama; one in Orange Beach, Alabama; one in Pascagoula, Mississippi; and two in Gulfport, Mississippi. Based on comments received from these businesses, prior to the ban, the national seashore was a popular destination for PWC use, but most PWC users visited other destinations in the area as well. Personal watercraft are sold year-round with the majority of the sales in the late spring/early summer. Interview data suggest that the PWC dealerships near the national seashore have other sources of revenue besides PWC sales. Some of the PWC dealerships sold items such as motorcycles, boats (other than PWC), motor scooters, all-terrain vehicles (ATVs), trailers, generators, and outboard motors. Each PWC dealership contacted implied that their business has been severely affected by the park's decision to ban PWC from GUIS in April 2002.

In addition to businesses offering PWC sales and service or rental services, the ban on PWC use has presumably affected lodging establishments, restaurants, gas stations, and retail stores in the area. However, because PWC users constitute an extremely small fraction of visitors to the local area and many

of them are assumed to continue visiting the area for alternative activities, it is very unlikely that the ban has caused substantial impacts on the region's tourist industry.

NATIONAL SEASHORE MANAGEMENT AND OPERATIONS

Enforcement rangers at Gulf Islands National Seashore enforce state boating regulations within seashore waters to ensure visitor safety. They also enforce the current prohibition of PWC use. Currently, Gulf Islands National Seashore has eight permanent ranger personnel to patrol park jurisdictional waters, with two personnel and one boat for the Florida District and six personnel and five boats for the Mississippi District. Enforcement patrols in the Florida District occur once a week, if possible, usually on Sunday. During the summer, there may be a boat out all weekend if staffing permits, traveling from Opal Beach in the east to Perdido Key in the west. The Mississippi District also patrols regularly on weekends. Enforcement patrols are generally infrequent due to the limited number of trained park staff and the size of the national seashore. In addition, the distance between districts and offshore barrier islands makes it difficult to effectively patrol these areas.

The National Park Service, U.S. Coast Guard, Florida Fish and Wildlife, and Escambia County Sheriff's Office Marine Unit conduct law enforcement and rescue operations in national seashore waters with overlapping jurisdiction. Due to the presence of the intracoastal waterway, Pensacola Bay, and two major shipping channels that cross the barrier islands between West Ship and Cat islands and between Horn and Petit Bois islands, law enforcement and rescue operations can be more frequent, especially during severe weather events.

ENVIRONMENTAL CONSEQUENCES

SUMMARY OF LAWS AND POLICIES

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

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 *Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS 2001b), and its accompanying handbook.

2. The National Parks *Omnibus Management Act of 1998* (NPOMA) (16 USC 5901 et seq.) underscores NEPA in that both are fundamental to NPS park management decisions. Both acts provide direction for articulating and connecting the ultimate resource management decision 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 handbook for *Director's Order #12* (NPS 2001b) 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 *Director's Order #12* (NPS 2001b) 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 National Park Service will follow the provisions of the regulations of CEQ (40 CFR 1502.22)." In summary, the National 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 effects of personal watercraft on the environment, as well as public safety concerns, site-specific impacts under all conditions and scenarios are difficult to measure and affirm with absolute confidence. Since personal watercraft were introduced in parks, data collected and interpreted about them and 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* (NPS 2001b, Section 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. With interpretation, one can ascertain whether a certain impact intensity to a park resource is "minor" compared to "major" and what criteria were used to base that conclusion.

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, of the various management alternatives.

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 prohibition of PWC use in the national seashore (no-action alternative). In the absence of quantitative data, best professional judgment is used to determine impacts. 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.

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) are integrated into the impact analysis. In order to further define resource protection goals relative to PWC management, the park's *Strategic Plan* (NPS 1997b) is used to ascertain the "desired future condition" of resources over the long term. The impact analysis then considers whether each management alternative contributes substantially to the park's achievement of its resource goals, or would be an obstacle. The planning team then considers potential ways to mitigate effects of personal watercraft on park resources, and the alternatives are modified accordingly.

For the purposes of analysis, the following assumptions are used for all impact topics:

Short-term impacts: Those impacts occurring from PWC use in the immediate future (per trip 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 direct PWC use or influence of PWC use.

Indirect impacts: Those impacts occurring from PWC use that indirectly alter a resource or condition.

Impact analysis area: Specific analyses apply only to NPS-managed portions of the waters around Gulf Islands National Seashore. Each resource impact is assessed in direct relationship to those resources affected inside 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 is further defined in the impact methodology.

CUMULATIVE IMPACTS

The CEQ regulations to implement the NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. A cumulative impact is 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 the national seashore and, if applicable, the surrounding region, as discussed in the "Purpose of and Need for Action" chapter.

IMPAIRMENT ANALYSIS

The NPS *Management Policies 2001* (NPS 2000d) 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 impairment, but an impact would be more likely to constitute an impairment to the extent that it has a major or severe adverse effect upon 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 authorizing legislation, the *1978 General Management Plan* (NPS 1978), the *Strategic Plan* (NPS 1997b), and other relevant background 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 by NPS *Management Policies 2001* (NPS 2000d).

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

PWC AND BOATING USE TRENDS

Boating and PWC use estimates are based on available visitor data for each district. The Mississippi District had the most complete data, including yearly visitation totals and the number of boats per month that visit the Mississippi District islands. The monthly boat-related day visits were totaled for 2001 and 2002 and the totals were compared to yearly visitation figures in order to derive a percentage of annual total park visits attributed to boats. Based on the Mississippi visitation figures, boating accounted for 14% of yearly park visits in 2001 and 9% in 2002. It was assumed that this percentage is the same for both Mississippi and Florida district visitation patterns.

Personal watercraft account for approximately 6% of registered boats in Mississippi (NPS 2001a). In Florida in 2000, personal watercraft comprised 12.5% of all registered vessels statewide (NMMA 2002 and FFWCC 2000b). According to park staff, personal watercraft comprise approximately 4% of recreational boating vessels in the Mississippi District of the park. In the Florida District, it is estimated that personal watercraft comprise 0.5% of recreational boating in that district. These assumptions were used to estimate Florida District boating and PWC related visitor activity from the available Florida annual visitation totals. This information is presented along with the Mississippi District boating and PWC use information in table 18.

TABLE 18: ANNUAL BOATING AND PWC USE AT GULF ISLANDS NATIONAL SEASHORE

	Florida District			Mississippi District		
Year	All boating	PWC	Non-PWC boats	All boating	PWC	Non-PWC boats
2001	122,640	613	122,027	24,590	984	23,606
2002	79,360	397	78,963	16,196	648	15,548
Average	101,000	505	100,495	20,393	816	19,577

Source: Mississippi visitor figures (NPS 2003c); Florida visitor figures estimated.

Boating activity and other recreation in Gulf Islands National Seashore can be highly variable from year to year and day to day for a variety of reasons, including weather events such as hurricanes. For example, the visitation numbers for 2002 are much lower than 2001, and to avoid skewed analysis results, the boating and PWC use numbers for 2001 and 2002 were averaged. For analysis purposes, the averages will be used as 2002 baseline use estimates figures. Also, numbers of personal watercraft in the park on peak-use days typically comprise a higher percentage of motorboats than these overall percentages would indicate. Numbers of personal watercraft in the park also sharply increase on good weather days.

SEASONAL USE TRENDS

Surveys from 2001 and 2002 in the Mississippi District were analyzed for seasonal boating activity trends. Approximately 23% of annual boating use in the Mississippi District occurs during June and July (table 19). Seasonal boating information is not available for the Florida District. Use patterns tend to reflect the summer vacation season and weather patterns. It is assumed that Florida visitation follows similar seasonal patterns. Based on staff observations, the typical annual peak-use days are holiday weekends, particularly Memorial Day weekend.

Use patterns in Florida include personal watercraft that traverse along the shoreline. High PWC activity in a typical area of the national seashore at one time would consist of 6 or 7 personal watercraft during a busy summer month. However, in areas of calm water, such as the Perdido Key area, there may be up to 25 personal watercraft per day over a busy summer weekend (such as the Memorial Day holiday).

The Mississippi District islands are within 6 to 14 miles of the mainland and weather conditions can change quickly. Large ships are common in the intracoastal waterway shipping channels, so there is minimal PWC use as primary transportation out to the islands. Most personal watercraft in the Mississippi District are towed by larger boats to park waters for use during the day. East Ship and West Ship islands have the heaviest use in the Mississippi District.

TABLE 19: PERCENTAGE OF ANNUAL BOATING ACTIVITY BY VISITORS PER MONTH, MISSISSIPPI DISTRICT, GULF ISLANDS NATIONAL SEASHORE, 2001 AND 2002

	2001		2002		
Month	Boats	Percent of Annual Boating	Boats	Percent of Annual Boating	Average
January	433	2.04%	331	1.76%	1.90%
February	405	2.00%	324	1.65%	1.82%
March	379	1.29%	209	1.54%	1.42%
April	1,648	8.88%	1,438	6.70%	7.79%
May	2,797	10.46%	1,694	11.37%	10.92%
June	5,686	22.71%	3,678	23.12%	22.92%
July	5,634	23.14%	3,748	22.91%	23.03%
August	2,174	13.15%	2,129	8.84%	10.99%
September	2,984	6.66%	1,079	12.14%	9.40%
October	1,145	6.27%	1,015	4.66%	5.46%
November	921	1.62%	263	3.75%	2.68%
December	384	1.78%	288	1.56%	1.67%
Total	24,590	100.00%	16,196	100.00%	100.00%

Source: Visitation figures (NPS 2002f).

FUTURE USE TRENDS

Park staff believe that PWC use has increased within the last five years prior to closure, although PWC use was still a small percentage of total boat use within Gulf Islands National Seashore. As the surrounding population and tourism in the area continue to increase, and more residents purchase personal watercraft, an increase in PWC usage in the national seashore area would be expected. Projected PWC and boating use trends were estimated based on population, boating registration, and park visitation trends.

Santa Rosa County is the fastest growing county in Florida with a 43.7% population increase from 1990 to 2000. Escambia County, Florida, grew by 12.2% from 1990 to 2000. In Mississippi between 1990 and 2000, Harrison County grew by 14.7% and Jackson County by 14.0%. From 2000 to 2001, Escambia County in Florida and Harrison County in Mississippi had negligible decreases in population of less than 1%. During the same time period, the population of Santa Rosa County, Florida increased by 4.6% and that of Jackson County, Mississippi increased by 1.1% (USCB 2003).

Boating registration statistics (all boating vessels) in the states of Florida and Mississippi show average annual increases for the years 1995 to 2001 of 3.3% and 4.1% respectively, and 3.7% when averaged together (NMMA 2002) (table 20). Based on population statistics and state boating registration data, the annual rate of growth in both PWC and other watercraft use was initially determined to be between 3% and 4%. However, analysis of available PWC registration statistics for Florida shows larger growth trends in PWC registrations for Escambia, Okaloosa, and Santa Rosa counties from 1997 to 2001 (FFWCC 2002b) (table 21). These counties include (or are adjacent to) the Florida District of the national seashore. The average annual increase in PWC registrations for each county from 1997 to 2001 was 5.7% for Escambia County, 5.4% for Okaloosa County, and 28.4% for Santa Rosa County. The average annual increase in PWC registrations for these three counties from 1997 to 2001 was 9.6%.

Based on this high rate of growth in PWC use in the local area, the projected increase in PWC use in the region is estimated to follow an annual increase of 9.6% through 2012. Projected non-PWC boating use at the national seashore is estimated to follow a 3.7% annual increase through 2012. See table 22 for projected annual PWC and boating use in 2002 and 2012.

TABLE 20: BOATING REGISTRATIONS, FLORIDA AND MISSISSIPPI, 1995–2001

State	1995	1996	1997	1998	1999	2000	2001	Average Annual Increase
Florida	744,123	749,323	796,662	805,581	805,079	840,684	902,964	3.3%
Mississippi	236,400	244,279	252,767	270,868	281,958	292,335	300,970	4.1%
							Both States	3.7%

Source: NMMA 2002.

TABLE 21: COUNTY PWC REGISTRATION STATISTICS, FLORIDA, 1997–2001

County	1997	1998	1999	2000	2001	Average Annual Increase
Escambia	1,187	1,344	1,395	1,744	1,480	5.7%
Okaloosa	1,970	2,216	2,295	2,557	2,429	5.4%
Santa Rosa	506	607	738	1,291	1,375	28.4%
Sum of 3 Counties	3,663	4,167	4,428	5,592	5,284	9.6%
Florida (statewide)	70,606	77,416	81,693	105,355	89,442	6.1%

Source: FFWCC 2000b.

TABLE 22: PROJECTED BOATING AND PWC ACTIVITY, GULF ISLANDS NATIONAL SEASHORE

Year	Florida District			Mississippi District			Both Districts		
	All Boating	PWC[a]	Non-PWC[b] Boats	All Boating	PWC[a]	Non-PWC[b] Boats	All Boating	PWC	Non-PWC
2002 Annual Use[c]	101,000	505	100,495	20,393	816	19,577	121,393	1,321	120,072
2012 Annual Use	145,784	1,263	144,521	30,195	2,041	28,154	175,979	3,304	172,675
2002 Peak Daily Use	5,039	39	5,000	1,768	161	1,607	6,807	200	6,607
2012 Peak Daily Use	7,288	98	7,190	2,714	403	2,311	10,002	501	9,501

a. Annual increase of 9.6% from 2002–2012.

b. Annual increase of 3.7% from 2002–2012.

c. 2002 baseline is based on average of 2001 and 2002 use due to variability of annual use.

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 also apply to two-stroke engines in personal watercraft. Two-stroke engines (and personal watercraft) 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) also are released from boat engines, including those in personal watercraft. These compounds are not found appreciably in the unburned fuel mixture, but rather are products of combustion. Discharges of all these compounds — BTEX and PAHs — have potential adverse effects on aquatic life and human health if present at high enough concentrations. A common gasoline additive, methyl tertiary butyl ether (MTBE) also is released with the unburned portion of the gasoline. In 2001, premium grade fuel (octane of 90 and higher) in Florida had MTBE concentrations ranging from 0% to 10.8% of the fuel mixture, with an average of 3.5%; no data was available for Mississippi (Dickson 2003). For this assessment, it was assumed that the concentration of MTBE in fuel used by all vessels in the Florida and Mississippi districts is 3.5%. There are no plans to ban the use of MTBE in fuels in Florida or Mississippi (DOE 2003). The PWC industry suggests that although some unburned fuel does enter the water, the fuel's gaseous state allows it to evaporate readily (Sea-Doo 2000).

A typical conventional (i.e., carbureted) two-stroke PWC engine discharges as much as 30% of the unburned fuel mixture into the exhaust (NPS 1999, CARB 1999). At common fuel consumption rates, an average two-hour ride on a personal watercraft may discharge 3 gallons (11.34 liters) of fuel into the water (NPS 1999). According to data from *Personal Watercraft Illustrated* and the Environmental Protection Agency (Bluewater Network 2001), an average 2000 model-year personal watercraft can discharge between 3.8 and 4.5 gallons of fuel during one hour at full throttle. (As described in appendix A, an estimated discharge rate of 3 gallons per hour is used in the water quality impact calculations.)

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 aquatic organisms) (EPA 2002b). These criteria have been adopted as enforceable standards by most

states. There are no EPA water quality criteria for the protection of aquatic life for the PWC-related contaminants (EPA 2002b). For the human health criteria, however, the EPA has established criteria for benzene and several PAH compounds. There are no criteria for xylene. Although there is no federal drinking water standard for MTBE, it is on the "Contaminant Candidate List" for consideration in setting health standards; there is no information about the long-term effects that MTBE can have (EPA 2001b). However, in 2001, an MTBE Water Quality Criteria Work Group (MTBE-WQCWG) was established, consisting of representatives from private companies, trade associations, and the EPA. This partnership generated the toxicity data necessary for deriving ambient water qualtiy criteria for MTBE, and calculated "preliminary" freshwater and marine criteria for acute and chronic exposure effects (Mancini et al. 2002).

The National Park Service's *Management Policies 2001* (NPS 2000d) states that the National Park Service will perpetuate surface water and groundwater as integral components of park aquatic and terrestrial ecosystems (NPS *Management Policies 2001,* sec. 4.6.1). Furthermore, the National 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 of 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)

Gulf Islands National Seashore does not have quantifiable water quality data documenting the effects of PWC emissions since the introduction of personal watercraft in the 1970s. To address water quality impacts potentially resulting from continued PWC use, water quality standards were used in the absence of park-specific data as a basic principle to guide the analysis.

A water quality standard defines the water quality goals of a water body 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 necessary to protect the uses. 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 in nature (NPS 2001e).

METHODOLOGY AND ASSUMPTIONS

In order to assess the magnitude of water quality impacts to Gulf Islands National Seashore's 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 Gulf Islands National Seashore 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 because the activity was authorized knowing this level of pollution would occur.

2. State water quality standards governing the waters of the Florida and Mississippi districts of Gulf Islands National Seashore were examined; where standards or water quality criteria were not available for pollutants present in PWC emissions, ecological and human health toxicity benchmarks for certain pollutants were acquired from various literature sources. The classification of Gulf Islands National Seashore waters was defined; and the overall sources of water pollutants, both internal and external to the national seashore boundary, were identified in relation to the standards and classification.

3. Baseline water quality data, especially for pollutants associated with two-stroke engines (PAHs, hydrocarbons) were examined, if available.

4. Use patterns of motorized watercraft, including numbers and hours used, were based on observations by Gulf Islands National Seashore staff. The numbers and distribution of PWC on a peak-use day in 2002 (e.g., Memorial Day or July 4th) at the Florida District were assumed to be 39 at Perdido Key, 12 north of Santa Rosa Island, and 2 in Gulf-side waters (south of islands). The assumed distribution of motorboats (excluding personal watercraft) was 250 at Perdido Key, 250 north of Santa Rosa Island, and 4,500 in Gulf-side waters. PWC and boating use is negligible at the Naval Live Oaks area. A PWC trip in Florida was estimated to be three hours in duration. Motorboat activity in the Florida District varies from full throttle speed to trolling to being anchored with the engine shut off; therefore, it was estimated that a motorboat trip is the equivalent of two hours at full throttle.

   In the Mississippi District, PWC and motorboat numbers are 129 PWC and 1,286 motorboats in Mississippi Sound waters and 32 PWC and 321 motorboats in Gulf-side waters. An average PWC trip in the Mississippi District was estimated to be four hours in duration, and a motorboat trip was assumed to be the equivalent of one hour at full throttle in park waters. Future PWC and motorboat use trends were estimated for the next 10 years for Gulf Islands National Seashore, based on registration data for Florida's Escambia, Okaloosa, and Santa Rosa counties from 1997 to 2001. The average annual increase in PWC registrations was 9.6%, and the average annual increase in motorboat registrations was 3.7%.

   The contaminant loading to water was calculated for a peak boating use day, assuming that peak PWC and motorboat use occurs simultaneously, and that full throttle PWC and outboard motorboat use (or its equivalent) discharges 3 gallons (11.34 liters) of gasoline per hour into park waters. Table 23 summarizes PWC and motorboat distribution and the PWC- or boat-hours at Gulf Islands National Seashore in 2002 and 2012.

5. 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 a rough estimate of whether typical PWC (and motorboat) use over a particular time (e.g., a typical busy day on a holiday weekend) would result in exceedances of the identified standards, criteria, or toxicity benchmarks. The approach is described in appendix A. Results of this approach were then taken into account, along with site-specific information about water flow, currents, mixing, wind, turbidity, etc., as well as the specific fate and transport characteristics of the pollutant involved (e.g., volatility), to assess the potential for the occurrence of adverse water quality impacts.

TABLE 23: SUMMARY OF PWC AND MOTORBOAT DISTRIBUTION AND HOURS OF USE AT GULF ISLANDS NATIONAL SEASHORE*

Florida District	PWC	PWC-Hours	Non-PWC	Non-PWC Hours
Perdido Key Area 2002	25	75	250	500
Perdido Key Area 2012	63	189	360	720
Area North of Santa Rosa Island 2002	12	36	250	500
Area North of Santa Rosa Island 2012	30	90	360	720
Gulf-Side Waters 2002	2	6	4,500	9,000
Gulf-Side Waters 2012	5	15	6,471	12,942
Mississippi District	**PWC**	**PWC-Hours**	**Non PWC**	**Non PWC-Hours**
Gulf-Side Waters 2002	32	128	321	321
Gulf-Side Waters 2012	80	320	462	462
Mississippi Sound 2002	129	516	1,286	1,286
Mississippi Sound 2012	323	1,292	1,849	1,849

Source: Kelson 2003a, 2003b.

* Assumes a 9.6% annual growth for PWC and a 3.7% annual growth for other motorboats.

6. In general, the approach provides the information needed to calculate emissions to the receiving water body from personal watercraft (and, by estimation, from outboard motors) of MTBE and 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, MTBE, and three PAHs (benzo(a)pyrene, naphthalene, and 1-methyl naphthalene). First the emissions of these pollutants to the water per PWC operational hour were estimated (based on literature values), and then the total loading of the pollutants into the water was estimated (based on the estimated hours of use). The next step was to estimate the volume of water needed to dilute the calculated emission loading to the level of the water quality standard or benchmark. The volume of water (referred to as the "threshold volume of water") was then compared to the total available volume of water, and all the mechanisms that result in loss of the pollutant from the water were qualitatively considered. In this way, an assessment was made as to the potential for the standards or benchmarks to be exceeded, even on a short-term basis.

   Although there is no clear definition of how MTBE, BTEX, and PAHs resulting from marine engine exhaust affect human and aquatic health, the physical barrier of the islands, especially Perdido Key and Santa Rosa Island, increases retention times for pollutants and contaminants. As a result, exposure time, concentrations, and risks associated with these pollutants may increase over time.

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

7. The principal mechanisms that result in loss of the pollutant from the water were qualitatively considered. Many organic pollutants that are initially dissolved in the water volatilize to the atmosphere, especially if they have high vapor pressures, are lighter than water, and mixing occurs at the air/water interface. Other compounds that have low vapor pressure, low solubility, and high

octanol/water partition coefficients tend to adhere to organic material and clays and eventually adsorb onto bottom sediments. By considering movements of the organics through the water column, an assessment can be made as to whether standards or benchmarks may be exceeded, even on a short-term basis. Gulf Islands National Seashore is a marine environment, and only limited water quality criteria or standards are available for PWC-related contaminants. Some states (e.g., New York, Washington) utilize freshwater quality criteria to assess effects on marine organisms for a variety of chemical parameters. In the absence of established marine criteria or standards at the federal or state level, this analysis adopted freshwater ecological benchmarks for benzo(a)pyrene, naphthalene, and benzene (Suter and Tsao 1996) to determine potential water quality impacts; marine benchmarks were used for 1-methyl naphthalene (FWS 2000) and MTBE (Mancini et al. 2002). Human health criteria for benzo(a)pyrene and benzene are based on the consumption of aquatic organisms (EPA 2002b; see table 24). The EPA criteria were compared with state standards (Florida Administrative Code 2002), and the more stringent benchmarks (EPA 2002b) were applied to both Florida and Mississippi waters.

Site-specific data on pollution from emissions was calculated for Gulf Islands National Seashore. The threshold volume was determined by considering the PWC-hours of operation for each area and the loadings during operating hours; the ecotoxicological and human health benchmarks were obtained from EPA guidelines and other available sources.

Benzene, when released to the water, is subject to rapid volatilization, with a half-life for evaporation of about five hours (EPA 2001a). Consequently, this evaporation rate is discussed for benzene in the analysis of the alternatives. (Calculated concentrations are shown in appendix A.)

8. The threshold volume of water was 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 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 in the effects of any other processes that contribute to the loss of the benzo(a)pyrene from the water column. However, if the impact area is a 5-acre backwater area averaging 2 feet deep (10 acre-feet), then there may be at least a short-term issue, especially if outboard emissions are added and/or if there is little mixing in the area. Water volumes were determined from soundings on NOAA charts 11373, 11382, 11383, and 11378 (NOAA n.d.).

9. To assess cumulative impacts, inboard and outboard motorboat emissions were added to PWC emissions to get a more complete estimation of loading to the receiving water body. Ninety percent of motorboats in the Florida and Mississippi districts were assumed to have outboard two-stroke engines and 10% were assumed to have inboard four-stroke engines. Outboard engines were assumed to be two-stroke engines discharging 3 gallons (11.34 liters) of gasoline per hour at full throttle into park waters. An inboard motorboat engine was assumed to have only 10% of the emissions of an outboard or PWC engine.

10. To predict the cumulative effects of PWC emissions in the context of all other similar types of emissions, projections of existing use were extrapolated into the future as a percentage of overall emissions in order to gage the magnitude of potential water quality changes, with and without continued PWC use at the park, and taking into account the reduction in emissions required by the Environmental Protection Agency over the next 10 years (table 25).

TABLE 24: TOXICOLOGICAL BENCHMARKS USED IN CALCULATIONS

Chemical	Ecotoxicological Benchmark (µg/L)	Source	Human Health Benchmark (Florida/ Mississippi, in µg/L)	Source
Benzo(a)pyrene	0.014	Suter & Tsao 1996	0.031[a]/0.018[a]	FAC 2002/ EPA 2002b
Naphthalene	62	Suter & Tsao 1996	—	—
1-methyl naphthalene	19[b]	FWS 2000	—	—
Benzene	130	Suter & Tsao 1996	71[a]/ 51[a]	FAC 2002/ EPA 2002b
MTBE	18,000	Mancini et al. 2002	—	—

a. Human health criterion for the consumption of aquatic organisms.

b. Based on LC_{50} of 1,900 µg/l for Dungeness crab.

TABLE 25: 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).
2005	Estimate 25% reduction in HC emissions overall as a result of newer models being gradually used (EPA 1996b; date modified in EPA 1997).
2006	EPA fully implements 75% HC reduction in new outboards and personal watercraft (EPA 1996b).
2012	Estimate of 50% reduction in HC emissions overall (EPA 1996b; date modified in EPA 1997).

Key dates in this chronology begin with 1999, when the EPA began to require production line testing for 75% hydrocarbon reduction in new outboard motors, and 2000, when testing for 75% hydrocarbon reduction in personal watercraft was started. By 2006 all new personal watercraft and outboards manufactured in the United States must have a 75% reduction in hydrocarbon emissions. In 2005 and 2012, the EPA estimates overall reductions in hydrocarbon emissions to be 25% and 50%, respectively, in personal watercraft and outboard motors. These estimates are based on interpolations of the emissions reduction percentages and associated years reported by the EPA (EPA 1996b), but with a one-year delay in the implementation of production line testing (EPA 1997). Therefore, for the purpose of evaluating future emissions, overall outboard and PWC emissions to waters at Gulf Islands National Seashore in 2012 are expected to be 50% of current emissions.

11. Existing information on PWC effects on water quality was reviewed and extrapolated to address district-specific issues. Threshold values were compared to estimated volumes of water within the park boundaries. Tables 26 and 27 indicate current contaminant loadings and threshold volumes at Gulf Islands National Seashore based on ecotoxicological and human health benchmarks shown in table 25. PWC usage (and organic pollutant discharge) was assumed to increase by 9.6% per year. Motorboat usage (and organic pollutant discharge) was assumed to increase by 3.7% per year. The loadings of pollutants for each geographic area were estimated based on maximum PWC and boating activity. Table 23 indicates the total number of PWC and motorboats used in the threshold volume calculations for 2002 and 2012.

No areas of the Florida or Mississippi districts are currently designated by EPA as nonattainment areas for pollution by carbon monoxide or ozone precursors such that they are subject to either the Wintertime Oxygenated Fuels or Reformulated Gasoline programs. TRW Petroleum Technologies, in conjunction with the American Petroleum Institute, performs an annual survey of non-reformulated gasoline, gasoline

TABLE 26: FLORIDA DISTRICT PWC POLLUTANT LOADINGS AND THRESHOLD VOLUMES FOR ECOTOXICOLOGICAL EFFECTS AND HUMAN HEALTH PROTECTION

	Perdido Key Area		Area North of Santa Rosa Island		Gulf-Side Waters	
NPS jurisdictional waters (acre-feet)	15,439		149,263		326,873	
Ecotoxicological Effects	Loadings (mg) (75 PWC-hrs)	Threshold (acre-feet*)	Loadings (mg) (36 PWC-hrs)	Threshold (acre-feet*)	Loadings (mg) (6 PWC-hrs)	Threshold (acre-feet*)
Benzo(a)pyrene (fuel and exhaust)	1.79×10^3	100	8.61×10^2	50	1.43×10^2	8
Naphthalene	3.14×10^6	41	1.51×10^6	20	2.51×10^5	3
1-methyl naphthalene	4.90×10^6	210	2.35×10^6	100	3.92×10^5	17
Benzene	1.58×10^7	98	7.57×10^6	47	1.26×10^6	8
MTBE	2.20×10^7	1	1.05×10^7	0.5	1.76×10^6	0.1
Human Health Protection						
Benzo(a)pyrene (fuel and exhaust)	1.79×10^3	81	8.61×10^2	38	1.43×10^2	7
Benzene	1.58×10^7	250	7.57×10^6	120	1.26×10^6	19

* Threshold volumes below which ecotoxicological effects might occur or human health might be impacted.

TABLE 27: MISSISSIPPI DISTRICT PWC POLLUTANT LOADINGS AND THRESHOLD VOLUMES FOR ECOTOXICOLOGICAL EFFECTS AND HUMAN HEALTH PROTECTION

	Mississippi Sound		Gulf-Side Waters	
NPS jurisdictional waters (acre-feet)	255,765		390,796	
Ecotoxicological Effects	Loadings (mg) (516 PWC-hrs)	Threshold (acre-feet*)	Loadings (mg) (128 PWC-hrs)	Threshold (acre-feet*)
Benzo(a)pyrene (fuel and exhaust)	1.23×10^4	710	3.06×10^3	180
Naphthalene	2.16×10^7	280	5.36×10^6	70
1-methyl naphthalene	3.37×10^7	1,400	8.36×10^6	360
Benzene	1.08×10^8	680	2.69×10^7	170
MTBE	1.51×10^8	7	3.75×10^7	2
Human Health Protection				
Benzo(a)pyrene (fuel and exhaust)	1.23×10^4	550	3.06×10^3	140
Benzene	1.08×10^8	1,700	2.69×10^7	430

* Threshold volumes below which ecotoxicological effects might occur or human health might be impacted.

alcohol blends, and reformulated gasoline from service stations throughout the country. Survey data for 2002 is not yet available, but for 2001, premium grade fuel (octane of 90 and higher) in Florida had MTBE concentrations ranging from 0% to 10.8% of the fuel mixture, with an average of 3.5%; no data was available for Mississippi (Dickson 2003). For this assessment, it was assumed that the concentration of MTBE in fuel used by all vessels in the Florida and Mississippi districts is 3.5%. There are no plans to ban the use of MTBE in fuels in Florida or Mississippi (DOE 2003).

IMPACT ANALYSIS AREA

The areas of boating activities summarized and evaluated for the Florida District include waters under the park's jurisdiction in the Perdido Key area, the area north of Santa Rosa Island, and in the Gulf of Mexico. The areas summarized and evaluated for the Mississippi District include waters under the national seashore jurisdiction in Mississippi Sound and in the Gulf of Mexico.

IMPACT TO WATER QUALITY FROM PWC USE

Given the above methodology and assumptions, the following impact thresholds were established to describe the relative changes in water quality (overall, localized, short and long-term, cumulative, adverse, and beneficial), under the various PWC management alternatives, when compared to baseline conditions (no-action alternative).

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 locally, slightly and singularly, exceeded on a short-term and temporary basis.

Impairment: Impacts are chemical, physical, or biological effects that would be detectable and 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 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 the No-Action Alternative – Continue Prohibition of PWC Use in Gulf Islands National Seashore

Florida District

Analysis. Under this alternative, PWC use would continue to be prohibited from all jurisdictional waters of Gulf Islands National Seashore. There would be no loading of PWC emissions to park waters in the Florida District, so there would be no impacts to water quality or associated biota.

Cumulative Impacts. Cumulative impacts associated with the no-action alternative would result from the cumulative water quality impacting activities taking place within the Florida District, including other

motorized watercraft that use the national seashore. These watercraft include recreational boats, commercial boats (fishing and cruises), and official units (police, U.S. Coast Guard, etc.). There would be no contribution of personal watercraft to cumulative impacts under this alternative. The extensive marine traffic (other than PWC use) in and around Pensacola Bay constitutes a main source of pollutants to the aquatic environment. Watercraft in nearby waters and point and non-point sources of urban pollutants would also contribute to cumulative sources of impacts, but were not included in calculations for this analysis.

As shown in table 23, peak-day non-PWC motorized watercraft within national seashore waters are assumed to be distributed as follows in 2002: 250 at Perdido Key Area, 250 north of Santa Rosa Island, and 4,500 in Gulf-side waters. Each non-PWC is assumed to operate for an equivalent of two hours at full throttle. Assuming a 3.7% average annual increase, by 2012 non-PWC numbers would increase to 360 at Perdido Key, 360 north of Santa Rosa Island, and 6,471 in Gulf-side waters. Threshold volumes required for all motorized vessels other than personal watercraft are shown in table 28.

In addition, a reduction in impacts to water quality associated with the emission of pollutants is expected in the long term because motorized vessel hydrocarbon emissions are projected to decrease by 50% by 2012 (EPA 1997) as lower emission four-stroke and injected two-stroke engines will gradually come into use.

As seen in table 28, non-PWC motorized vessels are responsible for large amounts of organic pollutants discharged into water. However, the available water volumes greatly exceed the threshold water volumes required for the protection of aquatic organisms and human health. Under the no-action alternative, water quality impacts based on ecotoxicological benchmarks would be negligible for all pollutants in the Florida District (Perdido Key area, waters north of Santa Rosa Island, and Gulf-side waters) in 2002 and 2012. Impacts from motorized vessels based on human health benchmarks also would be negligible in all areas in 2002 and 2012.

TABLE 28: THRESHOLD WATER VOLUMES NEEDED TO DILUTE POLLUTANTS FROM ALL MOTORIZED VESSELS IN THE FLORIDA DISTRICT (EXCLUDING PWC), NO-ACTION ALTERNATIVE

	Perdido Key Area		North of Santa Rosa Island		Gulf-Side Waters	
	2002	2012	2002	2012	2002	2012
NPS jurisdictional waters (acre-feet)	15,439		149,263		326,873	
Ecotoxicological Benchmarks[a]						
Benzo(a)pyrene (fuel and exhaust)	630	320	630	320	11,000	5,700
Napthalene	250	130	250	130	4,500	2,300
1-methyl napthalene	1,300	640	1,300	640	23,000	12,000
Benzene	600	300	600	300	11,000	5,400
MTBE	6	3	6	3	110	55
Human Health Benchmarks[b]						
Benzo(a)pyrene (fuel and exhaust)	490	250	490	250	8,800	4,500
Benzene	1,500	770	1,500	770	27,000	14,000

a. Threshold volumes (acre-feet) below which ecotoxicological effects might occur.

b. Threshold volumes (acre-feet) below which human health might be impacted.

Mississippi District

Analysis. Under this alternative, personal watercraft use would continue to be prohibited from all jurisdictional waters of Gulf Islands National Seashore. There would be no loading of PWC emissions to park waters in the Mississippi District, so there would be no impacts to water quality or associated biota.

Cumulative Impacts. Cumulative impacts associated with the no-action alternative would result from the cumulative activities taking place within the Mississippi District. These watercraft include recreational boats, commercial boats (fishing and cruises), and official units (police, U.S. Coast Guard, etc.). There would be no contribution of personal watercraft to cumulative impacts under this alternative. The extensive marine traffic (other than PWC use) in and around the Mississippi barrier islands, including the intracoastal waterway constitutes a major source of pollutants to the aquatic environment. Watercraft in nearby waters and point and non-point sources of urban pollutants such as municipal discharges, would also contribute to cumulative sources of impacts, but were not included in calculations for this analysis.

As shown in table 23, non-PWC motorized watercraft are assumed to be distributed as follows: 1,286 motorboats in Mississippi Sound waters and 320 motorboats in Gulf-side waters, and a motorboat trip was assumed to be the equivalent of one hour at full throttle in park waters. Assuming a 3.7% average annual increase, by 2012 non-PWC motorized watercraft numbers would increase to 1,849 in Mississippi Sound and 462 in Gulf-side waters. Threshold volumes required for all motorized vessels other than personal watercraft are shown in table 29.

In addition, a reduction in impacts to water quality associated with the emission of pollutants is expected in the long term because motorized vessel hydrocarbon emissions are projected to decrease by 50% by 2012 (EPA 1996b, 1997), as lower emission four-stroke and injected two-stroke engines will gradually come into use.

As seen in table 29, non-PWC motorized vessels are responsible for large amounts of organic pollutants discharged to the water in the Mississippi District. However, the available water volumes greatly exceed the threshold water volumes required for the protection of aquatic organisms and human health. Under the no-action alternative, water quality impacts based on ecotoxicological benchmarks would be negligible for all pollutants in the Mississippi District (Mississippi Sound and Gulf-side waters) in 2002 and 2012.

TABLE 29: THRESHOLD WATER VOLUMES NEEDED TO DILUTE POLLUTANTS FROM MOTORBOATS IN THE MISSISSIPPI DISTRICT (EXCLUDING PWC), NO-ACTION ALTERNATIVE

	Mississippi Sound		Gulf-side waters	
	2002	2012	2002	2012
NPS jurisdictional waters (acre-feet)	255,765		390,796	
Ecotoxicological Benchmarks[a]				
Benzo(a)pyrene (fuel and exhaust)	1,600	820	400	200
Napthalene	640	320	160	81
1-methyl naphthalene	3,300	1,600	810	410
Benzene	1,500	780	380	190
MTBE	15	8	4	2
Human Health Benchmarks[b]				
Benzo(a)pyrene (fuel and exhaust)	1,300	520	310	160
Benzene	3,900	2,000	980	490

a. Threshold volumes (acre-feet) below which ecotoxicological effects might occur.

b. Threshold volumes (acre-feet) below which human health might be impacted.

Impacts from motorized vessels based on human health benchmarks also would be negligible in both areas in 2002 and 2012.

Conclusion. Continuing the prohibition on PWC use within the national seashore boundary would result in no impacts to water quality of park waters in the Florida or Mississippi districts from non-PWC motorboats. Personal watercraft would not contribute emissions to the national seashore.

On a cumulative basis, other motorized vessels would continue to have negligible adverse impacts on the national seashore's water quality due to their discharge of organic pollutants.

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

Impacts of Alternative A – Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Florida District

Analysis. Under alternative A, PWC use would be reinstated in all waters within the Florida District as previously managed under the *Superintendent's Compendium*, and all state regulatory requirements would apply. As shown in table 23, PWC distribution and use are as follows: 25 at the Perdido Key area, 12 north of Santa Rosa Island, and 2 in Gulf-side waters, and each personal watercraft is assumed to be operating for 3 hours at full throttle. Assuming a 9.6% average annual increase, by 2012 PWC numbers would increase to 63 at Perdido Key area, 30 north of Santa Rosa Island, and 5 in Gulf-side waters.

Even with an increase in PWC use, a reduction in impacts to water quality associated with the emission of pollutants is expected in the long term because by 2012 PWC hydrocarbon emissions are projected to decrease by 50% (EPA 1996b, 1997). This reduction is a result of newer PWC models with lower emission four-stroke and direct-injection two-stroke engines coming into use. The summary of threshold volumes (acre-feet) for this alternative is presented in table 30.

TABLE 30: THRESHOLD WATER VOLUMES NEEDED TO DILUTE POLLUTANTS FROM PWC IN THE FLORIDA DISTRICT, ALTERNATIVE A

	Perdido Key Area		North of Santa Rosa Island		Gulf-Side Waters	
	2002	2012	2002	2012	2002	2012
NPS jurisdictional waters (acre-feet)	15,439		149,263		326,873	
Ecotoxicological Benchmarks[a]						
Benzo(a)pyrene (fuel and exhaust)	100	130	50	62	8	10
Napthalene	41	51	20	25	3	4
1-methyl napthalene	210	260	100	120	17	21
Benzene	98	120	47	59	8	10
MTBE	1	1	0.5	0.6	0.1	0.1
Human Health Benchmarks[b]						
Benzo(a)pyrene (fuel and exhaust)	81	100	38	48	7	9
Benzene	250	310	120	150	19	25

a. Threshold volumes (acre-feet) below which ecotoxicological effects might occur.

b. Threshold volumes (acre-feet) below which human health might be impacted.

The results of the water quality analysis for PWC activity show that for all discharged pollutants evaluated, the ecotoxicological threshold volumes estimated for 2002 and 2012 would be well below volumes of water available at the three areas. Threshold volumes range from 0.1 to 260 acre-feet, while available jurisdictional water volumes range from 15,439 to 326,873 acre-feet. Impacts to aquatic organisms are expected to be negligible for all pollutants evaluated.

Although the waters of the Florida District are not a source of drinking water, visitors to the national seashore could be affected by an increase in pollutant loadings through ingestion of finfish and shellfish that have accumulated pollutants. Threshold volumes for human health benchmarks of benzo(a)pyrene and benzene are also well below volumes of water available at the three areas in 2002 and 2012. Threshold volumes range from 7 to 310 acre-feet, while available jurisdictional water volumes in each of the three areas exceeds 15,439 acre-feet. Impacts to human health are expected to be negligible for all pollutants evaluated. Mixing, flushing, and the resulting dilution of park waters by adjacent waters would further reduce pollutant concentrations. As previously mentioned, tidal currents at the Pensacola Bay entrance reach a speed of 4.1 knots. Incoming tides increase the available water volume, especially in the Big Lagoon area of Perdido Key where the average depth is less than 8 feet. Outgoing tides transport soluble pollutants out of national seashore waters to the Gulf of Mexico.

Overall, water quality impacts due to PWC emissions of organic pollutants in 2002 would be negligible. In 2012, although PWC use would increase, water quality impacts due to PWC emissions are expected to remain negligible due to reduced emissions rates. The greatest threshold volume (310 acre-feet for benzene in 2012) is only 2% of the available water volume in the Perdido Key area. Further, threshold volumes for personal watercraft are 40% or less of the threshold volumes for all other motorboats.

Cumulative Impacts. Cumulative impacts associated with alternative A would result from the cumulative activities taking place within the Florida District, including non-PWC motorized watercraft. As shown in table 23, motorized watercraft are assumed to be distributed as follows: 250 at Perdido Key, 250 north of Santa Rosa Island, and 4,500 in Gulf-side waters. Assuming a 3.7% average annual increase, by 2012 non-PWC numbers would increase to 360 at Perdido Key, 360 north of Santa Rosa Island, and 6,471 in Gulf-side waters. Other contributing sources of cumulative impacts such as motorized watercraft use in nearby waters and point and non-point sources of urban pollutants were not calculated.

Threshold volumes calculated for all motorized watercraft are shown in table 31. For all discharged pollutants evaluated, the ecotoxicological threshold volumes estimated for 2002 and 2012 would be well below volumes of water available in park jurisdictional waters in the three areas. Threshold volumes range from 4 to 23,000 acre-feet, while available jurisdictional water volumes range from 15,439 to 326,873 acre-feet. Impacts to aquatic organisms are expected to be negligible for all pollutants evaluated.

Threshold volumes for risks to human health from benzo(a)pyrene and benzene would also be well below the jurisdictional volumes in all three areas in 2002 and 2012. Threshold volumes range from 300 to 27,000 acre-feet, while available jurisdictional water volumes range from 15,439 to 326,873 acre-feet. Risks to human health from benzo(a)pyrene and benzene, largely attributable to non-PWC use (approximately 60% of the loading to waters is due to non-PWC use), are expected to be negligible for all areas in 2002 and 2012. The greatest threshold volume (27,000 acre-feet in Gulf-side waters) is only 8% of the available volume.

Mississippi District

Analysis. Under alternative A, PWC use would be reinstated in all waters within the Mississippi District as previously managed under the *Superintendent's Compendium* (NPS 2003a), and all state regulatory requirements would apply. A total of 129 personal watercraft were assumed to be operating in Mississippi

TABLE 31: THRESHOLD WATER VOLUMES NEEDED TO DILUTE POLLUTANTS FROM ALL MOTORIZED WATERCRAFT IN THE FLORIDA DISTRICT, ALTERNATIVE A

	Perdido Key Area		North of Santa Rosa Island		Gulf-Side Waters	
	2002	2012	2002	2012	2002	2012
NPS jurisdictional waters (acre-feet)	15,439		149,263		326,873	
Ecotoxicological Benchmarks[a]						
Benzo(a)pyrene (fuel and exhaust)	730	450	680	380	11,000	5,700
Napthalene	290	180	270	150	4,500	2,300
1-methyl napthalene	1,500	900	1,400	770	23,000	12,000
Benzene	700	420	640	360	11,000	5,400
MTBE	7	4	6	4	110	55
Human Health Benchmarks[b]						
Benzo(a)pyrene (fuel and exhaust)	570	350	530	300	8,800	4,500
Benzene	1,800	1,100	1,600	920	27,000	14,000

a. Threshold volumes (acre-feet) below which ecotoxicological effects might occur.

b. Threshold volumes (acre-feet) below which human health might be impacted.

Sound and 32 were estimated to be in Gulf-side waters, and each PWC is assumed to be operating for 4 hours at full throttle. Assuming a 9.6% average annual increase, by 2012 PWC numbers would increase to 323 in Mississippi Sound and 80 in Gulf-side waters (see table 23).

In addition, a reduction in impacts to water quality associated with the emission of pollutants is expected in the long term because PWC hydrocarbon emissions are projected to decrease by 50% by 2012 (EPA 1997). This reduction is a result of newer PWC models with lower emission four-stroke and injected two-stroke engines gradually coming into use. The summary of threshold volumes (acre-feet) for this alternative is presented in table 32.

The results of the water quality analysis for PWC activity show that for all discharged pollutants evaluated, the ecotoxicological threshold volumes estimated for 2002 and 2012 would be well below volumes of water available at both areas. Threshold volumes range from 2 to 1,800 acre-feet, while available jurisdictional water volumes range from 255,765 to 390,796 acre-feet. Impacts to aquatic organisms are expected to be negligible for all pollutants evaluated.

Although the waters of the Mississippi District are not a source of drinking water, visitors to the park could be affected by an increase in pollutant loadings through ingestion of finfish and shellfish that have accumulated pollutants. Threshold volumes for human health benchmarks of benzo(a)pyrene and benzene are well below volumes of water available at both areas in 2002 and 2012. Threshold volumes range from 140 to 2,200 acre-feet, while available jurisdictional water volumes range from 255,765 to 390,796 acre-feet. Impacts to human health are expected to be negligible for all pollutants evaluated. Mixing, flushing, and the resulting dilution of park waters by adjacent waters would further reduce pollutant concentrations. Incoming tides increase the available water volume, especially in shallow areas. Outgoing tides transport soluble pollutants out of park waters to the Mississippi Sound and the Gulf of Mexico.

Overall, water quality impacts due to PWC emissions of organic pollutants in 2002 would be negligible. In 2012, water quality impacts due to PWC emissions are expected to increase slightly but remain negligible due to reduced emissions rates. The greatest threshold volume (2,200 acre-feet) is less than 1% of the available volume in Mississippi Sound.

TABLE 32: THRESHOLD WATER VOLUMES NEEDED TO DILUTE POLLUTANTS FROM PWC IN THE MISSISSIPPI DISTRICT, ALTERNATIVE A

	Mississippi Sound		Gulf-Side	
	2002	2012	2002	2012
NPS jurisdictional waters (acre-feet)	255,765		390,796	
Ecotoxicological Benchmarks[a]				
Benzo(a)pyrene (fuel and exhaust)	710	890	180	220
Napthalene	280	350	70	88
1-methyl napthalene	1,400	1,800	360	450
Benzene	680	840	170	210
MTBE	7	9	2	2
Human Health Benchmarks[b]				
Benzo(a)pyrene (fuel and exhaust)	550	690	140	170
Benzene	1,700	2,200	430	530

a. Threshold volumes (acre-feet) below which ecotoxicological effects might occur.

b. Threshold volumes (acre-feet) below which human health might be impacted.

Cumulative Impacts. Cumulative impacts associated with alternative A would result from the cumulative activities taking place within the Mississippi District, including other motorized watercraft. As shown in table 23, non-PWC motorized watercraft are assumed to be distributed as follows: 1,286 motorboats in Mississippi Sound waters and 321 motorboats in Gulf-side waters. Assuming a 3.7% average annual increase, by 2012 non-PWC motorized watercraft numbers would increase to 1,849 in Mississippi Sound and 462 in Gulf-side waters. Motorized watercraft that use nearby waters and point and non-point sources of urban pollutants also contribute to cumulative impacts, but were not analyzed.

Threshold volumes calculated for all non-PWC motorized watercraft are shown in table 33. For all discharged pollutants evaluated, the ecotoxicological threshold volumes estimated for 2002 and 2012 would be well below volumes of water available in park jurisdictional waters in both areas. Threshold volumes range from 4 to 4,700 acre-feet, while available jurisdictional water volumes range from 255,765 to 390,796 acre-feet. Impacts to aquatic organisms are expected to be negligible for all pollutants evaluated.

Threshold volumes for risks to human health from benzo(a)pyrene and benzene also would be well below the jurisdictional volumes in all three areas in 2002 and 2012. Threshold volumes range from 350 to 5,600 acre-feet, while available jurisdictional water volumes range from 255,765 to 390,796 acre-feet. Risks to human health from benzo(a)pyrene and benzene, largely attributable to non-PWC use, are expected to be negligible for all areas in 2002 and 2012. In 2012, cumulative water quality impacts from watercraft are expected to be lower than in 2002 due to reduced emission rates.

Conclusion. Under alternative A, water quality impacts from PWC use based on ecotoxicological and human health benchmarks would be negligible for all pollutants in all areas of the national seashore in 2002. In 2012, although PWC use is projected to increase, all water quality impacts from PWC use are expected to remain negligible due to reduced emission rates of newer technology engines.

In 2002, personal watercraft contribute approximately 30% of the cumulative emissions from all motorized watercraft, and in 2012, personal watercraft contribute approximately 50% of the cumulative emissions. Despite the addition of personal watercraft, cumulative water quality impacts from all motorized watercraft under alternative A based on ecotoxicological and human health benchmarks would still be negligible for all pollutants in all areas of the national seashore in 2002 and 2012. In 2012, cumulative water quality impacts from watercraft are expected to be lower than in 2002 due to reduced emission rates.

TABLE 33: THRESHOLD WATER VOLUMES NEEDED TO DILUTE POLLUTANTS FROM ALL MOTORIZED WATERCRAFT IN THE MISSISSIPPI DISTRICT, ALTERNATIVE A

	Mississippi Sound		Gulf-Side	
	2002	2012	2002	2012
NPS jurisdictional waters (acre-feet)	255,765		390,796	
Ecotoxicological Benchmarks[a]				
Benzo(a)pyrene (fuel and exhaust)	2,300	1,700	580	430
Napthalene	920	680	230	170
1-methyl naphthalene	4,700	3,400	1,200	860
Benzene	2,200	1,600	550	400
MTBE	22	16	6	4
Human Health Benchmarks[b]				
Benzo(a)pyrene (fuel and exhaust)	1,800	1,300	450	330
Benzene	5,600	4,100	1,400	1,000

a. Threshold volumes (acre-feet) below which ecotoxicological effects might occur.

b. Threshold volumes (acre-feet) below which human health might be impacted.

Implementation of the alternative would not result in an impairment of water quality.

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Florida District

Analysis. Under alternative B, PWC use would be reinstated in all waters within the Florida District as previously managed under the *Superintendent's Compendium* (NPS 2003a), and all state regulatory requirements would apply. In addition, a PWC flat-wake zone would be established a minimum of 300 yards from all park shorelines. PWC flat-wake speed engine emissions were assumed to be negligible; therefore it was assumed that the same number of PWC-hours of full-throttle use under alternative A in the three areas would occur, but only beyond 300 yards of park shorelines. This effectively reduces the available water volume for diluting PWC engine emissions (table 34).

The results of the water quality analysis for PWC activity shows that for all discharged pollutants evaluated, the ecotoxicological threshold volumes estimated for 2002 and 2012 would be well below volumes of water available at the three areas. Threshold volumes range from 0.1 to 260 acre-feet, while water volumes accessible to personal watercraft under this alternative range from 13,010 to 301,704 acre-feet. Impacts to aquatic organisms are expected to be negligible for all pollutants evaluated.

Threshold volumes for human health benchmarks of benzo(a)pyrene and benzene are also well below volumes of water available at the three areas in 2002 and 2012. Threshold volumes range from 7 to 310 acre-feet, while water volumes available to personal watercraft range from 13,010 to 301,704 acre-feet. Impacts to human health are expected to be negligible for all pollutants evaluated. Mixing, flushing, and the resulting dilution of park waters by adjacent waters would further reduce pollutant concentrations. As previously mentioned, tidal currents at the Pensacola Bay entrance reach a speed of 4.1 knots. Incoming tides increase the available water volume, especially at the Big Lagoon area of Perdido Key where the average depth is less than 8 feet. Outgoing tides transport soluble pollutants out of park waters to the Gulf of Mexico.

TABLE 34: THRESHOLD WATER VOLUMES NEEDED TO DILUTE POLLUTANTS FROM PWC IN THE FLORIDA DISTRICT, ALTERNATIVE B

	Perdido Key Area		North of Santa Rosa Island		Gulf-Side Waters	
	2002	2012	2002	2012	2002	2012
NPS jurisdictional waters (acre-feet)	15,439		149,263		326,873	
PWC permitted waters (acre-feet)	13,010		140,730		301,704	
Ecotoxicological Benchmarks[a]						
Benzo(a)pyrene (fuel and exhaust)	100	130	50	62	8	10
Napthalene	41	51	20	25	3	4
1-methyl napthalene	210	260	100	120	17	21
Benzene	98	120	47	59	8	10
MTBE	1	1	0.5	0.6	0.1	0.1
Human Health Benchmarks[b]						
Benzo(a)pyrene (fuel and exhaust)	81	100	38	48	7	9
Benzene	250	310	120	150	19	25

a. Threshold volumes (acre-feet) below which ecotoxicological effects might occur.

b. Threshold volumes (acre-feet) below which human health might be impacted.

Overall, water quality impacts due to PWC emissions of organic pollutants in 2002 would be negligible. In 2012, although PWC numbers would increase within the national seashore, water quality impacts due to PWC emissions are expected to remain negligible due to reduced emissions rates of newer technology engines.

Cumulative Impacts. Cumulative impacts associated with alternative B would result from the cumulative activities taking place within the Florida District, including non-PWC motorized watercraft. Watercraft that use nearby waters and point and non-point sources of urban pollutants contribute to water quality within park waters as well, but were not analyzed. As described in the "PWC and Boating Use Trends" section, motorized watercraft within the national seashore are assumed to be distributed as follows: 250 at Perdido Key, 250 north of Santa Rosa Island, and 4500 in Gulf-side waters. Assuming a 3.7% average annual increase, by 2012 non-PWC motorized watercraft numbers would increase to 360 at Perdido Key, 360 north of Santa Rosa Island, and 6,471 in Gulf-side waters.

Threshold volumes calculated for all motorized watercraft are shown in table 35. For all discharged pollutants evaluated, the ecotoxicological threshold volumes estimated for 2002 and 2012 would be well below volumes of water available in park jurisdictional waters in the three areas. Threshold volumes range from 4 to 23,000 acre-feet, while available jurisdictional water volumes range from 15,439 to 326,873 acre-feet (13,010 to 301,704 acre-feet for personal watercraft). Impacts to aquatic organisms are expected to be negligible for all pollutants evaluated.

Threshold volumes for risks to human health from benzo(a)pyrene and benzene would also be well below the jurisdictional volumes in all three areas in 2002 and 2012. Threshold volumes range from 300 to 27,000 acre-feet, while available jurisdictional water volumes range from 15,439 to 326,876 acre-feet (13,010 to 301,704 acre-feet for personal watercraft). Risks to human health from benzo(a)pyrene and benzene, largely attributable to non-PWC use, are expected to be negligible for all areas in 2002 and 2012.

TABLE 35: THRESHOLD WATER VOLUMES NEEDED TO DILUTE POLLUTANTS FROM ALL MOTORIZED WATERCRAFT IN THE FLORIDA DISTRICT, ALTERNATIVE B

	Perdido Key Area		North of Santa Rosa Island		Gulf-Side Waters	
	2002	2012	2002	2012	2002	2012
NPS jurisdictional waters (acre-feet)	15,439		149,263		326,873	
PWC permitted waters (acre-feet)	13,010		140,730		301,704	
Ecotoxicological Benchmarks[a]						
Benzo(a)pyrene (fuel and exhaust)	730	450	680	380	11,000	5,700
Napthalene	290	180	270	150	4,500	2,300
1-methyl naphthalene	1,500	900	1,400	770	23,000	12,000
Benzene	690	420	640	360	11,000	5,400
MTBE	7	4	6	4	110	55
Human Health Benchmarks[b]						
Benzo(a)pyrene (fuel and exhaust)	570	350	530	300	8,800	4,500
Benzene	1,800	1,100	1,600	920	27,000	14,000

a. Threshold volumes (acre-feet) below which ecotoxicological effects might occur.

b. Threshold volumes (acre-feet) below which human health might be impacted.

Mississippi District

Analysis. Under alternative B, PWC use would be reinstated in all waters within the Mississippi District as previously managed under the *Superintendent's Compendium* (NPS 2003a), and all state regulatory requirements would apply. In addition, a PWC flat-wake zone would be established 300 yards from park shorelines at West Ship, East Ship, and Spoil islands and 0.5 mile from Horn and Petit Bois islands. PWC flat-wake speed engine emissions were assumed to be negligible, so it was assumed that the same number of PWC-hours of full-throttle use under alternative A in Mississippi Sound and in Gulf-side waters would occur, but only beyond the flat-wake boundary. This effectively reduces the available water volume for diluting PWC engine emissions (table 36).

The results of the water quality analysis for PWC activity shows that for all discharged pollutants evaluated, the ecotoxicological threshold volumes estimated for 2002 and 2012 would be well below volumes of water available at both areas. Threshold volumes range from 2 to 1,800 acre-feet, while water volumes available to PWC use range from 183,665 to 273,952 acre-feet. Impacts to aquatic organisms are expected to be negligible for all pollutants evaluated.

Threshold volumes for human health benchmarks of benzo(a)pyrene and benzene are also well below volumes of water available at both areas in 2002 and 2012. Threshold volumes range from 140 to 2,200 acre-feet, while volumes available to PWC use range from 183,665 to 273,952 acre-feet. Impacts to human health are expected to be negligible for all pollutants evaluated. Mixing, flushing, and the resulting dilution of park waters by adjacent waters would further reduce pollutant concentrations. Incoming tides increase the available water volume, especially in shallow areas. Outgoing tides transport soluble pollutants out of park waters to Mississippi Sound and the Gulf of Mexico.

Overall, water quality impacts due to PWC emissions of organic pollutants in 2002 would be negligible. In 2012, water quality impacts due to PWC emissions are expected to remain negligible due to reduced emissions rates.

TABLE 36: THRESHOLD WATER VOLUMES NEEDED TO DILUTE POLLUTANTS FROM PWC IN THE MISSISSIPPI DISTRICT, ALTERNATIVE B

	Mississippi Sound		Gulf-Side Waters	
	2002	2012	2002	2012
NPS jurisdictional waters (acre-feet)	255,765		390,796	
PWC permitted waters (acre-feet)	183,655		273,952	
Ecotoxicological Benchmarks[a]				
Benzo(a)pyrene (fuel and exhaust)	710	890	180	220
Napthalene	280	350	70	88
1-methyl naphthalene	1,400	1,800	360	450
Benzene	680	840	170	210
MTBE	7	9	2	2
Human Health Benchmarks[b]				
Benzo(a)pyrene (fuel and exhaust)	550	690	140	170
Benzene	1,700	2,200	430	530

a. Threshold volumes (acre-feet) below which ecotoxicological effects might occur.

b. Threshold volumes (acre-feet) below which human health might be impacted.

Cumulative Impacts. Cumulative impacts associated with alternative B would result from the cumulative watercraft activities taking place within the Mississippi District. Other motorized watercraft that use nearby waters and point and non-point sources of urban pollutants were not calculated. As described in the "PWC and Boating Use Trends" section, non-PWC motorized watercraft are assumed to be distributed as follows: 1,286 motorboats in Mississippi Sound waters and 321 motorboats in Gulf-side waters. Assuming a 3.7% average annual increase, by 2012 non-PWC motorized watercraft numbers would increase to 1,849 in Mississippi Sound and 462 in Gulf-side waters.

Threshold volumes calculated for all motorized watercraft are shown in table 37. For all discharged pollutants evaluated, the ecotoxicological threshold volumes estimated for 2002 and 2012 would be well below volumes of water available in park jurisdictional waters in both areas. Threshold volumes range from 4 to 4,700 acre-feet, while available jurisdictional water volumes range from 255,765 to 390,796 acre-feet (183,655 to 273,952 acre-feet for personal watercraft). Impacts to aquatic organisms are expected to be negligible for all pollutants evaluated.

Threshold volumes for risks to human health from benzo(a)pyrene and benzene would also be well below the jurisdictional volumes in all three areas in 2002 and 2012. Threshold volumes range from 330 to 5,600 acre-feet, while available jurisdictional water volumes range from 255,765 to 390,796 acre-feet (183,655 to 273,952 acre-feet for PWC). Risks to human health from benzo(a)pyrene and benzene are expected to be negligible for all areas in 2002 and 2012.

Conclusion. Under alternative B, water quality impacts from PWC use based on ecotoxicological and human health benchmarks would be negligible adverse for all pollutants in all areas of the national seashore in 2002. In 2012, although PWC use is projected to increase more rapidly than non-PWC use, all water quality impacts from PWC use are expected to remain negligible due to reduced emission rates of newer technology engines.

TABLE 37: THRESHOLD WATER VOLUMES NEEDED TO DILUTE POLLUTANTS FROM ALL MOTORIZED WATERCRAFT IN THE MISSISSIPPI DISTRICT, ALTERNATIVE B

	Mississippi Sound		Gulf-Side Waters	
	2002	2012	2002	2012
NPS jurisdictional waters (acre-feet)	255,765		390,796	
PWC permitted waters (acre-feet)	183,655		273,952	
Ecotoxicological Benchmarks[a]				
Benzo(a)pyrene (fuel and exhaust)	2,300	1,700	5,901	430
Napthalene	920	680	230	170
1-methyl naphthalene	4,700	3,400	1,200	860
Benzene	2,200	1,600	550	400
MTBE	22	16	6	4
Human Health Benchmarks[b]				
Benzo(a)pyrene (fuel and exhaust)	1,800	1,300	450	330
Benzene	5,600	4,100	1,400	1,000

a. Threshold volumes (acre-feet) below which ecotoxicological effects might occur.

b. Threshold volumes (acre-feet) below which human health might be impacted.

In 2002, personal watercraft contributed approximately 30% of the cumulative emissions from all motorized watercraft, and in 2012, personal watercraft contribute approximately 50% of the cumulative emissions. Impacts would still be negligible for all pollutants in all areas of the national seashore in 2002 and 2012. At most, cumulative impact threshold volumes would constitute less than 5% of the volume available to personal watercraft. In 2012, even with increased motorcraft use, cumulative water quality impacts from all watercraft are expected to be lower than in 2002 due to reduced emission rates.

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

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 PAH 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[2] and NO_x emissions combine to form ozone (O_3). O_3 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

2. 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.

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. Gulf Islands National Seashore is designated a Class II area.

Conformity Requirements. National Park System areas that do not meet the NAAQS 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 NAAQS 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 the NAAQS 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. Gulf Islands National Seashore is within an attainment area for all pollutants, so the conformity requirements do not apply to this unit.

Applicable PWC Emission Standards. The EPA 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 EPA estimates that a 52% emission reduction will be achieved by 2011 and a 75% reduction by 2031 (EPA 1996a, 1997). In July 2002, the EPA proposed new evaporative emissions standards for gasoline-fueled boats and personal watercraft. 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 2000d) 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 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 (16 USC 1).

Under its *Management Policies,* 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 NPS *Management Policies 2001* further state that the NPS 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 NPS "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. Therefore, the National Park Service will protect resources at both Class I and Class II designated units. Furthermore, the NPS *Organic Act* and NPS *Management Policies 2001* provide additional protection beyond that afforded by the *Clean Air Act's* NAAQS alone because the National 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 the "Affected Environment" chapter were examined for each pollutant.

2. Air quality designations for the surrounding area were determined. Gulf Islands National Seashore is in an attainment area for each pollutant.

3. There are five monitoring stations near the national seashore located in Pensacola and Gulf Breeze, Florida and in Gulfport and Pascagoula, Mississippi that provide representative

ambient data. Based on data from the Florida Department of Environmental Protection and the Mississippi Department of Environmental Quality Air Quality Program, as described in the "Affected Environment" chapter, all highest maximum concentrations for each pollutant are below the NAAQS.

4. Typical use patterns of motorized watercraft were identified as outlined in the "PWC and Boating Use Trends" section.

5. The rated horsepower, average engine load, and other relevant parameters for each watercraft type were taken from default assumptions in the EPA NONROAD model. 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 of the cleaner-burning four-stroke type.

6. 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.

7. PAH are released during the combustion of fuel, though some PAH 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 PAH. The same study indicated that four-stroke engines have considerably less PAH emissions than two-stroke engines.[3] 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 2001).

8. Any reductions in emissions resulting from implementing control strategies were taken into account, as were changes in emissions resulting from increased or decreased usage.

9. There are have been no studies on ozone injury to sensitive plants at the seashore; however, park staff have not observed any ozone damage to vegetation.

10. A calculation referred to as SUM06 (ppm-hours) was used for assessing regional ozone exposure levels. These data are collected from rural and urban monitoring sites. The highest three-month, five-year average commonly used for the area was determined by reviewing ambient air quality data (available from the NPS Air Resources Division).

11. Visibility impairment was determined from local monitoring data or from qualitative evidence such as personal observations and photographs.

12. The air quality impacts of the various alternatives were assessed by considering the existing air quality levels and the air quality related values present, and by using the estimated emissions and any applicable, EPA-approved air quality models. Estimated reductions in HC emissions as

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

a result of the introduction of cleaner engines would be the same as those described for water quality.

13. 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 assumption in the EPA NONROAD 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 were also considered in the cumulative analysis through a review of the state implementation plan, county records, and the use of best professional judgment.

14. Annualized pollutant emissions were calculated for 2002 and 2012 using the methodology described in the "Water Quality" section. Estimates of watercraft use were based on park staff observations and statistics from various sources including the *General Management Plan* (NPS 1978), Florida and Mississippi state population projections, and National Marine Manufacturers Association boating registration statistics.

15. Cumulative impacts were analyzed quantitatively, with consideration given to boat and PWC air emissions. Although Gulf Islands National Seashore does maintain vehicular access to some of the park that is open to cars, trucks, and recreational vehicles, emissions from these vehicles were not assessed quantitatively, however they were included in the cumulative analysis. Regional scale impacts resulting from development outside of the park units was not considered quantitatively because the localized effects of individual projects will 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 EPA 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: impacts on human health resources and 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 the surrounding national seashore area where air pollutants may accumulate. Impacts were assessed separately for the Florida and Mississippi districts, as these districts are not contiguous and are part of two separate air quality jurisdictions.

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 3-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 3-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 3-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 3-year maximum for each pollutant is greater than NAAQS.

Impairment — Impacts would:

- Have a major adverse effect on national seashore resources and values; and
- Contribute to deterioration of the national seashore's air quality to the extent the seashore's purpose could not be fulfilled as established in its authorizing legislation; or
- Affect resources key to the national seashore's natural or cultural integrity or opportunities for enjoyment; or
- Affect the resource whose conservation is identified as a goal in the national seashore's general management plan or other 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 the No-Action Alternative — Continue Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. PWC use would not be reinstated in 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 the national seashore boundaries.

Cumulative Impacts. Regional emissions of all marine vehicles and boating activities under the no-action alternative are assessed quantitatively in tables 38 and 39, for the Florida and Mississippi districts, respectively. Under the no-action alternative, there would be no contribution from personal watercraft within the national seashore to overall cumulative emissions, and non-PWC motorized boats would continue to emit pollutants. PWC use would continue to occur outside of national seashore boundaries.

TABLE 38: NON-PWC MOTORIZED BOAT EMISSIONS AND HUMAN HEALTH IMPACT LEVELS AT GULF ISLANDS NATIONAL SEASHORE (FLORIDA DISTRICT) – NO-ACTION ALTERNATIVE

	CO		PM_{10}		HC		NO_x	
	2002	2012	2002	2012	2002	2012	2002	2012
Annual Emissions (tons/year)	554.6	890.5	15.1	15.2	231.0	169.1	6.8	18.2
Impact Level	Moderate	Moderate	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible

TABLE 39: NON-PWC MOTORIZED BOAT EMISSIONS AND HUMAN HEALTH IMPACT LEVELS AT GULF ISLANDS NATIONAL SEASHORE (MISSISSIPPI DISTRICT) – NO-ACTION ALTERNATIVE

	CO		PM_{10}		HC		NO_x	
	2002	2012	2002	2012	2002	2012	2002	2012
Annual Emissions (tons/year)	54.0	86.7	1.5	1.5	22.5	16.5	0.7	1.8
Impact Level	Minor	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Florida District. As described in the "Air Quality Methodology" section, boats accounted for approximately 99.5% of the annual motorized watercraft activity in the Florida District of the national seashore in 2000. Based on data provided in the "PWC and Boating Use Trends" section, annual use of non-PWC boats in the Florida District were estimated to be 100,495 vessels in 2002, increasing at approximately 3.7% annually to 144,521 vessels in 2012.

The impacts to human health from airborne pollutants in the Florida District from non-PWC boat use are presented in table 38. Adverse impacts related to use in 2002 would be moderate for CO and HC, and negligible for PM_{10} and NO_x, based on the quantities of emissions and that maximum pollutant levels are less than the NAAQS. By 2012, reductions in emissions of all pollutants would occur as a result of new engine technology required by the EPA, except for NO_x, which is predicted to increase by a very small amount. This increase would occur because the design in two-stroke direct-injection and four-stroke engines required to achieve HC reductions results in slightly higher NO_x emissions. As a result, impacts to human health from non-PWC boat emissions in 2012 would remain moderate for CO, minor for HC, and negligible for PM_{10} and NO_x. CO emission levels would increase due to increased boating activity. Even with the 3.7% increase in boating activity, HC emissions would be less in 2012 than in 2002 because of the continuing introduction of cleaner engines. Overall impact to regional ozone levels in 2012 would be lessened because reductions in HC emissions would be much greater than increases in NO_x emissions.

As carbureted two-stroke engines are 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 PAH that would occur with conversion to four-stroke engines. The human health risk from PAH would be negligible in 2002 and 2012.

Mississippi District. As described in the "Air Quality Methodology" section, boats accounted for approximately 96% of the annual motorized watercraft activity in the Mississippi District of the national seashore in 2002. Based on data provided in the "PWC and Boating Use Trends" section, non-PWC annual boat use in the Mississippi District was estimated at 19,577 vessels in 2002, increasing at approximately 3.7% annually to 28,154 non-PWC boats in 2012.

The impacts to human health from airborne pollutants in the Mississippi District from non-PWC boat use are presented in table 39. Adverse impacts related to use in 2002 would be minor for CO and negligible for PM_{10}, HC, and NO_x. In 2012, human-health-related air quality impacts reflect the predicted 3.7% annual increase in non-PWC activity and a forecasted 50% reduction in engine HC emission rates

compared to 2002. Impacts to human health from PWC air pollutants in 2012 would remain minor for CO and negligible for PM_{10}, HC, and NO_x. CO emission levels would increase due to increased boating activity. Even with the 3.7% increase in boating activity, HC emissions in 2012 would be less than in 2002 because of the continuing introduction of cleaner engines. Overall impact to regional ozone levels in 2012 would be reduced.

Conclusion. Continuing the ban on personal watercraft at Gulf Islands National Seashore would have no impacts on human health for PWC related CO, PM_{10}, HC, and NO_x emissions for the year 2002 and 2012 for both the Florida and Mississippi districts of the national seashore.

Cumulative adverse impacts to human health from airborne pollutants in both 2002 and 2012 in the Florida District would range from negligible for PM_{10} and NO_x to moderate for CO. Cumulative adverse impacts to human health from airborne pollutants in 2002 in the Mississippi District would range from negligible for PM_{10}, NO_x, and HC, to minor for CO. Increased CO emissions and slightly increased NO_x emissions in 2012 would result from increased boating activity and the conversion to new technology engines. However, with improved emission controls, future emissions of HC would continue to decline. The reductions in HC emissions from conversion to cleaner engines would contribute to a reduced impact to regional ozone levels in 2012. All impacts would be long term. The risk from PAH would also be negligible in 2002 and 2012.

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

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. Under alternative A, PWC use at the national seashore would be reinstated in all waters within the Florida District as previously managed under the *Superintendent's Compendium*, and all state regulatory requirements would apply.

Under this alternative, the use of the national seashore by personal watercraft would be reinstated and managed under the management strategies that were in place before the park was closed to PWC use in April of 2002.

Florida District. The impacts to human health from airborne pollutants from PWC use are presented in table 40. Adverse impacts related to PWC use in 2002 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 2012 would remain negligible for CO, PM_{10}, HC, and NO_x, even though the number of personal watercraft in the Florida District would increase from 505 in 2002 to 1,263 in 2012.

Mississippi District. The impacts to human health from airborne pollutants from PWC use are presented in table 41. Adverse impacts related to PWC use in 2002 would be negligible for CO, HC, PM_{10}, and NO_x. As a result of cleaner engines and increased PWC users, impacts to human health from PWC air pollutants in 2012 would remain negligible for CO, PM_{10}, HC, and NO_x even though the number of personal watercraft in the Florida District would increase from 816 in 2002 to 2,041 in 2012.

As carbureted two-stroke engines are 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 PAH that would occur with conversion to four-stroke engines. HC emissions due to PWC use are shown in tables 40 and 41 for the Florida and Mississippi districts, respectively. Because the no-action alternative excludes PWC use, the total emissions listed in these two tables represent the total projected increase in PWC emissions. The human health risk from PAH would be negligible in 2002 and 2012.

TABLE 40: PWC EMISSIONS AND HUMAN HEALTH IMPACT LEVELS AT GULF ISLANDS NATIONAL SEASHORE (FLORIDA DISTRICT) – ALTERNATIVE A

	CO		PM_{10}		HC		NO_x	
	2002	2012	2002	2012	2002	2012	2002	2012
Annual Emissions (tons/year)	9.0	17.9	0.2	0.4	4.5	5.6	<0.1	0.2
Impact Level	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

TABLE 41: PWC EMISSIONS AND HUMAN HEALTH IMPACT LEVELS AT GULF ISLANDS NATIONAL SEASHORE (MISSISSIPPI DISTRICT) – ALTERNATIVE A

	CO		PM_{10}		HC		NO_x	
	2002	2012	2002	2012	2002	2012	2002	2012
Annual Emissions (tons/year)	19.4	38.6	0.4	0.8	9.7	12.1	<0.1	0.4
Impact Level	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Cumulative Impacts. Under alternative A, PWC use would contribute to cumulative impacts related to the pollutants emitted by all motorized vessels.

Florida District. The combined emissions from personal watercraft and other boats are provided in table 42. PWC emissions would contribute to cumulative impacts to air quality under alternative A. Overall, cumulative adverse impacts to human health from airborne pollutants in 2002 would be negligible for PM_{10} and NO_x, and moderate for CO and HC based on the quantities of emissions and maximum pollutant levels that are less than the NAAQS. Overall cumulative adverse impacts to human health from air pollutants in 2012 would remain negligible for PM_{10} and NO_x and moderate for CO and HC.

Conclusion. Alternative A would result in negligible adverse impacts to human health related to the PWC airborne pollutants CO, PM_{10}, HC, and NO_x for the year 2002 in the Florida District. The risk from PAH would also be negligible. In 2012 in the Florida District, there would be increases in CO, PM_{10}, HC, and NO_x emissions, and the impact level for these pollutants would remain negligible, the same as in 2002.

Alternative A would result in negligible adverse impacts to human health related to the PWC airborne pollutants CO, PM_{10}, HC, and NO_x for the year 2002 in the Mississippi District. The risk from PAH would also be negligible. In 2012 in the Mississippi District, there would be increases in CO, PM_{10}, HC, and NO_x emissions and the impact level for these pollutants would remain negligible, the same as in 2002. The total increase in emissions resulting from alternative A for all pollutants is shown in tables 40 and 41 for the Florida and Mississippi districts, respectively.

Cumulative emission levels from all boating use in the Florida District would be negligible for PM_{10} and NO_x and moderate for CO and HC in 2002 and 2012. Cumulative emission levels from all boating use in the Mississippi District would be negligible for PM_{10}, HC, and NO_x in 2002 and 2012. Cumulative emission levels for CO would be minor in 2002 and would increase to moderate in 2012.

Mississippi District. The combined emissions from personal watercraft and other boats are provided in table 43. Overall, cumulative adverse impacts to human health from airborne pollutants in 2002 would be negligible for PM_{10}, HC, and NO_x, and HC and minor for CO based on the quantities of emissions and that maximum pollutant levels are less than the NAAQS. Overall cumulative impacts to human health from air pollutants in 2012 would remain negligible for PM_{10}, HC, and NO_x, but would increase to moderate for CO.

TABLE 42: PWC AND MOTORIZED BOAT EMISSIONS AND HUMAN HEALTH IMPACT LEVELS AT GULF ISLANDS NATIONAL SEASHORE (FLORIDA DISTRICT) – ALTERNATIVE A

	CO		PM_{10}		HC		NO_x	
	2002	2012	2002	2012	2002	2012	2002	2012
Annual Emissions (tons/year)	563.6	908.5	15.3	15.6	235.5	174.7	6.8	18.4
Impact Level	Moderate	Moderate	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible

TABLE 43: PWC AND MOTORIZED BOAT EMISSIONS AND HUMAN HEALTH IMPACT LEVELS AT GULF ISLANDS NATIONAL SEASHORE (MISSISSIPPI DISTRICT) – ALTERNATIVE A

	CO		PM_{10}		HC		NO_x	
	2002	2012	2002	2012	2002	2012	2002	2012
Annual Emissions (tons/year)	73.4	125.4	1.9	2.3	32.2	28.6	0.7	2.2
Impact Level	Minor	Moderate	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Overall, alternative A would have negligible adverse impacts to existing air quality conditions, with future reductions in PM_{10} and HC emissions due to improved emission controls. Overall, PWC emissions of HC are estimated to be less than 1% of the cumulative boating emissions in 2002 and 2012 in both districts. All impacts would be long term.

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

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. Under this alternative, the use of the national seashore by personal watercraft would be reinstated with some additional restrictions to the management strategies in force prior to the closure. The additional restrictions would establish a flat-wake zone 300 yards from all park shorelines at the low-water mark, except at the West Ship Island Pier and around all designated wilderness boundaries where a 0.5-mile flat-wake zone would be established. Furthermore, no PWC operation would be permitted within 200 feet of non-motorized watercraft and people in the water. Human-health air quality impacts from alternative B would be the same as described for alternative A for 2002 and 2012 in both Florida and Mississippi and would be negligible for CO, PM_{10}, HC, and NO_x. The human health risk from PAH would also be negligible in 2002 and 2012. The additional restrictions would not change the type of personal watercraft in use, nor increase or decrease the number of personal watercraft forecasted or their daily duration of use between 2002 and 2012.

Cumulative Impacts. Under alternative B, cumulative impacts from all boating use in the national seashore would not change from alternative A. In the Florida District, adverse impacts to human health from air pollutants in 2002 would be negligible for PM_{10} and NO_x and moderate for CO and HC. In 2012, levels would remain negligible for PM_{10} and NO_x, and moderate for CO and HC. In the Mississippi District adverse, impacts to human health from air pollutants in 2002 would be negligible for HC, PM_{10}, and NO_x, and minor for CO. In 2012, levels would remain negligible for PM_{10}, HC, and NO_x and would increase to moderate for CO.

Conclusion. Because no reduction in PWC use is expected, Alternative B would result in the same air quality impacts to human health from PWC emissions as alternative A. The additional management prescriptions would not noticeably affect PWC emissions as compared to Alternative A, therefore; the total increase in emissions resulting from Alternative A shown in tables 40 and 41 for the Florida and

Mississippi districts, respectively, is the same for Alternative B. Negligible adverse impacts from PWC emissions for CO, PM_{10}, HC, and NO_x would occur for 2002 and 2012 in both the Florida and Mississippi districts. The risk from PAH would also be negligible in 2002 and 2012.

Cumulative adverse impacts from PWC and other boating emissions at the national seashore would be the same as for alternative A. In the Florida District, adverse impacts to human health from air pollutants in 2002 would be negligible for PM_{10} and NO_x and moderate for CO and HC. In 2012, levels would remain negligible for PM_{10} and NO_x, and moderate for CO and HC. In the Mississippi District, impacts would be minor for CO and negligible for PM_{10}, HC, and NO_x, in 2002. In 2012, CO impact would increase to moderate; and impacts for the other pollutants would remain at 2002 levels. Regional ozone emissions would improve due to a reduction in HC emissions.

This alternative would have negligible adverse impacts to human health air quality conditions, with future reductions in PM_{10} and HC emissions due to improved emission controls. The PWC contribution to emissions of HC is estimated to be less than 1% of the cumulative boating emissions in 2002 and 2012. All impacts would be long term.

Implementation of this alternative would not result in an 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 O_3, NO_x, HC and particulate matter. $PM_{2.5}$ and NO_x emissions are evaluated for visibility impairment. HC and NO_x are precursors to the formation of ozone and are evaluated in lieu of ozone emissions.

To assess the impact of ozone on plants, the 5-year ozone index value, called SUM06, was calculated. The Air Resources Division of the National Park Service, based on local monitoring site data, developed SUM06 values used in this analysis.

To assess a level of impact on air quality related values from airborne pollutants, both the emissions of each pollutant related to motorized watercraft activity and the background air quality must be evaluated and then considered according to the thresholds defined below.

	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-hr.
Minor:	Emissions would be less than 100 tons/year for each pollutant.	**and**	SUM06 ozone is less than 15 ppm-hr.
Moderate:	Emissions would be greater than 100 tons/year for any pollutant. **or**	**or**	Ozone injury symptoms are identifiable on plants. **and**

	Visibility impacts from cumulative PWC emissions would be likely (based on past visual observations).		SUM06 ozone is less than 25 ppm-hr.
Major:	Emissions would be equal to or greater than 250 tons/year for any pollutant.	**and**	Ozone injury symptoms are identifiable on plants.
	or		**or**
	Visibility impacts from cumulative PWC emissions would be likely (based on modeling or monitoring).		SUM06 ozone is greater than 25 ppm-hr.

Impairment: Air quality related values in the park would be adversely affected. In addition, impacts would:

- Have a major adverse effect on national seashore resources and values; and
- Contribute to deterioration of the national seashore's air quality to the extent that the seashore's purpose could not be fulfilled as established in its authorizing legislation; or
- Affect resources key to the national seashore's natural or cultural integrity or opportunities for enjoyment; or
- Affect the resource whose conservation is identified as a goal in the national seashore's general management plan or other planning documents.

According to the NPS SUM06 ozone index maps for year 2000 based on rural monitoring sites, the ozone level for the national seashore is 16 to 20 ppm-hr in Florida and 21 to 25 ppm-hr in Mississippi.

Impacts of the No-Action Alternative — Continue Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. Under the no-action alternative, PWC use within Gulf Islands National Seashore would not be reinstated; therefore, there would be no impacts to air quality related values from PWC.

Cumulative Impacts. While PWC use would no longer be allowed within the national seashore, other motorized watercraft would operate at the use levels described in the "PWC and Boating Use Trends" section, and the area would continue to be influenced by other sources of $PM_{2.5}$ and ozone. The cumulative impact analysis includes non-PWC motorized watercraft use, taking into consideration regional use trends as well as current and future emission levels.

Florida District. Cumulative impacts to air quality related values for Florida are shown in table 44. Emissions of NO_x and $PM_{2.5}$ would be less than 50 tons per year for 2002 and 2012; HC emissions would be 231 tons per year for 2002 and 169 tons per year for 2012. The SUM06 ozone data show ozone in the region to be in the range of 16 to 20 ppm-hours, which indicates a moderate adverse impact, however there are no documented ozone effects in the park. Therefore, it is presumed that the HC contribution to ozone-related air quality values would be minor. However, the HC emissions exceed 100 tons per year and the overall cumulative adverse impact in 2002 to air quality related values is classified as moderate. Predicted year 2012 regional SUM06 ozone levels would be in the same range as year 2002 and HC emissions would decrease but would remain greater than 100 tons per year. Therefore, the cumulative adverse impact to air quality related values in 2012 would remain at moderate.

TABLE 44: AIR QUALITY RELATED VALUES IMPACTS FROM PWC AND MOTORIZED BOAT EMISSIONS AT GULF ISLANDS NATIONAL SEASHORE (FLORIDA DISTRICT) – NO-ACTION ALTERNATIVE

Emissions (tons/year)						Visibility Observations and Forecast		Impact Level	
HC		NO_x		$PM_{2.5}$					
2002	2012	2002	2012	2002	2012	2002	2012	2002	2012
231.0	169.1	6.8	18.2	13.9	14.0	No perceptible visibility impacts	No perceptible visibility impacts	Moderate	Moderate
Local Ozone Effects						SUM06 Index Value			
Ozone injury to plants (injury symptoms and monitoring data)		2002		2012					
		No park specific effects documented		No park specific effects anticipated		16 to 20 ppm-hours	16 to 20 ppm-hours <rural monitoring> assumed to be no greater than in 2002		

Source for SUM06 values: NPS Air Quality Division year 2000 monitoring data.

Mississippi District. Cumulative impacts to air quality related values for Mississippi are shown in table 45. Emissions of HC, NO_x, and $PM_{2.5}$ would be less than 50 tons per year for 2002 and 2012. The SUM06 ozone level values for the region are in the range of 21 to 25 ppm-hours, which indicates a moderate adverse impact, however there are no documented ozone effects in the park. Therefore, it is presumed that the HC contribution to ozone-related air quality values would be minor. In 2002, the overall cumulative adverse impact to air quality related values is classified as minor. Predicted year 2012 regional SUM06 ozone levels would be in the same range as year 2002, HC emissions would decrease in 2012, NO_x emissions would increase, but to a lesser extent than the HC decrease, and the overall cumulative adverse impact in 2002 to air quality related values would remain minor.

Conclusion. Under the no-action alternative, personal watercraft would not contribute emissions at the national seashore and there would be no impacts to air quality related values from personal watercraft in both 2002 and 2012. Cumulatively, there would be moderate long-term adverse impacts to air quality related values from all watercraft in the Florida District in 2002 and 2012, and minor long-term adverse impacts to air quality related values in the Mississippi District in 2002 and 2012. These conclusions are based on regional SUM06 values, the lack of existing or anticipated local ozone or visibility effects, and the calculated pollutant emission levels.

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

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. PWC use in Gulf Islands National Seashore would be reinstated according to management strategies in place prior to closure. There would be no locational restrictions or changes in speed limits from those previously enforced.

Florida District. As outlined in the "PWC and Boating Use Trends" section, annual use was estimated to be 505 personal watercraft in Florida in 2000, increasing at approximately 9.6% annually to 1,263 personal watercraft in 2012. Table 46 presents the annual PWC emissions, SUM06 data, and qualitative assessment of visibility and ozone-related effects for 2002 and 2012 under this alternative. Emissions of each pollutant would be less than 50 tons per year in both 2002 and 2012. The SUM06 ozone data show ozone in the region to be in the range of 16 to 20 ppm-hrs, which indicates a moderate adverse impact; however, this value reflects emissions from all local and regional sources of which PWC are a very small component. Therefore, the adverse impact of PWC operation on air quality related values would be classified as minor.

TABLE 45: AIR QUALITY RELATED VALUES IMPACTS FROM PWC AND MOTORIZED BOAT EMISSIONS AT GULF ISLANDS NATIONAL SEASHORE (MISSISSIPPI DISTRICT) – NO-ACTION ALTERNATIVE

Emissions (tons/year)						Visibility Observations and Forecast		Impact Level	
HC		NO_x		$PM_{2.5}$					
2002	2012	2002	2012	2002	2012	2002	2012	2002	2012
22.5	16.5	0.7	1.8	1.3	1.4	No perceptible visibility impacts	No perceptible visibility impacts	Minor	Minor
Local Ozone Effects						SUM06 Index Value			
Ozone injury to plants (injury symptoms and monitoring data)		2002		2012					
		No park specific effects documented		No park specific effects anticipated		21 to 25 ppm-hours	21 to 25 ppm-hours <rural monitoring> assumed to be no greater than in 2002		

Source for SUM06 values: NPS Air Quality Division year 2000 monitoring data.

TABLE 46: AIR QUALITY RELATED VALUES IMPACTS FROM PWC EMISSIONS AT GULF ISLANDS NATIONAL SEASHORE (FLORIDA DISTRICT) – ALTERNATIVE A

Emissions (tons/year)						Visibility Observations and Forecast		Impact Level	
HC		NO_x		$PM_{2.5}$					
2002	2012	2002	2012	2002	2012	2002	2012	2002	2012
4.5	5.6	<0.1	0.2	0.2	0.3	No perceptible visibility impacts	No perceptible visibility impacts	Minor	Minor
Local Ozone Effects						SUM06 Index Value			
Ozone injury to plants (injury symptoms and monitoring data)		2002		2012					
		No park specific effects documented		No park specific effects anticipated		16 to 20 ppm-hours	16 to 20 ppm-hours assumed to be no greater than in 2002		

Source for SUM06 values: NPS Air Quality Division year 2000 monitoring data.

Mississippi District. As outlined in the "PWC and Boating Use Trends" section, annual use was estimated to be 816 personal watercraft in Mississippi in 2000, increasing at approximately 9.6% annually to 2,041 personal watercraft in 2012. Table 47 presents the annual PWC emissions, SUM06 data, and qualitative assessment of visibility and ozone-related effects for 2002 and 2012 under this alternative. Emissions of each pollutant would be less than 50 tons per year in both 2002 and 2012. The SUM06 ozone data show ozone in the region to be in the range of 21 to 25 ppm-hrs, which indicates a moderate adverse impact; however, this value reflects emissions from all local and regional sources of which PWC are a very small component. Therefore, the impact of PWC operation on air quality related values would be classified as minor adverse.

Cumulative Impacts. The cumulative impact analysis includes PWC and other motorized watercraft use, taking into consideration regional use trends as well as current and future emission levels.

Florida District. NO_x and $PM_{2.5}$ emissions would be less than 50 tons per year in 2002, and HC emissions would be 235.5 tons. As described above, SUM06 ozone values for the region are in the range of 16 to 20 ppm-hours. The SUM06 values are moderate, but there are no documented ozone effects in the park. Therefore, it is presumed that the HC contribution to ozone-related air quality values would be minor. However, the HC emissions exceed 100 tons per year and the overall cumulative adverse impact in 2002 to air quality related values is classified as moderate. In 2012, NO_x emissions would slightly increase but remain below 50 tons per year, but there would be a much greater reduction in HC emissions, resulting in improved ozone levels. Predicted year 2012 regional SUM06 ozone levels would be in the same range as year 2002. The cumulative adverse impacts from all motorized vessel use to air quality related values at the Florida District of the national seashore in 2012 would continue to be moderate (table 48).

TABLE 47: AIR QUALITY RELATED VALUES IMPACTS FROM PWC EMISSIONS AT GULF ISLANDS NATIONAL SEASHORE (MISSISSIPPI DISTRICT) – ALTERNATIVE A

Emissions (tons/year)						Visibility Observations and Forecast		Impact Level	
HC		NO_x		$PM_{2.5}$					
2002	2012	2002	2012	2002	2012	2002	2012	2002	2012
9.7	12.1	<0.1	0.4	0.4	0.7	No perceptible visibility impacts	No perceptible visibility impacts	Minor	Minor
Local Ozone Effects						SUM06 Index Value			
Ozone injury to plants (injury symptoms and monitoring data)		2002		2012					
		No park specific effects documented		No park specific effects anticipated		21 to 25 ppm-hours	21 to 25 ppm-hours <rural monitoring> assumed to be no greater than in 2002		

Source for SUM06 values: NPS Air Quality Division year 2000 monitoring data.

TABLE 48: CUMULATIVE AIR QUALITY RELATED VALUES IMPACTS FROM PWC AND OTHER MOTORIZED BOAT EMISSIONS AT GULF ISLANDS NATIONAL SEASHORE (FLORIDA DISTRICT) – ALTERNATIVE A

Emissions (tons/year)						Visibility Observations and Forecast		Impact Level	
HC		NO_x		$PM_{2.5}$					
2002	2012	2002	2012	2002	2012	2002	2012	2002	2012
235.5	174.7	6.8	18.4	14.0	14.3	No perceptible visibility impacts	No perceptible visibility impacts	Moderate	Moderate
Local Ozone Effects						SUM06 Index Value			
Ozone injury to plants (injury symptoms and monitoring data)		2002		2012					
		No park specific effects documented		No park specific effects anticipated		16 to 20 ppm-hours	16 to 20 ppm-hours <rural monitoring> assumed to be no greater than in 2002		

Source for SUM06 values: NPS Air Quality Division year 2000 monitoring data.

Mississippi District. HC, NO_x and $PM_{2.5}$ emissions would be less than 50 tons per year for both years 2002 and 2012. There are likely to be minor cumulative adverse impacts for ozone exposure for year 2002. As described above, although SUM06 ozone values for the region are in the range of 21 to 25 ppm-hours, there are no documented ozone effects in the park. Therefore, it is presumed that the HC contribution to ozone-related air quality values would be minor. In 2002, the overall cumulative adverse impact to air quality related values is classified as minor. Predicted year 2012 regional SUM06 ozone levels would be in the same range as year 2002, HC emissions would decrease in 2012, NO_x emissions would increase, but to a lesser extent than the HC decrease, and the overall cumulative adverse impact in 2002 to air quality related values would remain as minor (table 49).

Conclusion. Minor adverse impacts to air quality related values from PWC would occur in both 2002 and 2012 in both districts of the national seashore. Emissions of each pollutant would be less than 50 tons per year in both 2002 and 2012. Compared to the no-action alternative, projected emission increases are shown in table 47. Moderate adverse impacts from cumulative emissions from motorized boats and PWC in the Florida District and minor adverse impacts to air quality related values from cumulative emissions from motorized boats and PWC would occur in both 2002 and 2012 in the Mississippi District. These conclusions are based on pollutant emissions, no observed visibility impacts or ozone-related plant injury in the national seashore, and regional SUM06 values, with very little influence from existing or forecast national seashore watercraft operations. All impacts would be long term.

TABLE 49: CUMULATIVE AIR QUALITY RELATED IMPACTS VALUES FROM PWC AND OTHER MOTORIZED BOAT EMISSIONS AT GULF ISLANDS NATIONAL SEASHORE (MISSISSIPPI DISTRICT) – ALTERNATIVE A

Emissions (tons/year)						Visibility Observations and Forecast		Impact Level	
HC		NO_x		$PM_{2.5}$					
2002	2012	2002	2012	2002	2012	2002	2012	2002	2012
32.2	28.6	0.7	2.2	1.8	2.1	No perceptible visibility impacts	No perceptible visibility impacts	Minor	Minor
Local Ozone Effects						SUM06 Index Value			
Ozone injury to plants (injury symptoms and monitoring data)		2002		2012					
		No park specific effects documented		No park specific effects anticipated		21-25 ppm-hours	21-25 ppm-hours <rural monitoring> assumed to be no greater than in 2002		

Source for SUM06 values: NPS Air Quality Division year 2000 monitoring data.

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

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. In alternative B, the annual number of personal watercraft using the Gulf Islands National Seashore would be the same as alternative A for both the Florida and Mississippi districts. Additional management prescriptions in alternative B, including flat-wake restrictions, would not affect PWC use numbers and potential future increases. The predicted emission levels and impacts of continued PWC use to air quality related values would be the same as those described for alternative A based on annual emission rates. Impacts to air quality related values from PWC in 2002 and 2012 would be minor.

Cumulative Impacts. Cumulative adverse impacts to air quality related values at the national seashore in both 2002 and 2012 would be the same as described under alternative A. In the Florida District, HC contribution to ozone-related air quality values would be minor. However, the HC emissions exceed 100 tons per year and the overall cumulative adverse impact in 2002 to air quality related values is classified as moderate. In 2012, NO_x emissions would slightly increase but remain below 50 tons per year, but there would be a much greater reduction in HC emissions, resulting in a reduced contribution to ozone levels relative to 2002. Predicted year 2012 regional SUM06 ozone levels would be in the same range as year 2002; the impact would remain moderate. In the Mississippi District, the SUM06 ozone values for the region are in the range of 21 to 25 ppm-hours, and there are no documented ozone effects in the park. Therefore, it is presumed that the HC contribution to ozone-related air quality values would be minor. In 2002, the overall cumulative adverse impact to air quality related values is classified as minor. Predicted year 2012 regional SUM06 ozone levels would be in the same range as year 2002, HC emissions would decrease in 2012, NO_x emissions would increase, but to a lesser extent than the HC decrease, and the overall cumulative adverse impact in 2012 to air quality related values would remain minor.

Conclusion. The impacts of alternative B on air quality related values would be the same as alternative A. Emissions of each pollutant would be less than 50 tons per year in both 2002 and 2012. Compared to the no action alternative projected emission increases are shown in table 47. Minor adverse impacts to air quality related values from PWC would occur in both 2002 and 2012 in both districts of the national seashore. In both 2002 and 2012, adverse impacts from cumulative emissions from motorized boats and PWC would be moderate in the Florida District, and minor in the Mississippi District. This conclusion is

based on calculated levels of pollutant emissions, regional SUM06 values, and the lack of observed visibility impacts or ozone-related plant injury in the national seashore.

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

SOUNDSCAPES

The primary soundscape issue relative to PWC use is that other visitors may perceive the sound made by personal watercraft as an intrusion or nuisance, thereby disrupting their experiences. This disruption is generally short term because personal watercraft travel for a relatively short time along the shore and spend most of the time in outlying areas. However, PWC occasionally congregate in popular shoreline areas with other visitors, and as PWC use increases, related noise may become more of an issue, particularly during certain times of the day. Additionally, visitor sensitivity to PWC noise varies from fisherman (more sensitive) to swimmers at popular beaches (less sensitive).

GUIDING REGULATIONS AND POLICIES

The fundamental mission of the national park system, established in law (16 USC 1 *et seq.*), is to conserve park natural and historic resources, and to provide for the enjoyment of park resources only to the extent that the resources will be left unimpaired for the enjoyment of future generations. As described in section 1.4.6 of *Management Policies 2001* (NPS 2000d), natural soundscapes are recognized and valued as a park resource in keeping with the NPS mission.

The natural soundscape, sometimes called natural quiet, is the aggregate of all of the natural sounds that occur in parks, together with the physical capacity for transmitting natural sounds. Management goals for soundscapes are included in section 4.9 of *Management Policies 2001* (NPS 2000d) and in *Director's Order 47: Soundscape Preservation and Noise Management* (NPS 2000b). The NPS management objectives for managing sound in Gulf Islands National Seashore, which are presented in the preceding section, reflect the management goals of these two documents.

Management Policies 2001 (NPS 2000d) requires restoration of degraded soundscapes to the natural condition whenever possible, and protection of natural soundscapes from degradation. In section 4.9, the National Park Service is 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."

Visitor uses of parks will only be allowed if they are appropriate to the purpose for which a park was established, and can be sustained without causing unacceptable impacts on park resources or values (sections 8.1 and 8.2 of *Management Policies 2001*). Unless mandated by statute, the National Park Service does 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 or historic locations within Gulf Islands National Seashore.

Director's Order 47: Soundscape Preservation and Noise Management (NPS 2000b) requires, "to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources." It also states that "the fundamental principle underlying the establishment of soundscape preservation objectives is the obligation to protect or restore the natural soundscape to the level consistent with park purposes, taking into account other

applicable laws." Noise is generally considered appropriate if it is generated from activities consistent with park purposes and at levels consistent with those purposes.

Director's Order 47 provides the following policy direction: "Where natural soundscape conditions are currently not impacted by inappropriate noise sources, the objective must be to maintain those conditions. Where the soundscape is found to be degraded, the objective is to facilitate and promote progress toward the restoration of the natural soundscape." Where legislation provides for specific noise-making activities in parks, the soundscape management goal would be to reduce the noise to the level consistent with the best technology available, which would mitigate the noise impact but not adversely affect the authorized activity. Where a noise-generating activity is consistent with park purposes, "soundscape management goals are to reduce noise to minimum levels consistent with the appropriate service or activity."

A key concept for noise management in both *Management Policies, 2001* and *Director's Order 47* is the purpose for which a park was established. The legislative intent of Gulf Islands National Seashore is to provide for recognition of certain historic values such as coastal fortifications and other purposes such as the preservation and enjoyment of undeveloped barrier islands and beaches (Public Law 91-660). Gulf Islands National Seashore preserves certain outstanding natural, cultural and recreational resources along the Northern Gulf Coast of Florida and Mississippi. These include several coastal defense forts spanning more than two centuries of military activity, historic and prehistoric archaeological sites, and pristine examples of intact Mississippi coastal barrier islands, salt marshes, bayous, submerged grass beds, complex terrestrial communities, emerald green water, and white sand beaches.

NPS regulations pertaining to noise abatement for boating and other water use activities in parks nationwide are included in 36 CFR 3.7. These regulations prohibit 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 specify testing procedures to determine such noise levels. Watercraft that exceed these levels are subject to fine and removal from the recreation area.

It is important to note that this NPS regulation and the testing procedure were developed for enforcement purposes, not impact assessment purposes. Nonetheless, it is reasonable to assume for this analysis that 82 decibels at 82 feet is the maximum that would be emitted by any legal watercraft at full acceleration (normally the loudest portion of its operation). This regulation sets a limit for the maximum allowable noise, but does not imply that there are no noise impacts from vessels operating below that noise level.

The States of Florida and Mississippi have adopted legislation that regulates PWC operation. Florida state PWC regulations that may have impacts on national seashore soundscapes include timing restrictions. Personal watercraft cannot be operated from one-half hour after sunset to one-half hour before sunrise. Mississippi state PWC regulations that may have impacts on soundscapes in recreational areas include usage areas. Personal watercraft are restricted to flat-wake speed within 100 feet of any small craft, marina, public boat launch ramp, or behind a water skier.

METHODOLOGY AND ASSUMPTIONS

The methodology used to assess PWC-related noise impacts in this document is consistent with NPS *Management Policies 2001* (NPS 2001d), *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* (NPS 2000b). Specific factors at Gulf Islands National Seashore 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 noise levels at Gulf Islands National Seashore are influenced by visitor activities, watercraft, military over flights, commercial fishing boats, large ships, waves, and wind. Noise influences and levels differ over the 160-mile span of Gulf Islands National Seashore from Florida to Mississippi. Due to easy seashore access in Florida, a variety of watercraft are used at the seashore in the summer season, e.g., ski boats, personal watercraft, runabouts, day cruisers, sailboats, houseboats, canoes, kayaks, and rowboats. Watercraft are most heavily used in the Perdido Key area and along the Santa Rosa Island shoreline due to the easy access of marinas, boat launches, rental facilities and calm waters. Most local PWC rental operations do not allow their machines to leave prescribed areas and their PWC usually do not operate in park waters (NPS 2001a). In the Mississippi region of the national seashore, large pleasure craft are the primary vessels used to access the islands due to their location 9 to 14 miles off the mainland. Many of the pleasure craft tow personal watercraft for recreational usage at the islands. Personal watercraft are most heavily used at East and West Ship Islands. Natural sounds are evident throughout the park; however, there are limited beach and water areas within the national seashore where motorized watercraft can not be heard occasionally. (

Temporal Factors: *Time Periods of Interest* — PWC use at Gulf Islands National Seashore is highly variable throughout the year due to bad weather, including hurricanes. Primary use occurs in June and July. During the PWC use period, personal watercraft make up approximately 4% of the total number of watercraft in the Mississippi Region and 0.5% in the Florida Region. On a daily basis, peak use occurs during mid-day. Use generally stops during periods of inclement weather (e.g., cold and thunderstorms).

Time periods of greater sensitivity to noise impacts include sunset, sunrise, and early morning, and night time when visitors may be in camp and when wildlife may be more active. However, shoreline species, such as nesting shorebirds may be more active during daylight hours; this is considered in the impacts to aquatic fauna section and the wildlife section. Wildlife may be equally or more sensitive during the day depending on species and other factors.

Duration and Frequency of Occurrence of Noise Impacts — In areas of concentrated PWC use, noise from personal watercraft (and other boat types) can be present intermittently from early morning to sunset. In areas of lower use, noise from personal watercraft (and other boat types) can be occasional, usually lasting a few minutes. However, an average of 25 personal watercraft are used in the Perdido Key area (Florida District) on peak holidays such as Memorial Day. On a typical summer day, approximately four to five personal watercraft are used in the same area.

Intensity: PWC-generated noise varies from vessel to vessel. NPS 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 2001 noise study (Harris Miller Miller & Hanson, Inc. 2002) included measurement of reference pass-bys for a number of vessels, including personal watercraft, and characterization of the noise sources. Measurements were taken from August 14 through August 18, 2001 at Crosby Canyon (a high-watercraft-use site), the middle of Last Chance Canyon (a moderate-use site), the end of Last Chance Canyon (a low-use site), and Rainbow Bridge.

These pass-by measurements are for individual machines. Measurements are not 100% additive for multiple machines passing at or about the same time because of the logarithmic relationships involved. However, multiple machines add a complex of sound characteristics that, in general, is perceived by a listener as being louder and of greater duration. Measurements of multiple machines reflect those characteristics. The pass-by recordings were made using a microphone mounted above

the front of an instrumented boat (Harris Miller Miller & Hanson Inc. 2002). Analysis of the data for individual watercraft indicated the following.

- Maximum sound levels for personal watercraft at 25 meters (82 feet) ranged from approximately 68 to 76 decibels.
- Maximum sound levels at 25 meters for other motorcraft ranged from about 65 to 77 decibels for most motorboats, and up to 86 decibels for boats with V-8 engines.
- Except for the boats with V-8 engines, no significant differences were found in the sound levels produced by personal watercraft and the other boats in the study.

Personal watercraft sound levels at steady speeds were measured in the 70- to 80-decibel range. However, sound levels varied rapidly as personal watercraft maneuvered and jumped wakes. Figure 11 shows fluctuations over a range of about 5 decibels for two or three personal watercraft circling during a 2-minute period, with a 180-degree turn producing a fluctuation of 10 decibels. (People usually perceive a 10-decibel increase in sound level to be "twice as loud" and a 10-decibel decrease to be "half as loud," assuming that the frequency content of the sound does not change.) In contrast, a time history (not included here) of a typical small outboard motorboat showed fluctuations of only a couple of decibels.

Manufacturers' literature indicates that the newer four-stroke personal watercraft are quieter than those with two-stroke engines. In addition, vehicles powered by two-stroke engines may be more noticeable than those powered by four-stroke engines because they tend to have a higher-pitched engine sound. However, because no four-stroke personal watercraft were observed during the 2001 study at Glen Canyon National Recreation Area, no comparative data were collected.

Many factors other than the engine type influence the sound level emitted from a personal watercraft. Some of these include exhaust configuration, muffling, vessel shape, insulation, and engine size. As a result, some two-stroke powered vessels may be quieter than some four-stroke powered vessels. Operator behavior, such as rapid acceleration and deceleration, jumps, and high speed, can have an even larger influence on sound emissions than engine type.

Many watercraft, including personal watercraft, emit their exhaust beneath the vessel into the water, which tends to muffle the sound. However, there are times when the bottom of the personal watercraft is exposed, such as during high-speed turns, when the operator jumps over waves or the wakes of other boats, or when the craft bounces on the water. Such exposure of the bottom of the craft and exhaust can cause noise emissions to fluctuate substantially. Measurements during the 2001 study showed that the fluctuations tended to be greater for personal watercraft than for motorboats.

The 2001 study indicated that use of personal watercraft currently does not exceed existing noise standards. Regardless of future NPS management actions, it is anticipated that noise from personal watercraft may decline from current levels. Noise-reducing measures that are being incorporated into the manufacture of vessels, such as the use of more rubber, the reduction of vibrations, and use of quieter four-stroke engine and exhaust technology could contribute to noise reduction assuming that quieter machines become widely used and that usage does not increase. Assertive education programs, by the personal watercraft industry, and regulatory action could help reduce noise by encouraging personal watercraft users to change noise-producing behaviors, or to limit their extent to certain areas. Such behaviors include wake jumping, rapid changes in speed or direction, and excessive revving.

Context, time, and intensity determine the level of impact for an activity. For example, noise for a certain period and intensity would have a greater impact in a highly sensitive context, and a given intensity would have 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 judgment based on a documented rationale must be used to determine which impact level best applies to the situation being evaluated.

PWC noise travels in relationship to the speed of the craft, the distance from shoreline, and other influences. To estimate the relative impacts of PWC use, the following methodology was applied:

1. Data from the 2001 watercraft noise study at Glen Canyon National Recreation Area 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 personal watercraft launch and operate offshore. Personal observations from park staff were used to identify these areas as well as determine the number of personal watercraft and timeframes 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.

4. In this assessment the noise of two or more personal watercraft operating at the same time (when one unit produces 76 dB), and at a distance of 25 meters (27 yards) from the source, was shown to be 79 dB.[4] Consequently, the noise levels at 274 meters (300 yards), and based on PWC average numbers per hour estimated in the user trend section of this report are depicted in tables 50 and 51.[5] These calculations show potential noise levels for the maximum anticipated number of PWC, operating simultaneously at full power.

Sound levels generated by motorized craft in 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 soundscape 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 number of personal watercraft per day on a peak use summer day by district in the national seashore area was assumed from table 23 presented in the "PWC and Boating Use Trends" section of this chapter.
- Personal watercraft commonly operate farther than 150 feet from the shoreline; the farther from shore, the lower the noise level to shoreline visitors.
- Noise levels within flat-wake zones are less than at full throttle and occur for short durations.
- Ambient noise levels at most locations include wind, waves, aircraft, large ships, commercial fishing boats, other visitor activities, and other motorboats.

4. The equation used was $10 \times \log ((10^{82/10}) + (10^{82/10})) = 79$ dB

5. The equation used was $20 \times \log (D1/D2)$
where D1 = the location to be calculated
D2 = the distance of the known noise source

TABLE 50: PWC NOISE LEVELS (dBA)[a] IN AIR AT SPECIFIED AREAS IN FLORIDA DISTRICT

Location	Perdido Key Area	Area North of Santa Rosa Island	Gulf-Side Waters
2002			
Number of PWC	25	12	2
Noise level at 25 meters[b] (27 yards)	90	87	79
Noise level at 274 meters (300 yards)	69	66	58
Noise level at 805 meters (0.5 mile[c])	60	57	49
2012			
Number of PWC	63	30	5
Noise level at 25 meters[b] (27 yards)	94	91	83
Noise level at 274 meters (300 yards)	73	70	62
Noise level at 805 meters (0.5 mile[c])	64	61	53

a. Noise levels shown assume all PWC at full power, with the noise level of 1 PWC = 76 dBA at 25 meters; PWC at flat-wake speed would have noise level of approximately 69 dBA at 25 meters.

b. Noise levels at 25 meters for more than 2 or 3 PWC are not meaningful because of physical limitations.

c. Noise levels at distances of 300 meters and 0.5 mile are calculated above on the basis of divergence only; at 0.5 mile there would likely be an additional 2 dBA reduction due to atmospheric absorption

TABLE 51: PWC NOISE LEVELS (dBA)[a] IN AIR AT SPECIFIED AREAS IN MISSISSIPPI DISTRICT

Location	Horn Island Sound Side	Horn Island Gulf Side	Petit Bois Sound Side	Petit Bois Gulf Side	Ship Islands Sound Side	Ship Islands Gulf Side
2002						
Number of PWC	48	12	24	7	56	14
Noise level at 25 meters[b] (27 yards)	93	87	90	85	94	87
Noise level at 274 meters (300 yards)	71	65	68	63	73	66
Noise level at 805 meters (0.5 mile[c])	63	57	60	55	63	57
2012						
Number of PWC	120	30	60	20	143	35
Noise level at 25 meters[b] (27 yards)	97	91	94	89	98	91
Noise level at 274 meters (300 yards)	75	69	72	67	77	70
Noise level at 805 meters (0.5 mile[c])	67	61	64	59	67	61

a. Noise levels shown assume all PWC at full power, with the noise level of 1 PWC = 76 dBA at 25 meters; PWC at flat-wake speed would have noise level of approximately 69 dBA at 25 meters.

b. Noise levels at 25 meters for more than 2 or 3 PWC are not meaningful because of physical limitations.

c. Noise levels at distances of 300 meters and 0.5 mile are calculated above on the basis of divergence only; at 0.5 mile there would likely be an additional 2 dBA reduction due to atmospheric absorption.

IMPACT ANALYSIS AREA

The impact analysis area for soundscapes is related to the area of PWC use and the distance that PWC noise travels. Personal watercraft had been allowed to operate in many locations in the Florida region of Gulf Islands National Seashore. However, personal watercraft use was restricted through speed, location, and seasonal regulations in the designated areas listed below. No federal or state regulations specifically limit watercraft use for noise abatement.

- The lagoons of Perdido Key within Big Lagoon are closed to all combustion engines.
- The areas 200 feet from the remnants of the old fishing pier and 200 feet from the new fishing pier at Fort Pickens are closed to all boating operations.
- Operating a vessel in excess of 5 mph or creating a wake is prohibited within 500 feet of the Fort Pickens Pier and within the posted area on the north side of Perdido Key near the Fort McRee site.
- Seasonal closures within the seashore to protect wildlife and habitat according to the *Superintendent's Compendium* (NPS 2003a), (see "Wildlife" section for more detail).

Personal watercraft were allowed to operate in the Mississippi region of the national seashore. However, personal watercraft use was restricted through speed, location, and seasonal regulations in the designated areas listed below.

- No motorized vehicles are allowed above the mean high tide line on the designated wilderness islands of Horn and Petit Bios.
- The lakes, ponds, lagoons, and inlets of East Ship Island, West Ship Island, Horn Island, Petit Bois Island, and Cat Island are closed to all motorized vehicles.
- Operating a vessel in excess of 5 mph or creating a wake is prohibited within 500 feet of the Davis Bayou launch ramp, the Ship Island Pier, the Horn Island Pier, and within the buoyed, flat-wake zone at Spoil Island.
- Seasonal closures within the seashore to protect wildlife and habitat according to the *Superintendent's Compendium* (NPS 2003a), (see "Wildlife" section for more detail).

In Florida, external influences that provide relatively high ambient sound include ships in the intracoastal waterway and military over-flights originating from Pensacola Naval Air Station and Eglin Air Force Base. External influences in the Mississippi region come from the commercial fishing boats and other large ships in the intracoastal waterway.

PWC noise is reduced over distance. Compared to the noise level at a distance of 50 feet, a reduction of approximately 34 dBA would be expected over a distance of 0.75 mile, with the noise from a single personal watercraft reduced to 34–42 dBA, which is a less than daytime ambient noise level anticipated in the more populated recreation areas. Noise levels would be greater with multiple watercraft. Thus, the impact analysis area for soundscapes will be taken as the NPS jurisdictional waters area, shoreline, and the 0.75-mile inland shore area.

IMPACT TO VISITORS FROM NOISE GENERATED BY PERSONAL WATERCRAFT

After estimating the number of personal watercraft, the range of relative noise generated by personal watercraft, 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, mostly immeasurable.

Minor: Natural sounds would predominate in areas where management objectives call for natural processes to predominate, with motorized noise infrequent and 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), and in a minority of the area. 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 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 adverse, major 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 authorizing legislation; would affect resources key to the park's natural or cultural integrity or opportunities for enjoyment; or would 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 Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. Under this alternative, PWC use would not be reinstated within national seashore waters. There would be no noise generated by the launching and operating of personal watercraft in Gulf Islands

National Seashore, and therefore no impact to anglers, non-motorized boat users, campers, and other park visitors from PWC use within the park.

Cumulative Impacts. Cumulative noise sources in Gulf Islands National Seashore include natural sounds such as waves or wind, aircraft, commercial fishing boats, large ships, other motor boats, and other visitor activities. Motorized boating activities within the seashore generate noise levels similar to those from personal watercraft, but personal watercraft comprise only 0.5% and 4% of total motorized watercraft use in Florida and Mississippi. The cumulative impacts of boating noise and ambient noise levels would range from negligible to minor, depending on the location within the unit and the time of year. Noise levels are elevated in the Florida unit due to adjacent land uses, existing boating activity, air traffic, and transportation corridors. Noise impacts would be negligible to minor to other visitors and minor for the natural soundscape in the Florida district, as these noise levels are the ambient condition. In the Mississippi district, noise impacts would be negligible to minor as natural sounds would prevail; motorized noise would be infrequent or absent in the majority of areas, including the wilderness area.

PWC use would continue outside the boundaries of the national seashore in the waters of the Gulf of Mexico. Therefore, particularly in Florida, minor adverse effects could occur in the national seashore from PWC operation outside park boundaries. These impacts would result from the close proximity of PWC use that would continue in non-NPS managed waters and the potential for some PWC users to inadvertently cross over into NPS managed waters and facilities. However, in the Mississippi district personal watercraft would not be used in great numbers outside park boundaries due to the distance from the mainland and the nearness of the intracoastal waterway, which in combination create inhospitable PWC use conditions.

Conclusion. The soundscape at the national seashore would not be impacted by the use of personal watercraft within the national seashore. Cumulative impacts of boating noise and ambient noise levels would range from negligible to minor, depending on the location, within the unit, the time of day, and the time of year. Impacts would typically be short in duration (i.e., a passing motorboat) but over the long-term. Projected increased PWC use levels outside of the park boundaries would not increase the severity of noise impacts.

Implementation of this alternative would not result in an impairment of the park's soundscape.

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. Under alternative A, PWC use would be reinstated within Gulf Islands National Seashore, as it was managed prior to closure to personal watercraft on April 22, 2002. As shown in table 23, PWC annual use levels are projected to increase by 9.6% through 2012, to 1,263 in Florida and 2,041 in Mississippi. The distribution and regulation of personal watercraft under this alternative would continue the same pattern of use that existed prior to closure. PWC use would be allowed throughout the national seashore and would be restricted by previous speed, area, and seasonal regulations. In Gulf Islands National Seashore, PWC users generally recreate on the north, sound-side areas of the park, specifically Perdido Key in Florida and the East Ship and West Ship islands in Mississippi. Moreover, PWC activity is higher near the launch and shoreline use areas as well as the sheltered coves with lake-like conditions.

PWC use patterns in the park are characterized by several people per personal watercraft who take turns riding. A personal watercraft will return to the area where a group is picnicking/camping to rest or switch riders. From park observations, personal watercraft generally run at higher speeds (and higher noise levels) after they have left the launch or picnic/camping areas and have gotten out into open water. Users

at the picnic areas or swimming areas where personal watercraft are allowed are exposed to PWC noise as they come in and out of the shore area and to the noise of personal watercraft that may be operating at high speeds in the vicinity. The impact from a personal watercraft coming into the shore area is dependent on the distance from shore that the operator slows down and at what speed they approach the shoreline. One personal watercraft operating at 50 feet from shore at 40 mph would generate noise levels of approximately 78 dBA to a shoreline observer; at 20 mph, the noise level would be approximately 73 dBA. At a distance of 100 feet, the noise level would be approximately 6 dBA less than at a distance of 50 feet. The noise level from two identical watercraft would be 3 dBA higher than from a single vessel. With new designs of personal watercraft, engines are likely to be quieter in the future, though calculations for noise levels in 2012 were made using current engine data.

In Florida, personal watercraft are not restricted to any state specified minimum speeds; however, in Escambia County, Florida, PWC regulations restrict speeds to no more than idle speed within 200 feet of any fishing pier, dock, wharf, designated swimming area, or within 200 feet of the shoreline except within designated PWC operation areas or when in transit to and from the shoreline. In Mississippi, personal watercraft are restricted to minimum speeds necessary to maintain steerageways within 100 feet adjacent to any small craft, marina, or public boat launch ramp.

Overall, noise from personal watercraft would be expected to be short in duration but occur over the long term. Noise impacts would be negligible to moderate adverse depending on the location, within the unit, the time of day, and the time of year. Minor adverse impacts would occur where use is infrequent and distanced from other park users; for example, if PWC users operated far from shore. With more frequent or constant PWC use, adverse impacts would be moderate when the use occurs in an area where motorized watercraft use is consistent with park objectives and existing watercraft facilities, as in those areas around the Ship Islands and Perdido Key. PWC noise levels may be higher than 90 dBA in some areas where PWC access near shore waters (see tables 50 and 51) Moderate adverse impacts would occur from highly concentrated PWC use in one area, as on the highest PWC use days of the year, such as on the Memorial Day holiday weekend. Although noise levels may be bothersome for some, most visitors in the Florida region of Gulf Islands National Seashore would expect to hear motorized noises from personal watercraft and other motorized watercraft on a busy holiday weekend. Use is consistent with the park purpose of supplying visitors with water-based recreational opportunities. Since motorized noise would be expected to be infrequent and at low levels due to use restrictions, minor adverse impacts might occur if PWC users choose to operate in areas of the park that are away from launch areas and campgrounds, and where shoreline visitors would be anticipating a quiet, wilderness experience such as Horn and Petit Bois Islands. Noise generated In 2012, the projected increase in PWC use could result in higher levels of noise from PWC engines. However, it is possible that newer technology engines will be quieter, and thus higher levels of noise impacts potentially would not occur. Without specific information on reductions in PWC engine noise, calculations were based on the current noise levels emitted from PWC engines.

Cumulative Impacts. Additional noise sources in Gulf Islands National Seashore include natural sounds such as waves or wind, aircraft, commercial fishing boats, large ships, other motor boats, nearby construction and dredging activities, and other visitor activities. Boating activities in the national seashore are capable of generating noise levels higher than personal watercraft due to the number of watercraft, (99.5% and 96% of total motorized watercraft use in Florida and Mississippi, respectively), their area of operation, and the noise characteristics of motorboats, which operate at similar and higher noise levels than personal watercraft. Although many motorboats can generate higher sound levels than personal watercraft, most are generally not perceived to be as annoying due to their more typical steady rate of speed and direction. However, at Gulf Islands National Seashore, high-powered speedboats may have noise levels much higher than other watercraft.

Cumulative adverse impacts on the Gulf Islands National Seashore soundscape from personal watercraft, boating, and other noise sources would be long-term and negligible to moderate, depending on the location, within the unit, the time of day, and the time of year. The cumulative impacts from all vessels would be more severe than from personal watercraft alone because there are more than 20 times the total number of watercraft than personal watercraft.

Conclusion. Noise from personal watercraft would be short-term in duration but would be expected to occur over the long-term. Impacts would be negligible to moderate adverse depending on the location, within the unit, the time of day, and the time of year. Impacts would be related to the number of personal watercraft operating as well as the sensitivity of other visitors, and would be highest during summer weekends and holiday periods that are potential times of peak use. Based on current engine noise levels, impacts to the soundscape would increase by 2012, along with the projected increase in PWC use. However, engine technology may be quieter in the future, lessening the increase in noise levels.

Cumulative adverse noise impacts from personal watercraft and other watercraft, commercial boats, and aircraft would be negligible to moderate, and would predominate on busy days during the high use season. Impacts would be short in duration but occur over the long-term because of the high volume of annual boating use, and could increase with increased boating use in the future. Impacts may increase in 2012 due to the projected increase in motorized boat use within the national seashore.

Implementation of this alternative would not result in an impairment of the park's soundscape.

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. Under alternative B, a special regulation would be written to reinstate personal watercraft use. Additional management strategies would mitigate watercraft safety concerns, protect natural and cultural resources, and enhance overall visitor experience.

PWC use would follow the same patterns assumed in alternative A; however, alternative B would implement flat-wake zoning for personal watercraft to help minimize the effects of PWC noise to park visitors, including anglers and near shoreline users of the swimming, picnic, and camping areas. The magnitude of noise near the speed restriction areas would be dependent on the changes in location and speed of the personal watercraft. As described in the analysis for alternative A, a reduction from 40 mph to 20 mph would reduce PWC noise levels approximately 5 dBA. Noise reductions would occur with reductions in speed limits below 20 mph. Increasing the distance from the personal watercraft to the listener from 100 to 200 feet would result in a noise reduction of about 6 dBA.

The types of adverse impacts to the soundscape of Gulf Islands National Seashore would be generally the same as alternative A because of the type of sound. However, the level of impact would be less due to increased distances between the PWC activity and shoreline activity. Overall, negligible to minor adverse impacts would result from PWC use on the soundscape of the national seashore. Impacts would generally be short in duration but occur over the long-term. Although they could periodically be more frequent at shoreline areas on very high use days where motorized watercraft noise may predominate for most of the day, most visitors to Gulf Islands National Seashore during those high use periods expect to hear motorized craft during the day, as the seashore is known for providing this type of recreational opportunity in addition to other activities. Since motorized noise would be expected to be infrequent and at low levels due to use restrictions, minor adverse impacts might occur if PWC users choose to operate in areas of the park that are away from launch areas and campgrounds, and where shoreline visitors would be anticipating a quiet, wilderness experience such as Horn and Petit Bois Islands. As in alternative A,

impacts could potentially increase if the noise output on newer engines does not decrease substantially enough to overcome the increase in PWC use.

Cumulative Impacts. Additional noise sources in Gulf Islands National Seashore include natural sounds such as waves or wind, aircraft, commercial fishing boats, large ships, other motor boats, nearby construction and dredging activity, and other visitor activities. Boating activities in the national seashore are capable of generating noise levels higher than personal watercraft due to the number of watercraft, (99.5% and 96% of total motorized watercraft use in Florida and Mississippi, respectively), their area of operation, and the noise characteristics of motorboats, which operate at similar and higher noise levels than personal watercraft. Although many motorboats can generate higher sound levels than personal watercraft, most are generally not perceived to be as annoying due to their more typical steady rate of speed and direction. However, at Gulf Islands National Seashore, high-powered speedboats may have noise levels much higher than other watercraft.

Cumulative adverse impacts on the Gulf Islands National Seashore soundscape from personal watercraft, boating, and other noise sources would be long-term and negligible to moderate, depending on the location, within the unit, the time of day, and the time of year. The cumulative impacts from all vessels would be more severe than from personal watercraft alone because there are more than 20 times the total number of watercraft than personal watercraft.

Conclusion. Noise from personal watercraft would be short-term in duration but would be expected to occur over the long-term. Impacts would be negligible to minor adverse depending on the location, within the unit, the time of day, and the time of year. Flat-wake zoning would reduce noise levels from PWC in shoreline areas, specifically those areas around Horn and Petit Bois Islands. Impact levels would relate to the number of personal watercraft operating as well as the sensitivity of other visitors and could potentially increase by 2012 based on noise levels of newer engine technology.

Cumulative adverse noise impacts from personal watercraft and other watercraft, commercial boats, and aircraft would be negligible to moderate. Impacts would be short in duration but occur over the long-term because of the high volume of annual boating use, and could increase with increased boating use in the future.

Implementation of this alternative would not result in an impairment of the park's soundscape.

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, wakes created by personal watercraft may affect shorelines through erosion by wave action.

GUIDING REGULATIONS AND POLICIES

According to NPS management policy, natural shoreline processes such as erosion, deposition, overwash, inlet formation, and shoreline migration 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 *Management Policies 2001,* NPS 2000d, 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 whenever possible.

METHODOLOGY AND ASSUMPTIONS

Potential impacts to shoreline vegetation and to the shoreline itself (erosion that can affect shoreline communities) were evaluated based on the pattern of use of motorized watercraft in the Gulf Islands National Seashore, the nature of the shoreline and vegetation present, and the professional judgment and observations of national seashore staff. To assess the magnitude of impacts from PWC use on shoreline vegetation, the following assumptions were made:

Basic assumptions were made regarding personal watercraft and visitor activities, as follows:

1. The majority of PWC users operate their craft in a lawful manner.

2. Approximately 39 personal watercraft are in the Florida District of Gulf Islands National Seashore during a peak summer day for an average of 3 hours per day, and 161 in the Mississippi District for an average of 4 hours per day (table 20).

3. Generally, impacts are expected to increase in 2012 due to the estimated projected 9.6% annual increase in personal watercraft over the next 10 years. Approximately 501 personal watercraft would be on the national seashore waters in 2012 on a peak use day.

4. PWC users who disembark on the shore would travel no more than 100 feet inland and would follow existing trails.

IMPACT ANALYSIS AREA

The area of analysis includes shoreline areas within the national seashore and the land 100 feet inland. The 100-foot area encompasses an area where PWC users would be expected to roam after landing their craft.

Magnitude of Effects

Shoreline and submerged aquatic vegetation impacts were determined by examining the potential effects of PWC and visitor use on vegetation, according to type and sensitivity. The number of personal watercraft and visitors and their distribution was based on the analysis provided in "PWC and Boating Use Trends" section.

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 personal watercraft; no impacts or impacts with only temporary effects are expected.

Minor: Shoreline vegetation or submerged aquatic vegetation communities are present, but in low numbers. Occasional impacts are expected, but with no impacts or

very limited impacts that are not expected to threaten the continued existence of plant 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 plant species or viable functioning communities in the national seashore.

Major: Shoreline vegetation or submerged aquatic vegetation 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 plant species or communities 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 to national seashore 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 authorizing 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 national seashore planning documents.

Impacts of the No-Action Alternative — Continue Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. PWC use in Gulf Islands National Seashore would not be reinstated under the no-action alternative. There would be negligible impacts to shoreline vegetation from PWC access and no direct or indirect physical disturbance to vegetation communities from PWC operation.

Continuing the prohibition on PWC use within the national seashore would be no impacts on submerged aquatic vegetation. Seagrass beds would not be subjected to PWC-related impacts.

Cumulative Impacts. Cumulative impacts to shoreline vegetation resources would consist of non-PWC related visitor use including motorized boating, camping, hiking, and other shoreline activities. Sensitive shoreline vegetation that would be susceptible to impacts from visitor activities includes marsh and dune communities.

All of the national seashore islands support both fresh and saltmarsh communities, especially along the north shorelines. The majority of marshes are small and scattered, but some extensive salt marsh communities are located in the Florida District, including the east and west ends of Perdido Key, Big Sabine at Santa Rosa, and three ponds at Fort Pickens (Hoggard 2003d).

The most vulnerable marsh environments in the Mississippi District include the ponds and lagoons on East Ship and Cat islands, and the Davis Bayou Channel (Hopkins 2003). However, these areas are closed

to motorized vessel use. Freshwater marshes are often isolated and associated with ponds, swales, and ditches. Saltmarsh communities tend to be located along the shoreline and are often exposed to open waters, making them more susceptible to erosion from boating induced wave action among the emergent shoreline vegetation communities in the area.

Motorized boating would be a source of minor to moderate adverse impacts through wave-induced erosion to the sensitive saltmarsh communities within the national seashore. Due to the wet nature of salt marshes, they are not conducive to other types of visitor activities and adverse impacts from visitor activities other than boating would be negligible.

Dune communities within the national seashore are typically dry, but swales between dunes can support grasses or wetland vegetation. These dune environments are susceptible to trampling or other disturbances from visitors, in addition to erosion from boating caused wake action. The most sensitive of these areas in the Florida District are protected by the relic dune closures and over-sand foot traffic closures mandated in the *Superintendent's Compendium* (NPS 2003a) and described in the "Threatened and Endangered Species" section of this chapter. Visitor activities including camping, hiking, and boating would cause minor to moderate impacts to some dune communities not protected by closures within the national seashore.

Failure to protect fragile dune habitat that supports *Balduinia augustifolia* and the solitary bee (*Hesperapis oraria*) could result in loss of the plant host and subsequent loss of the bee species due to visitor disturbance. There is a need to determine the distributions of *H. oraria* and *B. augustifolia* in order to identify critical habitat and to avoid adverse impacts to that habitat through normal park activities (Hoggard 2003b).

Similar to shoreline vegetation, PWC use would not contribute to cumulative impacts to seagrass habitats. Non-PWC motorized vessels would still be able to access most seagrass habitats in the Perdido Key area and north of Santa Rosa Island in Florida as well as around the islands in the Mississippi District. Motorized boat use would have adverse impacts to seagrass beds resulting from propeller scarring and sediment resuspension, which adversely affects the growth and health of seagrass beds. Cumulative impacts to seagrass habitats associated with increased future use by non-PWC vessels would be minor to locally moderate and adverse. Direct impacts include collision, uprooting, and sediment alteration. Indirect impacts include increased turbidity, decreased available sunlight, and deposition of suspended sediment and its effects.

Future increases in boating use within the national seashore would potentially result in slight increases in impacts in 2012.

Conclusion. PWC operators would not be allowed to operate in the national seashore, and no impacts would occur to shoreline or submerged aquatic vegetation from PWC use. Direct and indirect adverse cumulative impacts to shoreline vegetation resources from non-PWC watercraft activity and other visitor uses would continue, and would be minor to moderate to both marsh and dune communities. Cumulative impacts to seagrass beds would result from propeller scarring and sediment resuspension and would be adverse, direct and indirect, minor to moderate, and short- and long-term because most seagrass habitats could still be accessed. Impacts would potentially be higher in 2012 than in 2002.

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

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. Under alternative A, PWC use would be reinstated in all waters within national seashore as previously managed under the *Superintendent's Compendium* (NPS 2003a), and all state regulatory requirements would apply. PWC use could affect shoreline vegetation wherever use occurs near areas of considerable marsh vegetation, (including the west and east ends of Perdido Key, Big Sabine at Santa Rosa Island, the Fort Pickens ponds, the lagoons on East Ship and Cat islands, and the Davis Bayou Channel) or through PWC operators trampling or otherwise disturbing plants on shore in order to access trails. PWC caused wave action could cause erosion in areas of high PWC use, such as those areas adjacent to Perdido Key in the Florida District and East Ship and West Ship and Horn islands in the Mississippi District. Sand disturbances resulting from PWC access can also affect shoreline vegetation. Prior mandated closures of sensitive habitat areas described in previous sections of this chapter would apply and would afford a measure of protection from foot traffic to sensitive dune communities in Florida. In Mississippi, impacts to marsh communities have been recorded, including the Stark Bayou and Davis Bayou marshes where personal watercraft have been known to get stuck (Hopkins 2003). Shoreline vegetation communities would be susceptible to minor to moderate adverse impacts from PWC use.

Of the approximately 1,930 acres of potential submerged aquatic seagrass habitat in the Florida District of the national seashore, about 1,700 acres would be open to PWC use. In the Perdido Key area, where PWC use is the most intense in the Florida District (25 personal watercraft on a peak use day), approximately 500 of the 640 acres of seagrass habitat would be exposed to potential direct and indirect PWC impacts. Direct impacts include collision, uprooting, and sediment alteration. Indirect impacts include increased turbidity, decreased available sunlight, and deposition of suspended sediment, which adversely affects the growth and health of seagrass beds. Under alternative A, PWC use within the Florida District would result in direct and indirect impacts to seagrass habitats that are moderate, and both short- and long-term.

In the Mississippi District, 80% of PWC use is in the Mississippi Sound, which supports approximately 3,300 acres of potential seagrass habitat. Seagrass habitats would be exposed to potential direct and indirect PWC impacts. Under alternative A, PWC use within the Mississippi District would have impacts to seagrass habitats that are direct and indirect, minor to locally moderate, and both short- and long-term.

The projected increase in PWC use would potentially result in increased impacts to vegetation communities within the national seashore in 2012 relative to 2002.

Cumulative Impacts. Cumulative impacts include all sources of visitor activities, including PWC use and other motorized vessels. Cumulative impacts would be minor to moderate to shoreline and submerged aquatic vegetation communities.

Minor to moderate disturbances to dune communities would occur from shoreline visitor use. Cumulative impacts associated with non-PWC motorized vessels would be minor to moderate, as current and increased future motorboat use could continue to cause propeller scarring and sediment resuspension in most seagrass habitats. Wakes and other wave action from motorized vessels, including PWC, would have a minor to moderate adverse impact on marsh areas within the national seashore. Further, motorized vessels are expected to have adverse direct and indirect cumulative effects on submerged aquatic seagrass habitats within the Florida and Mississippi districts of the national seashore, especially in the Perdido Key area.

Conclusion. Reinstating PWC use within the national seashore would cause minor to moderate short- to long-term adverse impacts from physical disturbance, wave action, or visitor access to emergent shoreline vegetation communities, including marshes or dune environments. PWC use would have adverse impacts

to seagrass habitats in both the Florida and Mississippi districts that are direct and indirect, minor to moderate, and short- and long-term, because shallow water habitats in the park are the preferred areas for PWC use, particularly in the Perdido Key and Mississippi Sound areas.

Cumulative adverse impacts would include effects from all visitor activities, including PWC use and other motorized vessels, and would be minor to moderate to shoreline and submerged aquatic vegetation communities.

Projected increases in PWC and other motorized vessel use within the national seashore would potentially result in higher levels of impacts to vegetation communities in 2012.

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

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. Under alternative B, PWC use would be reinstated in all waters within the national seashore as previously managed under the *Superintendent's Compendium* (NPS 2003a), and all state regulatory requirements would apply. In addition, a flat-wake zone would be established 300 yards from all park shorelines except around the West Ship Island Pier and around wilderness boundaries (Horn and Petit Bois islands) where 0.5-mile flat-wake zones would be in effect. The flat-wake zoning component of the management prescriptions under alternative B would minimize both erosion effects from PWC induced wave action and direct PWC disturbance to shoreline marsh and dune communities. These impacts would be adverse and negligible under alternative B. Minor adverse impacts from PWC use to emergent vegetation communities within the national seashore would result from visitor disturbance to dune communities as a result of PWC access. Overall, PWC use would have negligible to minor adverse impacts on shoreline vegetation communities within the national seashore.

Of the approximately 1,930 acres of potential seagrass habitat within the Florida District of the national seashore, about 1,000 acres would be open to full-throttle PWC use. In the Perdido Key area of the Florida District, where PWC use is most intense (peak use of 25 personal watercraft), only about 300 of the 640 acres of seagrass habitat would be accessible to PWC full-throttle use. Direct and indirect PWC impacts to seagrass beds would occur, but would be minimized by the wake restrictions. Potential direct impacts would include collision, uprooting, and sediment alteration. Indirect impacts would include increased turbidity, decreased available sunlight, and deposition of suspended sediment, which adversely affects the growth and health of seagrass beds. Under alternative B, PWC use within the Florida District would have impacts to submerged aquatic vegetation communities that are direct and indirect, minor, and short- and long-term.

In the Mississippi District, a flat-wake zone would be established 300 yards from park shorelines at West Ship, East Ship, and Spoil islands and 0.5 mile from the shorelines at Horn and Petit Bois islands. Approximately 700 of the 3,300 acres of potential seagrass habitat would be accessible to full-throttle PWC use under alternative B. Direct and indirect adverse PWC impacts to seagrass habitats would occur, but would be minimized by the flat-wake zoning. Under alternative B, PWC use within the Mississippi District would have impacts to seagrass habitats that are direct and indirect, minor, and short- and long-term.

Projected increases in PWC use within the national seashore would potentially result in higher levels of impacts in 2012 relative to 2002.

Cumulative Impacts. Cumulative impacts to emergent shoreline vegetation and submerged aquatic vegetation communities include all sources of visitor activities, including PWC use and other motorized vessels. Cumulative impacts would be minor to moderate to shoreline and submerged aquatic vegetation communities; however, since alternative B includes increased mitigation such as additional flat-wake zones, impacts would be fewer than alternative A.

PWC visitor access would contribute negligible to minor cumulative impacts on vegetation communities. Similar to alternative A, minor to moderate disturbances to dune communities would occur from shoreline visitor use. Cumulative impacts associated with non-PWC motorized boating would be similar to alternative A and include minor to moderate effects from boat wakes on marsh areas, and from motorboat propeller scarring and sediment resuspension to seagrass habitats. PWC-related impacts would be less than alternative A due to increased wake restrictions. Projected increases in PWC and other motorized watercraft would likely result in increased impacts in 2012 relative to 2002.

Conclusion. PWC use would cause negligible adverse impacts to shoreline vegetation from physical disturbance and wave action, and minor adverse impacts from visitor access to emergent shoreline vegetation communities. PWC use under alternative B would have impacts to seagrass habitats that are direct and indirect, minor, and short- and long-term, because shallow water habitats in the national seashore are the preferred areas for PWC use, particularly the Perdido Key and Mississippi Sound areas. The flat-wake zoning would restrict PWC impacts to about one-half of the potential seagrass habitat in Florida and one-quarter of the potential seagrass habitat in Mississippi. Therefore, alternative B would have fewer adverse impacts to shoreline and submerged aquatic vegetation than alternative A. Cumulative impacts to shoreline vegetation would include effects from all visitor activities, including PWC use and other motorized vessels, and would be minor to moderate. Cumulative impacts to seagrass habitats associated with use by all motorized vessels would be minor to moderate locally, as motorboat use could continue to cause propeller scarring and sediment resuspension and its effects. Impacts would potentially be higher in 2012 relative to 2002 due to projected increases in PWC and other motorized watercraft use.

Implementation of 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 causing interruption of normal activities, alarm or flight, avoidance or degradation of habitat, and effects on reproductive success. This is thought to be a result of a combination of PWC speed, noise, and ability to access sensitive areas, especially in shallow-water depths.

Waterfowl and nesting birds are the most vulnerable to personal watercraft. Fleeing a disturbance created by personal watercraft 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 sensitive species, such as the manatee and the Perdido Key beach mouse, are documented in the "Threatened, Endangered, or Special Concern Species" section.

GUIDING REGULATIONS AND POLICIES

The NPS *Organic Act*, 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

the 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 200* (NPS 2000d), the restoration of native species is a high priority (Section 4.1). 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.

In 1978, Congress designated Horn and Petit Bois islands as wilderness areas. Motorized recreation is not permitted within the boundaries of a wilderness area, and boats with motors must be turned off and tilted up so as to be out of the water or removed from the transom or gunnels. These islands provide habitat for uncommon species of birds, animals, and marine life without human interference.

The Mississippi District is also designated as Mississippi Coastal Preserves. There are no other additional federal, state, or local regulations or policies for wildlife and wildlife habitat at Gulf Islands National Seashore.

The *Superintendent's Compendium* (NPS 2003a) for the Gulf Islands National Seashore outlines various closures in place to protect wildlife and wildlife habitat. These closures are subject to change, but are listed below as of May 2003. Additional closures may be enacted as park staff observe the need for further protection of sensitive species areas.

METHODOLOGY AND ASSUMPTIONS

Potential impacts to wildlife and wildlife habitat were evaluated based on the pattern of PWC use in the Gulf Islands National Seashore, the nature of habitats and species present, and the professional judgment of the project team and members of the national seashore area staff. Information on wildlife habitat was acquired from national seashore area staff, existing NPS reports, U.S. Fish and Wildlife Service, Florida Division of Forestry, Florida Fish and Wildlife Conservation Commission, Mississippi Wildlife Fisheries and Parks, and other public information resources. To assess impacts from PWC use on wildlife, the following assumptions were made:

1. The majority of PWC users operate their craft in a lawful manner.

2. Approximately 39 personal watercraft are in the Florida District and 161 in the Mississippi District during a peak summer day such as over Memorial Day weekend. Estimated use per vessel is an average of 3 hours per day in the Florida District, and 4 hours per day in the Mississippi District (see table 20).

3. In 2012 on a peak use day, approximately 98 personal watercraft would be on the water in the Florida District and 403 in the Mississippi District.

4. PWC users who disembark on national seashore shorelines would travel no more than 100 feet inland and will follow existing trails.

The national seashore implements seasonal closures that are reviewed on an annual basis to protect valuable shorebird habitat from impacts resulting from public use, including PWC activity. Refer to the "Affected Environment – Wildlife" section for a list of locations.

IMPACT ANALYSIS AREA

The focus of this study is Gulf Islands National Seashore and the surrounding shoreline area, extending inland approximately 200 feet. This 200-foot inland segment is assumed to provide an encompassing range of assessment, based on the distance of PWC operation from the shoreline, terrestrial wildlife responses to PWC activity, and the likely distance PWC users would travel inland. The analysis area pertaining to aquatic species includes waters that are inhabited by such species that are within the national seashore boundary.

Magnitude of Effects

The following thresholds were used to determine the magnitude of effects on wildlife and wildlife habitat:

Negligible: No wildlife species are present; no impacts or impacts with only temporary effects are expected.

Minor: Non-breeding animals are present, but only in low numbers. Habitat is not critical for survival; other habitat is available nearby. Occasional flight responses by wildlife are expected, but without interference with feeding, reproduction, or other activities necessary for survival.

Moderate: Breeding animals are present; animals are present during particularly vulnerable life-stages such as migration or juvenile stages; mortality or interference with activities necessary for survival are expected on an occasional basis, but are not expected to threaten the continued existence of the species in the national seashore.

Major: Breeding animals are present in relatively high numbers, and/or wildlife are present during particularly vulnerable life stages. Habitat targeted by PWC use or other actions has a history of use by wildlife during critical periods and is somewhat limited. Mortality or other effects are expected on a regular basis and could threaten the continued survival of the species in the national seashore.

Impairment: Some of the major impacts described above might be an impairment of national seashore area resources if their severity, duration, and timing resulted in the elimination of a native species or significant population declines in a native species. In addition, these adverse, major impacts to national seashore 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 authorizing 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 national seashore planning documents.

Impacts of the No-Action Alternative — Continue Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. Under the no-action alternative, PWC use would not be reinstated in the national seashore; therefore, PWC use in national seashore waters would not affect aquatic or terrestrial wildlife or wildlife habitat within the park boundary, resulting in no impacts.

Cumulative Impacts. PWC use would not contribute to cumulative impacts to aquatic or terrestrial wildlife within the national seashore. Motorized boating exclusive of personal watercraft and other visitor activities such as hiking, camping, swimming, and wildlife watching would continue to be allowed within national seashore boundaries and could affect wildlife, especially in high use areas such as Opal Beach at Santa Rosa, Langdon Beach at Fort Pickens, Johnson Beach at Perdido Key, the Okaloosa area, the Davis Bayou area, and near the West Ship Island Boardwalk.

Short-term, minor, direct and indirect adverse impacts to aquatic wildlife species and habitats would be expected from motorized vessel use within the national seashore. Wildlife routinely exhibit movement or flight response due to disturbance by powerboats that is similar to response from PWC-caused disturbance (Rodgers and Schwikert 2002).

Dolphins could be adversely impacted by motorized vessel use either directly from injuries received as a result of collisions, or indirectly through engine noise transmitted underwater. Effects of underwater noise on dolphins and other aquatic species are discussed in the "Impact of PWC Noise on Aquatic Fauna" section.

Terrestrial mammals within the national seashore such as rabbits, opossum, squirrels, fox, raccoon, and coyote may be disturbed by noise and physical disturbance from approaching motorized boats and other visitor activities such as camping and hiking in shoreline areas. The majority of terrestrial mammals within the national seashore are dependent upon habitats that are located away from shoreline areas and are generally acclimated to human presence. These mammal species would likely only infrequently visit areas where visitor use would be concentrated and would experience short-term negligible adverse effects from boating and other shoreline visitor use at the national seashore.

Portions of all islands within the national seashore contain important shorebird and waterbird nesting, loafing, or foraging habitat. The northern shorelines and the east and west tips of the islands provide ideal habitat due to calmer waters than Gulf-side shorelines. These sound-side shorelines and tips of the islands are also areas of high visitor use. Shorebirds and other species that nest, wade, or forage along the shoreline would be the most vulnerable to disturbance from visitor activities in these higher use areas. Impacts to primary shoreline nesting areas would be minimized during peak nesting times by the closures implemented under the *Superintendent's Compendium* (NPS 2003a). However, nesting individuals or colonies that establish in other areas would still be vulnerable to minor impacts from boating and other visitor activities. Species such as plovers, sandpipers, terns, and gulls would be susceptible to impacts from visitor noise and activity, mainly while wading, loafing, or foraging. Visitors using motorized vessels and/or engaging in activities on shore could cause temporary flight responses to shorebirds, potentially causing short-term minor adverse effects. Long-term effects are unlikely, as nesting areas are protected by visitor use restrictions.

Wading birds that utilize shoreline areas within the national seashore include multiple species of herons and egrets. Extensive great blue heron and night heron nesting and roosting areas are located on all the Mississippi islands within the national seashore. In the Florida District, Perdido Key contains a small area of nesting and roosting habitat. Areas utilized for nesting and roosting are located on interior portions of the islands where sufficiently tall trees exist and are typically out of the range of visitor disturbance.

Impacts to wading, foraging or resting individuals would be similar to those for shorebirds and would include mostly short-term minor adverse disturbances from motorized vessels or shoreline activities in these higher use areas.

Research and park specific data has shown that raptors, such as osprey and bald eagles, are susceptible to disturbance from human intrusion, and may abandon nest sites in areas of high disturbance. Both of these species nest on Horn and Petit Bois islands. Both of these islands were designated National Wilderness areas in 1978 and are closed to motorized vessels, but experience other types of visitor activities such as camping, fishing, backpacking, and non-motorized watercraft. Minor to moderate adverse impacts to foraging, roosting or nesting osprey and other raptors could occur. Impacts would mostly be short-term, but longer-term effects could occur if nesting individuals abandon or relocate nesting sites due to disturbance.

Other non-recreational activities in the area may impact wildlife at Gulf Islands National Seashore. The U.S. Marine Corps' amphibious unit will be transferring its operations from Puerto Rice to Santa Rosa Island. The unit plans to conduct two to three amphibious operations per year at the eastern edge of the park's boundary beginning in 2004. These operations may have a short-term adverse impact to fish, marine mammal, and wading bird species within the park.

The towns of Biloxi and Gulf Port in Mississippi permit floating gambling casinos in the Mississippi Sound. Light pollution from the casinos can be seen from the national seashore islands, and has been known to affect sea turtles and possibly other marine species. In addition, the casinos may offer PWC rentals in the future.

Projected increases in watercraft use within the national seashore would likely result in higher levels of impacts in 2012 relative to 2002.

Conclusion. PWC use would continue to be prohibited in the waters of Gulf Islands National Seashore, and there would be no impacts from PWC related disturbance to aquatic or terrestrial wildlife and wildlife habitat.

Cumulative adverse impacts on wildlife and wildlife habitat would result from other motorized watercraft use and visitor shoreline activity. Non-PWC motorized watercraft would be expected to have short-term, minor, direct and indirect adverse impacts to aquatic wildlife species and habitats. Motorized watercraft in conjunction with shoreline visitor activities would cause short-term negligible impacts to terrestrial mammals and minor, mostly short-term impacts to avian species that utilize the shoreline for foraging, wading and nesting. Long-term effects to breeding individuals and colonies would be unlikely to occur due to restricted access to nesting areas.

Impacts in 2012 would likely be higher than 2002 levels due to the projected increase in motorized watercraft use within the national seashore.

Implementation of this alternative would not result in impairment to aquatic or terrestrial wildlife or wildlife habitat.

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. Alternative A would reinstate PWC use within the national seashore. Restrictions that were in place prior to the PWC closure and seasonal closures as described in the "Alternatives" chapter would be

applicable. There is one launch site within the national seashore, located at Davis Bayou in the Mississippi District. Other launch facilities are located nearby that would offer access to national seashore waters, including at Halstead Bayou, Santa Rosa Island, Shoreline Park, and Pensacola Bay. PWC use could affect wildlife wherever motorized vessels are allowed.

In the Florida District, personal watercraft occasionally traverse along the shoreline, and the only area of concentrated use is in the Perdido Key area. The Mississippi islands are located 9 to 14 miles from the mainland, weather conditions can change quickly, and large ships use the intracoastal waterway shipping channels. These factors contribute to minimal PWC use as primary access out to the islands. Most personal watercraft that recreate in the Mississippi District are towed by larger boats to the islands for use during the day. Frequent use areas in the Mississippi District include the tips of all the islands.

Under alternative A, PWC use would adversely affect aquatic wildlife species, especially in high use areas such as Big Lagoon, the area north of Santa Rosa Island and Mississippi Sound. Dolphins could be affected by PWC use either directly from injuries received as a result of collisions, or indirectly through PWC engine noise transmitted underwater. Larval and juvenile stages of many fish and shellfish species inhabiting the shallow protected waters and seagrass beds where PWC use is high may be adversely impacted. PWC use in areas providing essential fish habitats for fish and shellfish species could disrupt normal feeding and other critical life functions and could adversely affect suitability of these areas to meet life cycle requirements. Adverse effects to fish and shellfish from PWC emissions, sediment resuspension, and destruction of seagrass beds could also occur. Reinstating PWC use in park waters is expected to have short-term and long-term minor to moderate, direct and indirect adverse impacts to aquatic wildlife species and habitats.

Terrestrial mammals within the national seashore, such as rabbits, opossum, squirrels, fox, raccoon, and coyote may be disturbed by personal watercraft due to noise and the ability of PWC users to rapidly approach shoreline areas where terrestrial species may be present. The majority of terrestrial mammals within the national seashore are dependent upon habitats that are located away from shoreline areas and would likely only infrequently visit areas where PWC use would occur. Adverse impacts to terrestrial mammals from PWC use within the national seashore would be short-term negligible to minor due to the infrequent use of shoreline areas relative to the primary habitat areas located further inland.

Shorebirds and wading birds are susceptible to disturbance from motorized boating including PWC, although there are no documented cases of deliberate harassment or collisions with wildlife by PWC users at the national seashore. Located close to the shoreline, these birds are susceptible to PWC noise impacts during feeding, mating, and nesting activities.

High PWC use in the vicinity of shorebird habitats could cause temporary or permanent displacement of birds that are not tolerant of human activity. Excessive noise or disturbance from PWC could cause nesting birds to abandon traditional nesting habitats or to leave chicks or eggs in the nests vulnerable to high temperatures and predation. Colonial nesting birds are particularly vulnerable to human disturbances because of high nest density. When one bird is disturbed enough to respond, others in a colony often follow (Rodgers and Smith 1995).

Further, it is believed that undisturbed periods of resting and feeding are also important to the success of non-breeding shorebirds. Birds may leave and discontinue using preferred nesting, feeding or roosting areas when startled by pedestrians or vehicle operation. This could result in increased energy expenditure and lower feeding rates, which may adversely affect the survival of the birds (USFWS 2003d).

Park staff have observed least terns (a threatened species), royal terns, sandwich terns, and black skimmers (state species of concern) being flushed from the nesting colony as a result of PWC

disturbance. Also, some portions of the heron rookeries within the national seashore located in remote waterways are accessible by shallow-draft PWC (NPS 2001a). Several authors have noted that frequent disturbances requiring upflights from colonies eventually cause long-term effects such as reproductive losses or colony desertions, although this has not been specifically observed at Gulf Islands (Southern and Southern 1979, Brown and Brown 1996).

Osprey have been observed flushing from nests as a result of PWC activity within the national seashore. Specifically, park staff have observed osprey repeatedly flushing from a nest as a PWC performed "figure eight" maneuvers in adjacent waters. The osprey finally settled back onto the nest when the PWC left the area (NPS 2001a). Osprey feed along the shallow waters of all the islands, and could experience minor adverse effects due to the ability for PWC to access these areas near the beaches. Seasonal closures would afford some protection to nesting sites, but feeding individuals would potentially be affected on a short-term basis, with a potential for long-term impacts to nesting individuals.

Overall, impacts to avian species from PWC noise and activity within the national seashore would be adverse and minor to moderate, as personal watercraft would potentially cause short-term disturbance to loafing or foraging shorebirds, wading birds, and other water birds through access to shoreline areas and noise. The majority of impacts would be short-term and would occur to loafing or foraging individuals, but long-term impacts could potentially occur to nesting sites located outside of concentrated breeding areas protected by seasonal closures.

Projected increases in PWC use within the national seashore would result in higher levels of impacts in 2012 relative to 2002.

Cumulative Impacts. In addition to PWC use, potential cumulative impacts to wildlife and wildlife habitat in the national seashore include motorized boating use and other visitor activities that occur in proximity to wildlife species.

Cumulative impacts associated with non-PWC motorized vessels would be minor. Impacts could result from boats disrupting essential fish habitat, causing temporary flight responses in shorebird and wading birds, and collisions with marine mammals. Shoreline visitor activities would cause minor impacts to avian species and negligible to minor impacts to terrestrial mammals. Impacts would mostly be short-term with the potential for some longer-term effects due to abandonment or relocation of nesting sites. Impacts to dolphins, fish and shellfish, and their habitats are expected to be short term, minor to moderate, direct and indirect, and adverse.

In addition, other non-recreational activities in the area may impact wildlife at Gulf Islands National Seashore. The U.S. Marine Corps' amphibious unit will be transferring its operations from Puerto Rice to Santa Rosa Island. The unit plans to conduct two to three amphibious operations per year at the eastern edge of the park's boundary beginning in 2004. These operations may have a short-term adverse impact to fish, marine mammal, and wading bird species within the park.

The towns of Biloxi and Gulf Port in Mississippi permit floating gambling casinos in the Mississippi Sound. Light pollution from the casinos can be seen from the national seashore islands, and has been known to affect sea turtles and possibly other marine species. In addition, the casinos may offer PWC rentals in the future.

Conclusion. Reinstating PWC use in park waters is expected to have short term, minor to moderate, direct and indirect adverse impacts to aquatic wildlife species and habitats. PWC use would contribute short-term negligible to minor adverse impacts to terrestrial mammals within the national seashore. Avian

species with primary habitat located in shoreline areas would be more susceptible to impacts and PWC use would cause mostly short-term minor to moderate adverse impacts to these species.

Cumulative impacts would include PWC related effects in addition to those from other motorized vessel use and shoreline visitor activities. Cumulative impacts would include short term, minor to moderate adverse impacts to aquatic species, short- to long-term minor to moderate impacts to avian species and negligible to minor short-term impacts to terrestrial mammals.

Impacts in 2012 would likely be higher relative to 2002 levels due to the projected increase in PWC and other motorized watercraft use within the national seashore.

Implementation of this alternative would not result in impairment to aquatic or terrestrial wildlife or wildlife habitat.

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. Under alternative B, PWC use would occur as under alternative A, with additional management prescriptions as follows.

- A flat-wake zone would be established 300 yards from all park shorelines at the low-water mark with the exception of:
  - At the West Ship Island Pier a flat-wake zone would extend 0.5 mile from the shoreline and 0.5 mile from either side of the pier.
  - Around all designated wilderness boundaries a flat-wake zone would be established 0.5 mile from the shorelines at low-water mark.
- No PWC operation would be permitted within 200 feet of non-motorized watercraft and people in the water.

Impacts to aquatic wildlife species, especially in high use areas such as the Perdido Key area, the area north of Santa Rosa Island, and Mississippi Sound would be fewer than alternative A. Alternative B would minimize impacts from PWC because the most shallow water habitats and considerable portions of seagrass bed habitats lie within the PWC flat-wake zones prescribed by this alternative. Aquatic wildlife species inhabiting shallow protected waters and seagrass beds within the flat-wake zone would not be subjected to PWC full-throttle impacts. However, PWC use in areas providing essential fish habitats could disrupt normal feeding and other critical life functions of fish and shellfish species and could adversely affect suitability of these areas to meet life cycle requirements. Adverse impacts to fish and shellfish and their habitat from PWC-generated sediment resuspension and emissions may occur in these areas. Reinstating PWC use in park waters with the establishment of a PWC flat-wake zone would have fewer adverse impacts than alternative A. This alternative is expected to have short term, minor, direct and indirect adverse impacts to aquatic wildlife species and habitats.

The extended flat wake zoning under alternative B would minimize impacts from PWC activity to terrestrial wildlife species by restricting speed near shoreline habitat areas and thus limiting the potential for disturbance from noise and rapid approach by personal watercraft. Impacts to terrestrial mammals from PWC use would be negligible due to both the infrequent use of shoreline areas by these species and the extension of flat wake zoning.

Prior established seasonal closures of areas around avian nesting sites in conjunction with increased flat-wake zoning under alternative B would minimize long-term impacts to nesting individuals. Adverse impacts to avian species from PWC noise and activity within the national seashore would be negligible to minor from short-term disturbance from PWC noise and access to loafing or foraging shorebirds, wading birds, and other water birds. Osprey would also experience short-term negligible to minor adverse effects due to the potential for PWC access to disturb roosting or feeding activities.

Projected increases in PWC use within the national seashore would result in higher levels of impacts in 2012 relative to 2002.

Cumulative Impacts. In addition to PWC use, potential cumulative impacts to wildlife and wildlife habitat include motorized and non-motorized boating and other visitor activities that occur in the vicinity of wildlife species.

Similar to alternative A, cumulative impacts associated with non-PWC motorized vessels would be negligible to minor. Impacts could result from boats disrupting essential fish habitat, causing temporary flight responses in shorebird and wading birds, and collisions with marine mammals. Shoreline visitor activities would cause minor impacts to avian species and negligible to minor impacts to terrestrial mammals. Impacts would mostly be short-term with the potential for some longer-term effects due to abandonment or relocation of nesting sites. Impacts to dolphins, fish, shellfish, and their habitats under alternative B are expected to be short term, minor, direct and indirect, and adverse.

In addition, other non-recreational activities in the area may impact wildlife at Gulf Islands National Seashore. The U.S. Marine Corps' amphibious unit will be transferring its operations from Puerto Rice to Santa Rosa Island. The unit plans to conduct two to three amphibious operations per year at the eastern edge of the park's boundary beginning in 2004. These operations may have a short-term adverse impact to fish, marine mammal, and wading bird species within the park.

The towns of Biloxi and Gulf Port in Mississippi permit floating gambling casinos in the Mississippi Sound. Light pollution from the casinos can be seen from the national seashore islands, and has been known to affect sea turtles and possibly other marine species. In addition, the casinos may offer PWC rentals in the future.

Conclusion. Under alternative B, flat-wake zoning prescriptions would minimize impacts to shoreline wildlife within the national seashore. Reinstating PWC use in park waters while establishing a flat-wake zone is expected to have short term, minor, direct and indirect adverse impacts to aquatic wildlife species and habitats. PWC use would contribute negligible short-term adverse impacts to terrestrial mammals, and negligible to minor mostly short-term adverse impacts to avian species with primary habitat located in shoreline areas.

Cumulative impacts to aquatic and avian wildlife associated with all types of motorized vessel use are expected to be short-term, minor, direct and indirect, and adverse. There would be a slight potential for some long-term impacts to avian species if nesting individuals are disturbed to an extent that would cause individuals to relocate. Cumulative impacts to terrestrial wildlife would be negligible to minor and short term.

Impacts in 2012 would likely be higher relative to 2002 levels due to the projected increase in PWC and other motorized watercraft use within the national seashore.

Implementation of this alternative would not result in impairment to aquatic or terrestrial wildlife or wildlife habitat.

IMPACT OF PWC NOISE ON AQUATIC FAUNA

Aquatic wildlife react to high levels of underwater noise in various ways, depending on the species, exposure period, intensities, and frequencies. PWC motors produce noise levels in air in the range of 70–102 dB per unit. Because of the way the craft are used, noise is usually produced at various intensities, and this continual change in loudness during normal use makes PWC-generated noise much more disturbing than the constant sounds of conventional motorboats (Bluewater Network 2001; Komanoff and Shaw 2000). The sudden increases in noise levels can startle aquatic wildlife, triggering flight responses. In areas of high boating use, the energy cost to aquatic fauna due to noise-induced stresses could be significant, potentially affecting their survival.

Intense sounds can inflict pain and damage the sensory cells of the ears of mammalian species, and there is concern that similar sounds can impair hearing in aquatic wildlife species. One of the few direct studies on the impact of sound on fishes conducted under laboratory conditions (Hastings et al. 1996) found that when fish were subjected to high decibel levels for four hours, some sensory cells of the ears were damaged. This damage does not show up until a few days after exposure, and it is a short-term effect (regeneration did occur after a few days). Fish exposed to high decibel noise levels may have a short-term disadvantage in detecting predators and prey, potentially adversely affecting their survival. In addition, several species of fish in the drum family produce sounds as part of their mating behavior, so short term hearing damage could negatively affect reproduction. Loggerhead turtle nesting has been shown to be negatively affected by loud noises such as close overflights by aircraft (EuroTurtle 2001), but it is unknown at what frequencies and intensity noise might affect sea turtles or damage their hearing.

Although marine mammals show a diverse behavioral range that can obscure correlations between a specific behavior and the impact from noise, experts from around the country have voiced concern that PWC activity can have negative impacts on marine mammals, disturbing normal rest, feeding, social interactions, and causing flight (Getten 1995; HDNR 1995; SJC 1998; Osborne 1998). Toothed whales (including dolphins), produce sounds across a broad range of frequencies for communication as well as echolocation, a process of creating an acoustic picture of their surroundings for the purpose of hunting and navigation. Watercraft engine noise can mask sounds that these animals might otherwise hear and use for critical life functions and can cause temporary hearing threshold shifts. Bottlenose dolphins exposed to less than an hour of continuous noise at 96 dB experienced a hearing threshold shift of 12 to 18 dB, which lasted hours after the noise terminated (Au et al. 1999). A hearing threshold shift of this degree would substantially reduce a dolphin's echolocation and communication abilities. Perry (1998) reviewed numerous scientific studies documenting increased swimming speed, avoidance, and increased respiration rates in whales and dolphins as a result of motorized watercraft noise. Whales have been observed to avoid man-made noise of 115 dB, and at higher frequencies, whales become frantic, their heart rates increase, and vocalization may cease (CCU 1998). Noise generated by motorized watercraft can exceed 100 dB over a range of frequencies from 12 Hz to 30 kHz (CCU 1998). As dolphins can hear frequencies up to 150 kHz, PWC and motorboat engine noise could impede their ability to navigate, communicate, or hunt, or could displace them from preferred feeding habitats, potentially affecting their survival.

Marine mammals that could be affected by increased noise levels in the waters of Gulf Islands National Seashore include manatees, bottlenose dolphins, and Atlantic spotted dolphins. Kemp's ridley, loggerhead, leatherback, and green sea turtles have been identified in the waters at Gulf Islands National Seashore, and all of these species have nested on park beaches. In addition, more than 200 species of fish can be found in the waters surrounding Gulf Islands National Seashore. Essential fish habitat occurs in the vicinity of Gulf Islands National Seashore for a number of commercially and recreationally important fish as described in the "Aquatic Wildlife Affected Environment" section.

METHODOLOGY AND ASSUMPTIONS

Noise generated by motorized watercraft can exceed 100 dB over a range of frequencies from 12 Hz to 30 kHz (CCU 1998). As whale and dolphin communication occurs within these frequencies, PWC and motorboat engine noise could impede their ability to communicate, navigate, or hunt, and could displace them from preferred feeding habitats.

PWC users tend to operate in groups, so aquatic wildlife in high PWC use areas are exposed to the cumulative noise of multiple PWC. Maximum noise generated from 25 PWC (if each produces 76 dBA at 25 meters) would be approximately 90 dBA in air. The measurement scales for sound in water and in air have a difference of 63 dBA between them (NOAA n.d). That is, 25 PWC producing 90 dBA in air would produce approximately 150 dBA underwater. As a frame of reference, whales produce calls at sound levels of 145 to 190 dBA, and a supertanker produces about 190 dBA. (FAS 1998). Because sound dissipates over distance, the noise levels heard by a marine animal decrease as the distance to the source increases. Because sound dissipates over distance, the noise levels heard by a marine animal decrease as the distance to the source increase. Table 52 shows the maximum possible noise levels produced by PWC in air and underwater at various distances in the Florida and Mississippi districts during peak PWC use, assuming that PWC are operating at full throttle. The methodology for determining noise levels at Gulf Islands National Seashore is described in the "Methodology and Assumption" section of "Soundscapes" in this chapter.

There are no data for PWC-related noise effects on marine mammals, reptiles, or fish, and no specific monitoring has been done at the national seashore to quantify impacts. Therefore, personal observations of park staff were used to determine areas of concern. These areas were identified and assessed relative to the number, location, and season of use, of personal watercraft and the species present in those sensitive areas. The same magnitude of effects and impact analysis area as defined for the "Wildlife and Wildlife Habitat" section were used to assess PWC noise impacts to aquatic fauna.

TABLE 52: PEAK-USE PWC NOISE LEVELS IN AIR AND UNDERWATER

Florida District	Number of PWC	Noise Level in Air (dBA)[a] at 25 meters (27 yards)	Equivalent Noise Level Underwater (dBA)[b]
Perdido Key Area	25	90	152
Area North of Santa Rosa Island	12	87	149
Gulf-Side Waters	2	79	141
Mississippi District[c]			
Horn Island Sound Side	48	93	155
Horn Island Gulf Side	12	87	149
Petit Bois Sound Side	24	90	152
Petit Bois Gulf Side	7	85	147
Ship Islands Sound Side	56	94	156
Ship Islands Gulf Side	14	87	149

a. Noise levels shown assume all PWC are at full-throttle, with each PWC producing 76 dBA in air at a distance of 25 meters.

b. Underwater noise levels are assumed to be 63 dBA higher than noise levels in air.

c. Mississippi PWC distribution based on 2001 and 2002 visitation figures (NPS 2002g).

Impacts of the No-Action Alternative — Continue Prohibition of PWC Use at Gulf Islands National Seashore

Analysis. Under this alternative, personal watercraft use would continue to be prohibited in all jurisdictional waters of Gulf Islands National Seashore. Because PWC use would not be allowed in park waters, aquatic fauna would not be subjected to high levels of PWC noise at close range.

Cumulative Impacts. There is considerable boating activity in and around Gulf Islands National Seashore. As a result, human activity and noise levels are typically high in many area of the park, especially between May and September. Underwater noise sources include motorboats, commercial vessels, and official vessels (U.S. Coast Guard, police, and military). Because PWC use would be prohibited within park waters under this alternative, they would not contribute to cumulative noise levels produced in park waters.

Non-PWC motorized vessel use would still occur throughout park waters and could adversely affect aquatic wildlife species, especially in areas experiencing high recreational boating use, such as shallow Gulf-side waters in the Florida district and around East Ship and West Ship islands and in Mississippi Sound in the Mississippi district. As these areas include seagrass beds and salt marshes where fish and invertebrates seek food and shelter, underwater motorboat noise could cause flight or avoidance of these habitats. Dolphins and manatees may also be stressed and displaced by motorboat noise. Sea turtles may also be affected by engine noise, but because their presence in the park is more common at night when few boats are operating, impacts would not be significant. New technologies would contribute to reduced noise emissions from recreational marine engines in the future (Sea-Doo 2001). Because motorized watercraft use occurs primarily during the middle of the day on a seasonal basis, and peak activity occurs mostly on weekends, noise impacts to aquatic fauna are not expected to be long term. Impacts to aquatic fauna from motorized vessel noise under the no-action alternative are expected to be adverse, minor to moderate, and short-term. PWC operation adjacent to park waters would produce underwater noise which may adversely impact aquatic fauna within national seashore waters. However, since the park has jurisdiction over a large area of water, and PWC use has seasonal and daily activity patterns, any impacts to aquatic fauna within national seashore waters from use outside of the seashore boundaries are expected to be negligible.

Conclusion. Continuing the prohibition on PWC use within park waters would ensure that aquatic fauna are not affected by PWC noise impacts originating from within park boundaries. Noise from PWC that are operating adjacent to park waters may have a negligible impact on aquatic fauna. Impacts to aquatic fauna in park waters from cumulative impacts including non-PWC motorized watercraft noise under the no-action alternative are expected to be adverse, minor to moderate, and short in duration but occurring over the long-term.

Alternative A — Reinstate PWC Use Under a Special NPS Regulation as Previously Managed

Analysis. Under alternative A, PWC use would be reinstated in all park waters as previously managed under the *Superintendent's Compendium*, and all state regulatory requirements would apply. PWC use would occur throughout most of the national seashore, producing underwater noise at levels that would be detectable by aquatic fauna, particularly in high use areas. Because personal watercraft tend to operate in groups and produce rapid throttle changes they can be especially disturbing to wildlife. Maximum PWC-generated underwater noise levels during periods of peak use could reach 140 dBA in the waters of the national seashore (see table 52). Maximum PWC underwater noise levels could reach 150 dBA in the Perdido Key area, and in the Mississippi Sound side waters of East and West Ship islands and Horn Island during periods of peak use. While it is unlikely that all PWC in an use area are operating

simultaneously, or operating at full throttle, levels of underwater noise produced by PWC could adversely affect critical life functions of aquatic fauna and the suitability of their habitats. Substantial levels of PWC noise would be produced in nearly all national seashore waters, especially in nearshore habitats such as sheltered coves and seagrass habitats that are critical to many species of fish and shellfish. Dolphins and manatees in the Perdido Key area, Santa Rosa Sound, and the Mississippi Sound side waters could be exposed to high levels of PWC engine noise. Sea turtles are less likely to be affected by PWC engine noise, as they are more common in the Gulf side waters where less PWC use occurs. Reinstating PWC use in the national seashore is expected to have long-term, moderate, adverse impacts to aquatic fauna.

Cumulative Impacts. Under alternative A, motorized vessels, including personal watercraft, would be able to access and, therefore, produce underwater noise in nearly all park waters, particularly in high PWC and boating use areas. As PWC are outnumbered by other motorboats by at least 10 to 1 in the park, most noise production would be attributed to non-PWC vessels. However, because of the way in which PWC are used, their noise can be more disturbing to wildlife than that of other non-PWC vessels. Cumulative PWC and other motorized watercraft noise would impact areas aquatic fauna, especially in shallow, protected waters where PWC use tends to become focused, such as Perdido Key and the Ship Islands. High levels of underwater noise could affect critical life functions of fish, shellfish, marine mammals, and sea turtles and the suitability of their habitats. Impacts to aquatic fauna are expected to be long-term, moderate and adverse.

Conclusion. Reinstating PWC use in national seashore waters is expected to have long-term, moderate adverse impacts to aquatic fauna. Cumulative adverse impacts would result from PWC use in combination with other motorized vessels, and would be long-term, moderate.

Implementation of this alternative would not result in an impairment to aquatic fauna.

Alternative B — Reinstate PWC Use Under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. Under alternative B, PWC use would be reinstated in all park waters as previously managed under the *Superintendent's Compendium* (NPS 2003a), and all state regulatory requirements would apply. In addition, a flat-wake zone would be established 300 yards from all park shorelines in the Florida and Mississippi districts, with the exception of Horn Island and Petit Bois Island, where a flat-wake zone would be established within 0.5 mile of the shore. PWC full-throttle use would only occur beyond the flat-wake zone in park waters.

PWC use under this alternative would occur in much of the national seashore, producing underwater noise at levels that would be detectable by aquatic fauna. While PWC would still be allowed to travel at full throttle in most park waters, resulting in underwater noise levels similar to those described under alternative A, these levels would originate from a greater distance offshore. PWC-operating in the flat-wake zone would be traveling at slow speeds and producing relatively little noise. Because many species of fish and shellfish are concentrated in shallow nearshore habitats such as seagrass beds and salt marshes, and these habitats fall within the flat-wake zone, noise impacts would be less severe than under alternative A. Marine mammals and sea turtles are likely to occur outside of the flat-wake zone, and could still be exposed to significant levels of PWC noise. Reinstating PWC use in park waters and the establishment of a PWC flat-wake zone is expected to have long-term, minor to moderate, adverse impacts to aquatic fauna.

Cumulative Impacts. Under alternative B, personal watercraft would be able to access much of park waters, and other motorized watercraft could access nearly all park waters, producing underwater noise

Cumulatively, most noise production would be attributed to non-PWC vessels which outnumber PWC in the park; however, PWC engine noise beyond the flat-wake zone could be more disturbing to aquatic fauna because of the characteristic rapid acceleration of PWC and its effects on wildlife. PWC-generated underwater noise levels within the flat-wake zone would be substantially lower than beyond it, resulting in reduced noise levels in shallow water areas such as sheltered coves, salt marshes, and seagrass beds which are critical habitats for many species of fish and shellfish. Marine mammals and sea turtles could still be exposed to high levels of underwater noise. Under alternative B, impacts to aquatic fauna are expected to be long-term, minor to moderate, and adverse.

Conclusion. Reinstating PWC use in park waters and establishing a flat-wake zone is expected to have long-term, minor to moderate, adverse impacts to aquatic fauna. Adverse cumulative noise impacts to aquatic fauna would be long-term and minor to moderate.

Implementation of this alternative would not result in an impairment to aquatic fauna.

THREATENED, ENDANGERED, OR OTHER SPECIAL STATUS SPECIES

The same issues described for PWC use and general wildlife also pertain to special status species. Potential impacts from personal watercraft include inducing flight and alarm responses, disrupting normal behaviors and causing stress, degrading habitat quality, and potentially affecting reproductive success. In addition to wildlife, threatened, endangered, or special concern plant species are also at risk from disturbance related to PWC use. Special status species at the national seashore include federally listed threatened, endangered, or candidate species. Additionally, some species at Gulf Islands National Seashore are designated by the states of Florida and/or Mississippi as 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 federally 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.

An analysis of the potential impacts to those special status species that potentially could be affected by PWC use at Gulf Islands National Seashore is included in this section. It has been determined that none of the alternatives are likely to adversely affect any of the listed species at Gulf Islands National Seashore. The completed environmental assessment will be submitted to the U.S. Fish and Wildlife Service for 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 of initiation of formal consultation, the U.S. 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 U.S. Fish and Wildlife Service would state its opinion as to whether the proposed PWC activities 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. To ensure that a species would not be jeopardized by PWC activities, the National Park Service would confer with the U.S. Fish and Wildlife Service to identify recommendations for reducing adverse effects and would integrate those into the preferred alternative.

NPS *Management Policies 2001* (NPS 2000d) states that potential effects of agency actions will also be considered regarding state or locally listed species. 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.

State and federal listed species were identified through discussions with national seashore area staff, and consultation of Florida, Mississippi, and U.S. Fish and Wildlife resources (see appendix B). A consultation letter informing the agency of the action was sent to the U.S. Fish and Wildlife Service.

METHODOLOGY AND ASSUMPTIONS

Primary steps in assessing impacts on listed species were taken to determine the following:

1. Which species are found in areas likely to be affected by management actions described in the alternatives.

2. Current and future use and distribution of personal watercraft by alternative.

3. Habitat loss or alteration caused by the alternatives.

4. Displacement and disturbance potential of the actions and the species' potential to be affected by PWC activities.

The information in this analysis was obtained through best professional judgment of national seashore staff and experts in the field (as cited in the text), and by conducting a literature review.

Basic assumptions were made regarding personal watercraft and visitor activities, as follows:

1. The majority of PWC users operate their craft in a lawful manner.

2. Approximately 39 personal watercraft are in the Florida District of Gulf Islands National Seashore during a peak summer day for an average of 3 hours per day, and 161 in the Mississippi District for an average of 4 hours per day.

3. Generally, impacts are expected to increase in 2012 due to the estimated projected 9.6% annual increase in personal watercraft over the next 10 years. Approximately 501 personal watercraft would be on the national seashore waters in 2012 on a peak use day.

4. PWC users who disembark on the shore would travel no more than 100 feet inland and would follow existing trails.

The PWC and visitor use trends data were used to evaluate impacts to threatened or endangered species. Additional information was obtained from national seashore staff. Vegetation and wildlife information were provided by Gulf Islands National Seashore resource specialists, existing NPS reports, and literature reviews.

The *Superintendent's Compendium* (NPS 2003a) includes regulatory provisions that are relevant to management of threatened and endangered species within the national seashore. They include the shorebird nesting closures mentioned in the "Wildlife and Wildlife Habitat" section in this chapter in addition to relic dune closures and over-sand foot travel closures described below. These mandated regulations influence the potential for PWC use to affect special status species within the national seashore.

Relic Dune Closures

The following locations contain highly fragile relic sand dune structures and are closed to all public use and access as indicated below:

(a) The area north of Highway 399 through the Santa Rosa area, within 0.5 mile of the paved parking areas, as designated by signs.

(b) The area north of Fort Pickens Road, within 0.5 mile of the paved parking areas, as designated by signs.

Determination: These areas consist of some of the last remaining relic sand dunes and the sand flats surrounding them. These dunes are made of wind blown sand that has been transformed over time into special ecological niches. These dunes systems are habitat for threatened and endangered species and are extremely fragile and subject to rapid erosion when trampled underfoot. It is important to preserve these dune structures for their natural and esthetic values. Less restrictive measures would allow walking through the dunes, which would result in erosion and eventual loss of the dune structures.

Over-sand Foot Travel Closures

Over-sand foot travel is prohibited on the north and south sides of the 1.7-mile Perdido Key Road between the Star Pavilion and the eastern turnaround except by way of the designated access points. The access points are the designated boardwalks and the one sand trail provided along the roadway.

Determination: The sand dunes adjacent to the Perdido Key Road are extremely fragile and subject to rapid erosion when trampled underfoot. These dunes systems are habitat for threatened and endangered species and it is important to preserve them for their natural and esthetic values. Less restrictive measures would allow walking through the dunes, which would result in erosion and eventual loss of the dune structures.

IMPACT ANALYSIS AREA

The focus of this study is Gulf Islands National Seashore and the surrounding shoreline area inland to approximately 200 feet. Based on the distance of PWC operation from the shoreline, wildlife responses to PWC activity, and the likely distance PWC users would travel inland, this 200-foot inland segment is assumed to provide a more encompassing range of assessment.

Magnitude of Effects

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

> *No effect:* When 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 are discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated) or are completely beneficial.
>
> *May affect / likely to adversely affect:* When an adverse effect to a listed species may occur as a direct or indirect result of proposed actions and the effect either is not discountable or is 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 national seashore boundaries. This would be equivalent to impairment if the impact to listed species and their habitat would be affected to the point that the park's purpose (authorizing legislation, general management plan, and strategic plan) could not be fulfilled and resources could not be experienced and enjoyed by future generations.

Impacts of the No-Action Alternative — Continue Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. Under the no-action alternative, PWC use would not be reinstated in Gulf Islands National Seashore. There would be no effect to aquatic or terrestrial threatened or endangered and other special status species and their habitat from PWC-related physical disturbance, noise, and emissions within the national seashore.

Cumulative Impacts. PWC use would not contribute to cumulative impacts to threatened or endangered or other special status species in park waters. Cumulative impacts would include effects from non-PWC motorized vessel use throughout most waters of the Florida District. The following summarizes the impacts that would be expected from non-PWC visitor use to the federal and state listed endangered, threatened, candidate, and special concern species discussed under the "Affected Environment" chapter.

Aquatic Species. Non-PWC motorized vessel use would still occur in most park waters and may affect the Florida manatee, Atlantic green sea turtle, Kemp's ridley sea turtle, Atlantic loggerhead sea turtle, and leatherback sea turtle through collisions and noise impacts. However, manatees are not common in waters of the Florida District and are not known to frequent waters in the Mississippi District of the national seashore. Sea turtles are found in park waters and are known to nest on the beaches within the Florida district of the national seashore during the spring and summer months. The Florida district includes 21 miles of beaches suitable for sea turtle nesting. An average of 40 to 50 sea turtles nest in the Florida district annually. Nests are marked, dated, and watched by staff biologists and volunteers. Visitor activities within the national seashore may affect, but are not likely to adversely affect sea turtle species, nests, or habitat. The Gulf sturgeon is likely to be present in both districts of national seashore waters during the winter months when boating activity is low and only for short periods during migrations to and from freshwater spawning habitats. The Gulf sturgeon and its designated critical habitat may be affected but are not likely to be adversely affected by noise and water quality impacts from motorized watercraft.

The saltmarsh topminnow is a state listed species in Florida and inhabits marsh habitats behind the barrier islands in sound-side areas within the Florida District of the national seashore. Noise and water quality impacts from motorized watercraft may affect but are not likely to adversely affect the saltmarsh topminnow, because most non-PWC motorized vessel use in the park occurs in Gulf-side waters.

American alligators, a federally threatened and state-listed species of concern in Florida, generally remain in wetland and lagoon areas where motorized watercraft cannot or are not permitted to access. The alligator snapping turtle, a Florida state-listed species of concern, occurs in wetland habitats of the Florida District, but, like the alligator, is unlikely to be present in waters where motorized watercraft use occurs. Visitor activities may affect, but are unlikely to adversely affect, the American alligator or the alligator snapping turtle.

Terrestrial Species. The Perdido Key beach mouse is listed as both a federally and state endangered species in Florida with critical habitat designated within the Perdido Key area of the Gulf Islands National Seashore. The mouse is known to occupy habitat within the national seashore on the eastern portion of Perdido Key in addition to areas outside of national seashore boundaries on western portions of Perdido Key. Popular visitor use areas are located on Perdido Key, and some effects from visitor activities to Perdido Key beach mouse habitat could occur, but disturbances to nesting areas would be minimized by over-sand foot travel closures as stated in the *Superintendent's Compendium* (NPS 2003a) and detailed in this report. Direct disturbance to the mouse is unlikely, as it is nocturnal and generally avoids people. Visitor activities within the national seashore may affect, but are not likely to adversely affect the Perdido Key beach mouse.

The Santa Rosa beach mouse is a state-listed species of concern in Florida, and is found only on the Santa Rosa Island in Florida. Within the national seashore it has been identified as a species that requires special management efforts in an attempt to prevent a decline in population and the need for federal protection. Three known Santa Rosa beach mouse populations occupy habitat located in dune environments at the ends and middle portion of the island and could be accessible to visitors engaging in shoreline activities. Due to the nocturnal nature of the mouse, direct disturbance from visitors is unlikely. In addition, the restrictions on foot access to dune habitats minimize the potential for impact. Visitor activities within the national seashore may affect but are not likely to adversely affect the Santa Rosa beach mouse.

Potential effects to the gopher tortoise, a state-listed species of concern in Florida and an imperiled species in Mississippi, would include disturbance to individuals or habitat by people engaging in activities in inland areas. Within the national seashore, the gopher tortoise is known mainly from inland locations and is unlikely to be adversely affected by visitor uses that are focused mainly on shoreline and water-based activities.

Avian Species. In addition to federal threatened status, the American bald eagle is state-listed as threatened in Florida, and state-listed critically imperiled (breeding) (S1B) and imperiled (non-breeding) (S2N) in Mississippi. In Florida, there are no known nesting locations, but bald eagles are often observed in the area and are believed to feed in park waters (Hoggard 2003a). Within the Mississippi District, bald eagles nest on Horn Island, where reintroduction efforts were begun in 1985 (NPS 2003b). Bald eagle nesting locations within the national seashore but are protected during nesting times as stated in the *Superintendent's Compendium* (NPS 2003a). Temporary disturbances from motorized boat use may occur to foraging or roosting individuals, but adverse effects to the species from visitor activities within the national seashore are unlikely.

The piping plover is a federally threatened species within its wintering habitat in Florida and Mississippi, as well as a state-listed threatened species in Florida. Lands within the national seashore are designated critical wintering habitat. This habitat is concentrated in open beaches and tidal flats, and piping plovers

begin arriving in July and remain into the following May (NPS 2001a). Within the Florida District, piping plovers are known to winter in tidal flat areas on Perdido Key and on the north side of Santa Rosa Island. Seasonal closures of shorebird nesting areas serve as a measure of protection of piping plovers, since they congregate in areas where other shorebirds nest. Visitor activity including motorized boating at the national seashore may affect but is unlikely to adversely affect overwintering populations of piping plover.

The American peregrine falcon was removed from the federal endangered and threatened species list in 1999, but remains listed as a state endangered species in Florida. Throughout the Florida District of the national seashore, peregrines are routinely observed perched on beaches during fall and spring migrations. There are no known breeding sites within the Florida District of the national seashore, but resting or foraging individuals could be temporarily disturbed by motorized boating or other visitor activities, though adverse effects to the peregrines are unlikely to occur.

The brown pelican is listed as an endangered species by the USFWS, except for the Atlantic Coast, Florida, and Alabama. In addition, it is a state species of special concern in Florida and a state-listed critically imperiled (non-breeding) species within Mississippi. Within the national seashore, brown pelicans primarily occur within the Mississippi District in the Davis Bayou area, the East Ship and West Ship islands, Horn Island, Petit Bois Island, and Cat Island (GEMS n.d.). Visitor use, including motorized boating in these areas, could affect the brown pelican through temporary disturbance to non-breeding individuals, but adverse effects to the species are unlikely.

The southeastern snowy plover is a year-round resident of the national seashore, and is a state-listed threatened species in Florida and a state-listed imperiled species in Mississippi. Within the national seashore, nests are located and monitored on Perdido Key and in the Fort Pickens area (NPS 2003a, 2003b). Feeding and loafing areas are also present on the western side of the Santa Rosa area (NPS 2003a, 2003b). Within Mississippi, the plover is present on the East Ship and West Ship islands, Horn Island, Petit Bois Island, and Cat Island. Seasonal closures of nesting areas to visitor use serve to minimize impacts to plover populations from human disturbances. Cumulative effects from visitor activity may affect, but are unlikely to adversely affect populations of southeastern snowy plover within the national seashore.

The least tern is a state-listed threatened species in Florida and a rare or uncommon species in Mississippi. It has been identified as a species that requires special management by the national seashore to attempt to avoid the need for federal protection. Populations at Fort Pickens and Santa Rosa are large, as they increased when least terns from Perdido Key relocated after Hurricane Opal. Within the Mississippi District, the least tern is present on the East Ship and West Ship islands, Horn Island, Petit Bois Island, and Cat Island. There is potential for visitor activity, including motorized boating, to affect loafing and foraging least terns, but primary nesting areas are protected by seasonal closures and adverse effects to the species are unlikely.

The southeastern American kestrel is a state-listed threatened species in Florida. Within the national seashore, it is designated as a species requiring special management efforts in an attempt to prevent a further decline in population and the subsequent need for federal protection. The southeastern American kestrel is not likely to be affected by visitor use within the national seashore because primary habitat is located in inland areas and is not directly adjacent to popular visitor use areas.

The black skimmer is a state-listed species of concern in Florida and a state-listed vulnerable species in Mississippi. Black skimmers share nesting colonies with least terns and impacts from visitor use would be similar for the two species. Important skimmer rookeries are located on the East Ship and West Ship islands, Horn Island, and Cat Island. Nesting activities would be largely protected from boating and other

visitor activities due to seasonal closures of primary nesting areas. Impacts from disturbance of foraging and loafing individuals would potentially occur. Visitor activity would affect but is unlikely to adversely affect the black skimmer.

The reddish egret is a state-listed species of concern in Florida, and has been identified within the national seashore as an uncommonly occurring species requiring special management. Reddish egrets are most likely to visit areas within the national seashore frequented by other wading birds. Visitor activity may occasionally affect reddish egrets in these areas they are unlikely to be adversely affected by boating or other visitor use within the national seashore.

The snowy egret is a state-listed species of concern in Florida. The snowy egret is not known to nest within the national seashore, but migrating individuals occur within park saltmarsh environments (Hoggard 2003a). Effects from visitor activities within the national seashore may temporarily disturb foraging or loafing individuals, but adverse impacts to the species are unlikely.

The little blue heron is a state-listed species of concern in Florida. It is rarely observed within the national seashore in the Naval Live Oaks area, and nesting activity has not been confirmed within the national seashore. Short-term effects from disturbance by boating or other visitor use to migratory loafing or foraging individuals may occur, but adverse impacts to the little blue heron from visitor activities are unlikely.

Special Status Plants. Special status plants and other vegetation communities may be at risk from human disturbance, including trampling, as a result of visitors that leave designated trail areas.

Special status plants that occur in the Florida District of the park include three state-listed endangered plants, the white-top pitcher plant, Cruise's golden aster, and Godfrey's golden aster. In addition, two state-listed threatened plants are found within the national seashore, Curtiss' sandgrass and large-leaved jointweed. The white-top pitcher plant is also a state-listed imperiled to rare species in Mississippi.

The rare and carnivorous white-top pitcher plant, found within the national seashore in wetland and boggy areas, including in the of the Perdido Key area, is unique to the Gulf Coast and is found only between the Apalachicola and Mississippi rivers (FDE 2002b). Adverse impacts from visitor activities to the pitcher plants are unlikely, as the bogs or other wetland environments where the plant grows are not conducive to visitor activity.

Cruise's golden aster and Godfrey's golden aster are both found throughout the Florida District, but not in large numbers. The plants are vulnerable to disturbance from foot-traffic in suitable habitat areas (Hoggard 2003a). Within the national seashore, populations that occur in dune communities would be the most susceptible to trampling by visitors engaging in shoreline activities. Closures of sensitive dune communities to foot traffic as mandated by the *Superintendent's Compendium* (NPS 2003a) would serve as a measure of protection for both Cruise's and Godfrey's golden asters. Visitor use within the national seashore may affect, but is unlikely to adversely affect Cruise's golden aster and Godfrey's golden aster.

Suitable habitat for Curtiss' sandgrass is characterized by sand pine scrub and longleaf pine sandhills, including such areas in the Naval Live Oaks region of the national seashore (Hoggard 2003). Visitors who explore areas away from the shoreline may affect Curtiss' sandgrass, but it is unlikely to be adversely affected, as it is not present in the open dune areas of the shoreline where visitor activities are more concentrated. In addition, motorized boat use was low in the Naval Live Oaks area.

Large-leaved jointweed is found in the sands of the Florida Panhandle on sand pine-oak scrub ridges (Center for Plant Conservation n.d.). The main threat to species survival stems from development and

consequent loss of habitat. Within the national seashore, it is found mostly on the mainland in coastal bluffs and sand pine scrub environments, including portions of Naval Live Oaks. Large-leaved jointweed may be affected but is unlikely to be adversely affected by shoreline visitor activities within the national seashore due to the isolated occurrence of the species coupled with its location away from high use open shoreline areas.

Conclusion. PWC users would not be allowed to operate within national park waters of the national seashore, precluding PWC related effects to special status species and habitat. Cumulative impacts from other visitor activities within the national seashore may affect but would not likely adversely affect any federally or state listed threatened, endangered, or other special concern species or primary habitat areas to. Special status plant species within the national seashore may be affected by visitor disturbance, but adverse effects are unlikely due to occurrences that are isolated from visitor use areas, or protection of sensitive habitat areas by seasonal or permanent closure to human activities (see table 53).

Implementation of this alternative would not result in an impairment of threatened or endangered species.

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. Under alternative A, PWC use would be reinstated in all waters within the Florida and Mississippi districts as previously managed under the *Superintendent's Compendium* (NPS 2003a), and all state regulatory requirements would apply. PWC use would occur throughout most waters of the Florida District, particularly in the Perdido Key area. PWC use would occur throughout the waters of the Mississippi District, mostly in sound-side waters. Restrictions that were in place prior to the PWC closure as described in the "Alternatives" chapter of this document and the beginning of this section would be applicable.

TABLE 53: POTENTIAL IMPACTS OF THE NO ACTION ALTERNATIVE TO FEDERAL AND STATE LISTED WILDLIFE IN GULF ISLANDS NATIONAL SEASHORE

Common Name	Impact	Cumulative Impact
Marine Mammals		
Florida (West Indian) manatee	No effect	Non-PWC motorized vessel use may affect, but are not likely to adversely affect, through collisions and noise impacts.
Perdido Key beach mouse	No effect	Direct disturbance to the mouse is unlikely, as it is nocturnal and generally avoids people. Visitor activities within the national seashore may affect, but are not likely to adversely affect.
Santa Rosa beach mouse	No effect	Visitor activities within the national seashore may affect but are not likely to adversely affect the Santa Rosa beach mouse.
Aquatic Reptiles		
American alligator	No effect	Non-PWC motorized vessel use unlikely to adversely affect since species generally remains in wetland and lagoon areas where motorized watercraft cannot or are not permitted to access.
Leatherback sea turtle	No effect	Non-PWC motorized vessel use and other visitor activity may affect, but are not likely to adversely affect.
Atlantic green turtle	No effect	Non-PWC motorized vessel use and other visitor activity may affect, but are not likely to adversely affect.
Kemps ridley sea turtle	No effect	Non-PWC motorized vessel use and other visitor activity may affect, but are not likely to adversely affect.
Atlantic loggerhead sea turtle	No effect	Non-PWC motorized vessel use and other visitor activity may affect, but are not likely to adversely affect.
Alligator snapping turtle	No effect	Non-PWC motorized vessel use unlikely to adversely affect since species generally remains in wetland and lagoon areas where motorized watercraft cannot or are not permitted to access.

Common Name	Impact	Cumulative Impact
Terrestrial Reptiles		
Gopher tortoise	No effect	Unlikely to be adversely affected by visitor use focused mainly on shoreline and water-based activities.
Fish		
Gulf sturgeon	No effect	Non-PWC motorized vessel use may affect but is not likely to adversely affect through noise and water quality impacts.
Saltmarsh topminnow	No effect	Noise and water quality impacts from motorized watercraft may affect but are not likely to adversely affect because most motorized vessel use occurs in gulf-side waters.
Birds		
Brown pelican	No effect	Visitor use, including motorized boating in these areas, could affect the brown pelican through temporary disturbance to non-breeding individuals, but adverse effects to the species are unlikely.
American bald eagle	No effect	Temporary disturbances from motorized boat use may occur to foraging or roosting individuals, but adverse effects to the species from visitor activities within the national seashore are unlikely.
Piping plover	No effect	Visitor activity including motorized boating at the national seashore may affect but is unlikely to adversely affect overwintering populations of piping plover.
Peregrine falcon	No effect	Could be temporarily disturbed by motorized boating or other visitor activities, though adverse effects to the peregrines are unlikely to occur.
Southeastern snowy plover	No effect	Seasonal closures of nesting areas to visitor use serve to minimize impacts to plover populations from human disturbances. Cumulative effects from visitor activity may affect, but are unlikely to adversely affect populations within the national seashore.
Least tern	No effect	There is potential for visitor activity, including motorized boating, to affect loafing and foraging least terns, but primary nesting areas are protected by seasonal closures and adverse effects to the species are unlikely.
Southeastern American kestrel	No effect	Not likely to be affected by visitor use within the national seashore because primary habitat is located in inland areas and is not directly adjacent to popular visitor use areas.
Black skimmer	No effect	Nesting activities largely protected from boating and other visitor activities due to seasonal closures of primary nesting areas. Impacts from disturbance of foraging and loafing individuals would potentially occur. Visitor activity would affect but is unlikely to adversely affect the black skimmer.
Reddish egret	No effect	Visitor activity may occasionally affect reddish egrets s, but they are unlikely to be adversely affected by boating or other visitor use within the national seashore.
Little blue heron	No effect	Short-term effects from disturbance by boating or other visitor use to migratory loafing or foraging individuals may occur
Snowy egret	No effect	Effects from visitor activities within the national seashore may temporarily disturb foraging or loafing individuals, but adverse impacts to the species are unlikely.
Plants		
White-top pitcher plant	No effect	Adverse impacts from visitor activities to the pitcher plants are unlikely, as the bogs or other wetland environments where the plant grows are not conducive to visitor activity.
Cruise's golden aster	No effect	Visitor use within the national seashore may affect, but is unlikely to adversely affect.
Godfrey's golden aster	No effect	Visitor use within the national seashore may affect, but is unlikely to adversely affect.
Curtiss' sandgrass	No effect	Unlikely to be adversely affected as it is not present in the open dune areas of the shoreline where visitor activities are more concentrated.
Large-leaved jointweed	No effect	May be affected but unlikely to be adversely affected by shoreline visitor activities within the national seashore due to its location away from high use open shoreline areas.

Aquatic Species. The endangered Florida manatee is occasionally present in park waters in the warmer months. Because manatees feed on shallow water seagrass beds, the manatee is vulnerable to collisions with all types of motorized watercraft. The continued high level of manatee deaths related to human activities, particularly the increasing percentage of watercraft-related deaths, raises concern about the ability of the overall population to grow or even remain stable. Within the national seashore district, manatees are generally known to occur in Gulf-side waters within the Florida District. Collisions and noise impacts from PWC use within the national seashore under alternative A may affect, but are unlikely to adversely affect the endangered Florida manatee due to the lack of individuals occurring in the sound-side waters where PWC use typically takes place.

The Atlantic green, Kemp's ridley, Atlantic loggerhead, and leatherback sea turtles are common in national seashore waters between spring and fall. Sea turtles feed, bask, and loaf just offshore in Gulf-side waters and the loggerhead and green sea turtles are known to frequent seagrass beds in the sound-side waters. During the spring and summer nesting season, male and female turtles congregate in the shallow Gulf-side waters just off the beach and nest in the park on Gulf-side beaches. As PWC use is highest in the summer, and sea turtles are common in park waters in the summer, there is some risk of PWC collisions with these surface-breathing reptiles. Also, the repeated, rapid travel by personal watercraft through areas where sea turtles are common may cause turtles to avoid habitats that are critical to their survival and reproduction. However, sea turtles are most common in Gulf-side waters, while most PWC use occurs in the more protected sound-side waters. Nesting activities by sea turtles take place during nighttime hours during the nesting season from May 1 to October 31. PWC use occurs during daylight hours and thus would not directly impact nesting activities of sea turtles. PWC use within the national seashore under alternative A may affect sea turtles through collisions and noise impacts, but is not likely to adversely affect sea turtles, including the Kemp's ridley sea turtle, green sea turtle, leatherback sea turtle, and the Atlantic loggerhead sea turtle.

Gulf sturgeon have been found to spend much time in the shallow passes between the Mississippi islands. Sturgeon are also known to use Pensacola Pass as they migrate to and from their river spawning habitats. The Gulf sturgeon and its designated critical habitat may be affected but are not likely to be adversely affected by PWC noise and water quality impacts, as this species and its habitat occur in Pensacola Pass and other areas where PWC use is low.

The state-listed (Florida) saltmarsh topminnow may inhabit salt marshes and brackish water habitats at Gulf Islands National Seashore. The saltmarsh topminnow may also be locally affected by PWC activity in the Perdido Key area, but is not likely to be adversely affected by PWC noise and water quality impacts, as these are negligible.

American alligators occur in the Florida District, but generally remain in wetland and lagoon areas where personal watercraft cannot or are not permitted to access. The alligator snapping turtle occurs in wetland habitats of the Florida District, but like the American alligator, is unlikely to be present in waters where PWC use occurs. PWC use may affect, but is unlikely to adversely affect the American alligator or the alligator snapping turtle.

Terrestrial Species. The Perdido Key beach mouse is known to occupy habitat within the national seashore on the eastern portion of Perdido Key in addition to areas outside of park boundaries on western portions of Perdido Key. Popular PWC use areas are located in the Perdido Key area, and some effects resulting from visitors who gain access by personal watercraft to Perdido Key beach mouse habitat could occur. Over-sand foot travel closures in the western part of Perdido Key are in effect and minimize this type of disturbance to the dune environment and beach mouse habitat. Direct disturbance to the mouse is unlikely, as it is nocturnal and generally avoids people. PWC use within the national seashore may affect, but is not likely to adversely affect the Perdido Key beach mouse.

There are three known Santa Rosa beach mouse populations within the Florida District of the national seashore located at the ends and middle portion of the Santa Rosa Island. This habitat could be accessible and affected by uncontrolled PWC landing (NPS 2001a). Adverse impacts to the Santa Rosa beach mouse from PWC use are unlikely due to the nocturnal lifestyle of the mouse and the resulting avoidance of direct exposure to human activities. In addition, restrictions on foot travel in sensitive dune environments minimize effects to Santa Rosa beach mouse habitat resulting from PWC gained shoreline access.

Potential effects to the gopher tortoise in Florida and Mississippi would include disturbance to individuals or habitat by people with access to the shoreline or interior areas of the islands, including PWC users. However, the gopher tortoise is known mainly from inland locations within the national seashore, and is unlikely to be adversely affected by the activity of PWC users.

Avian Species. Noise or physical disturbance from PWC use within the national seashore could potentially affect foraging or roosting bald eagles on a short-term basis, but adverse effects to bald eagles are unlikely. Known bald eagle nesting sites on Horn Island within the Mississippi District are protected during nesting times as stated in the *Superintendent's Compendium* (NPS 2003a). Short-term effects from PWC noise and physical disturbance may occur to foraging or roosting individuals, but adverse effects to the species from PWC activity within the national seashore are unlikely.

Critical habitat for piping plovers is concentrated in open beaches and tidal flats, and piping plovers begin arriving as early as July and remain into the following May (NPS 2001a). Within the Florida District, piping plovers are known to winter in tidal flat areas on Perdido Key and on the north side of Santa Rosa Island. Although piping plovers do not nest within the national seashore, they congregate in areas where other shorebirds nest. Therefore, the seasonal closures of shorebird nesting areas also serve to protect piping plovers from adverse effects from PWC and other public use. In locations outside of these protected areas, or during other times of the year, PWC activity poses a threat of short-term disturbance to piping plovers. PWC activity within the national seashore may affect but is unlikely to adversely affect overwintering populations of piping plover.

Resting or feeding peregrine falcons could be disturbed by PWC activities within the national seashore on a short-term basis, but adverse effects to the species are unlikely to occur.

The brown pelican is a year-round migratory resident of the national seashore. It is a state species of special concern in Florida and in Mississippi is listed as an endangered species by the USFWS in addition to a state-listed critically imperiled (non-breeding) species. It is known to occur in the Davis Bayou area and on the Ship islands, Horn Island, Petit Bois Island, and Cat Island (GEMS n.d.). Noise and physical disturbance from PWC activity in these areas of the national seashore could affect loafing, roosting, or feeding individuals. Adverse effects from PWC use to the brown pelican are unlikely due to the short-term nature of potential disturbance and the lack of breeding individuals within the national seashore.

Seasonal closures of southeastern snowy plover nesting areas to visitor use would minimize adverse impacts from PWC use to plover populations. Known nesting areas include locations on the Ship islands, Horn Island, Petit Bois Island, and Cat Island in the Mississippi District. Disturbances from noise and physical disturbance from PWC activity may temporarily affect loafing or foraging individuals, but is unlikely to adversely affect populations of southeastern snowy plover within the national seashore. National seashore occurrences of the least tern include large populations at Fort Pickens and Santa Rosa Island in the Florida District, and locations on the Ship islands, Horn Island, Petit Bois Island, and Cat Island in the Mississippi District. Adverse effects from PWC use to the species are unlikely due to the seasonal closures of primary nesting areas to public access during the nesting season, though PWC noise and physical disturbance may cause short-term flight responses to loafing and foraging least terns.

The southeastern American kestrel is not likely to be affected by PWC use within the national seashore because primary habitat is located in inland areas that are not adjacent to PWC use areas.

Nesting colonies of the black skimmer include rookeries on the Ship islands, Horn Island, and Cat Island in the Mississippi District. These areas would be largely protected from PWC access and activities due to seasonal closures during nesting. Short-term effects to foraging and loafing individuals could potentially occur from PWC noise and physical disturbance. PWC activity may affect but is unlikely to adversely affect the black skimmer within the national seashore. PWC activity may occasionally affect reddish egrets when they gather with other wading birds in the area, but, due to the infrequent occurrence of the reddish egret within the national seashore, they are unlikely to be adversely affected by PWC use.

Migrating snowy egrets occur within the saltmarsh environments of the national seashore (Hoggard 2003a). Effects from PWC noise and physical disturbance may temporarily disturb foraging or loafing individuals within the national seashore on a short-term basis, but adverse impacts to the species are unlikely as they do not nest within the national seashore.

Short-term effects from PWC noise and physical disturbance to migratory loafing or foraging little blue heron may infrequently occur, but adverse impacts to the little blue heron from PWC activities are unlikely due to the uncommon occurrence of the species in areas of PWC use within the national seashore.

Special Status Plants. Personal watercraft provide visitor access to the shoreline, and operators may disembark to explore shoreline areas. As a result, special status vegetation could be trampled by visitors in shoreline areas if visitors leave the trail. The affinity of the white-top pitcher plant for bogs and other wet environments in both the Florida and Mississippi districts of the national seashore precludes impacts from typical recreational exploration and trampling, including that of PWC users. No effects to this species are expected to result from PWC access within the national seashore.

Cruise's golden aster and Godfrey's golden aster are vulnerable to foot-traffic in the Florida District of the national seashore. Visitor access from personal watercraft to suitable habitat areas may affect the species (Hoggard 2003a). Within the national seashore, populations that occur in dune communities would be the most susceptible to trampling by visitors with PWC access to the shoreline. Closures of sensitive dune communities to foot traffic as mandated by the *Superintendent's Compendium* (NPS 2003a) would serve as a measure of protection for both Cruise's and Godfrey's golden asters. PWC use within the national seashore may affect, but is unlikely to adversely affect Cruise's golden aster and Godfrey's golden aster.

Suitable habitat for Curtiss' sandgrass is characterized by sand pine scrub and longleaf pine sandhills, including such areas in the Naval Live Oaks region of the national seashore (Hoggard 2003a). Visitors who gain access by personal watercraft and explore areas away from the shoreline may affect Curtiss' sandgrass. However, the Naval Live Oaks region is an area of minimal PWC use. Adverse impacts are unlikely as it is not present in the open shoreline areas of the national seashore where visitor exploration and access is likely to occur by PWC users.

Within the national seashore, large-leaved jointweed is found mostly on the mainland in coastal bluffs and sand pine scrub environments, including portions of Naval Live Oaks, where PWC use would be minimal. Large-leaved jointweed may be affected but is unlikely to be adversely affected by PWC activity within the national seashore due to the isolated occurrence of the species in locations away from open shoreline areas where personal watercraft would be likely to land and explore.

Cumulative Impacts. PWC use within the national seashore would contribute to cumulative impacts to special status species as described in the above analysis. The majority of cumulative impacts to the above special status animal and plant species would result from visitor activities including non-PWC water-based or shoreline recreational activities such as boating, swimming, hiking, picnicking, camping, and fishing, and would be the same as under the no-action alternative.

Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect aquatic threatened or endangered species in park waters. Sea turtles and manatees may be affected but are not likely to be adversely affected through collisions and noise impacts because most PWC and boating use occur in areas where these species are less common. The Gulf sturgeon and saltmarsh topminnow may be affected but are not likely to be adversely affected by motorized watercraft noise and water quality impacts.

Likewise, visitor activities including motorized boat use may also affect listed terrestrial mammals, listed reptiles, waterbirds, shorebirds, wading birds and raptors, but are not likely to adversely affect these species due to isolated occurrences away from visitor use areas or restrictions such as seasonal or permanent closures of primary habitat areas to visitor use.

Special status plant species are not likely to be adversely affected by cumulative impacts from visitor activities within the national seashore, as they are either located in areas not frequented by visitors (white-top pitcher plant, Curtiss' sandgrass, large-leaved jointweed) or are found in areas that are protected by restrictions to visitor use (Cruise's golden aster, Godfrey's golden aster).

Conclusion. Prior mandated closures of sensitive habitat areas throughout the national seashore would provide a measure of protection against adverse impacts from PWC use to many special status species. In addition, the timing and location of PWC use differ from special status species occurrences within the national seashore, further minimizing adverse effects to these species. PWC use may affect but is unlikely to adversely affect special status aquatic animal species, terrestrial or avian species, special status plant species. PWC use would have no effect on the white-top pitcher plant.

Cumulative impacts from visitor activities, including PWC use and other visitor activities, within the national seashore may affect but are not likely to adversely affect federal or state listed terrestrial or aquatic animal or plant species or other special status wildlife or plant species (see table 54).

TABLE 54: POTENTIAL IMPACTS OF ALTERNATIVE A TO FEDERAL AND STATE LISTED WILDLIFE IN GULF ISLANDS NATIONAL SEASHORE

Common Name	Impact	Cumulative Impact
Marine Mammals		
Florida (West Indian) manatee	Collisions and noise impacts from PWC use within the national seashore may affect, but are unlikely to adversely affect.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Perdido Key beach mouse	PWC use within the national seashore may affect, but is not likely to adversely affect the Perdido Key beach mouse.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Santa Rosa beach mouse	Adverse impacts from PWC use are unlikely due to the nocturnal lifestyle of the mouse and the resulting avoidance of direct exposure to human activities.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Aquatic Reptiles		
American alligator	PWC use may affect, but is unlikely to adversely affect.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Leatherback sea turtle	PWC use within the national seashore may affect sea turtles through collisions and noise impacts, but is not likely to adversely affect.	Motorized vessels, including personal watercraft, and other visitor activity may affect but are not likely to adversely affect.

Common Name	Impact	Cumulative Impact
Atlantic green turtle	PWC use within the national seashore may affect sea turtles through collisions and noise impacts, but is not likely to adversely affect.	Motorized vessels, including personal watercraft, and other visitor activity may affect but are not likely to adversely affect.
Kemps ridley sea turtle	PWC use within the national seashore may affect sea turtles through collisions and noise impacts, but is not likely to adversely affect.	Motorized vessels, including personal watercraft, and other visitor activity may affect but are not likely to adversely affect.
Atlantic loggerhead sea turtle	PWC use within the national seashore may affect sea turtles through collisions and noise impacts, but is not likely to adversely affect.	Motorized vessels, including personal watercraft, and other visitor activity may affect but are not likely to adversely affect.
Alligator snapping turtle	PWC use may affect, but is unlikely to adversely affect.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Terrestrial Reptiles		
Gopher tortoise	Unlikely to be adversely affected by the activity of PWC users.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Fish		
Gulf sturgeon	May be affected but not likely to be adversely affected by PWC noise and water quality impacts.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Saltmarsh topminnow	Not likely to be adversely affected by negligible PWC noise and water quality impacts.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Birds		
Brown pelican	Noise and physical disturbance from PWC activity could affect loafing, roosting, or feeding individuals. Adverse effects from PWC use to the brown pelican are unlikely due to the short-term nature of potential disturbance and the lack of breeding individuals within the national seashore.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
American bald eagle	Short-term effects from PWC noise and physical disturbance may occur to foraging or roosting individuals, but adverse effects to the species from PWC activity are unlikely.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Piping plover	PWC activity within the national seashore may affect but is unlikely to adversely affect overwintering populations of piping plover.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Peregrine falcon	Resting or feeding peregrine falcons could be disturbed by PWC activities within the national seashore on a short-term basis, but adverse effects to the species are unlikely to occur.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Southeastern snowy plover	Disturbances from noise and physical disturbance from PWC activity may temporarily affect loafing or foraging individuals, but is unlikely to adversely affect populations.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Least tern	Adverse effects from PWC use to the species are unlikely due to the seasonal closures of primary nesting areas to public access during the nesting season, though PWC noise and physical disturbance may cause short-term flight responses to loafing and foraging least terns.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Southeastern American kestrel	Not likely to be affected by PWC use within the national seashore because primary habitat is located in inland areas that are not adjacent to PWC use areas.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Black skimmer	Short-term effects to foraging and loafing individuals could potentially occur from PWC noise and physical disturbance. PWC activity may affect but is unlikely to adversely affect the black skimmer within the national seashore.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Reddish egret	PWC activity may occasionally affect reddish egrets when they gather with other wading	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.

Common Name	Impact	Cumulative Impact
	birds in the area, but, due to the infrequent occurrence of the reddish egret within the national seashore, they are unlikely to be adversely affected by PWC use.	
Little blue heron	Short-term effects from PWC noise and physical disturbance to migratory loafing or foraging may infrequently occur, but adverse impacts from PWC activities are unlikely due to the uncommon occurrence of the species in areas of PWC use.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Snowy egret	Effects from PWC noise and physical disturbance may temporarily disturb foraging or loafing individuals within the national seashore on a short-term basis, but adverse impacts to the species are unlikely as they do not nest within the national seashore.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Plants		
White-top pitcher plant	No effects.	Not likely to be adversely affected by cumulative impacts from visitor activities.
Cruise's golden aster	PWC use within the national seashore may affect, but is unlikely to adversely affect.	Not likely to be adversely affected by cumulative impacts from visitor activities.
Godfrey's golden aster	PWC use within the national seashore may affect, but is unlikely to adversely affect.	Not likely to be adversely affected by cumulative impacts from visitor activities.
Curtiss' sandgrass	Adverse impacts are unlikely as it is not present in the open shoreline areas of the national seashore where visitor exploration and access is likely to occur by PWC users.	Not likely to be adversely affected by cumulative impacts from visitor activities.
Large-leaved jointweed	Unlikely to be adversely affected by PWC activity within the national seashore due to the isolated occurrence of the species in locations away from open shoreline areas where personal watercraft would be likely to land and explore.	Not likely to be adversely affected by cumulative impacts from visitor activities.

Implementation of this alternative would not result in an impairment of threatened or endangered species.

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. Under alternative B, PWC use would occur as under alternative A, with additional management prescriptions as follows.

- A flat-wake zone would be established 300 yards from all park shorelines at the low-water mark with the exception of:
  - At the West Ship Island Pier a flat-wake zone would extend 0.5 mile from the shoreline and 0.5 mile from either side of the pier
  - Around all designated wilderness boundaries a flat-wake zone would be established 0.5 mile from the shorelines at low-water mark.
- No PWC operation would be permitted within 200 feet of non-motorized watercraft and people in the water.

The extended flat wake zoning under alternative B would minimize impacts from PWC activity to threatened and endangered species by restricting speed near shoreline habitat areas and thus limiting the potential for disturbance from noise and rapid approach by personal watercraft.

Potential impacts to special status species from PWC use within the national seashore under alternative B are as follows.

Aquatic Species. PWC use may affect, but is not likely to adversely affect, the Florida manatee, Atlantic green, Kemp's ridley, Atlantic loggerhead, and alligator snapping sea turtles through collisions and noise impacts. The 300-yard PWC flat-wake zone would encompass much of the shallow seagrass habitats in the Perdido Key area and north of Santa Rosa Island in the Florida District, and in Mississippi Sound in the Mississippi District where manatees and turtles may occur, thereby minimizing the chance of collisions.

The Gulf sturgeon and its designated critical habitat may be affected but are not likely to be adversely affected by PWC noise and water quality impacts, because much of this habitat in the national seashore occurs within the 300-yard PWC flat-wake zone.

PWC use may affect, but is unlikely to adversely affect, the state listed saltmarsh topminnow. The PWC flat-wake zone restriction would eliminate full-throttle PWC use in the salt marsh and shoreline habitats of the national seashore where this fish occurs.

Terrestrial Species. Direct adverse impacts from personal watercraft to the Perdido Key beach mouse and the Santa Rosa beach mouse would be unlikely due to the nocturnal nature of both species and the general avoidance of human activity. Closures of sensitive dune ecosystems as stated in the *Superintendent's Compendium* (NPS 2003a) would minimize the potential for indirect effects related to PWC access and resultant visitor activity in habitat areas. PWC use under alternative B may affect the Perdido Key and Santa Rosa species of beach mouse, but adverse effects to the species would be unlikely.

The gopher tortoise could be potentially affected by disturbance to individuals or habitat from people with shoreline access, including PWC users. Within the national seashore, the gopher tortoise is known mainly to occur in inland locations, away from areas of PWC access, and is unlikely to be adversely affected by PWC use.

Avian Species. Flat-wake zoning of personal watercraft within at least 300 yards of shoreline areas would minimize adverse impacts from PWC noise and physical disturbance to the federally or state listed bird species in both the Florida and Mississippi districts of the national seashore. Minor effects from PWC use to special status bird species may occur under alternative B. As in other alternatives, seasonal closures of important nesting sites for shoreline birds reduce the potential for impacts to nesting individuals. Under alternative B, the slower speeds and decreased noise from personal watercraft that would result from implementation of flat-wake zoning in shoreline areas, would preclude adverse effects from PWC use within the national seashore to the bald eagle, piping plover, American peregrine falcon, brown pelican, southeastern snowy plover, least tern, southeastern American kestrel, black skimmer, reddish egret, snowy egret, and little blue heron. Any effects that would occur from PWC use would be short-term in nature and would likely result in temporary flight responses by loafing or foraging individuals.

Special Status Plants. The additional management prescriptions under alternative B would not affect the accessibility of shoreline areas or reduce the potential for PWC users to disembark and explore the islands, potentially impacting special status plant species.

The affinity of the white-top pitcher plant for bogs and other wet environments precludes impacts from typical recreational exploration and trampling within either the Florida or Mississippi district of the national seashore. No effects to this species are expected to result from PWC access within the national seashore.

Within the national seashore, populations of Cruise's golden aster and Godfrey's golden aster that occur in dune communities would be the most susceptible to trampling by visitors with PWC access to the shoreline. Closures of sensitive dune communities to foot traffic as mandated by the *Superintendent's Compendium* (NPS 2003a) would serve as a measure of protection for both Cruise's and Godfrey's golden asters from PWC user access. PWC use within the national seashore may affect, but is unlikely to adversely affect Cruise's golden aster and Godfrey's golden aster.

Visitors who gain access by personal watercraft and explore areas away from the shoreline may affect Curtiss' sandgrass. Adverse impacts are unlikely as it is not present in the open shoreline areas of the shoreline where visitor exploration and access is likely to occur.

Large-leaved jointweed may be affected but is unlikely to be adversely affected by PWC activity within the national seashore due to the isolated occurrence of the species in locations away from open shoreline areas where personal watercraft would be likely to land and to its location in the Naval Live Oaks area where PWC use would be low.

Cumulative Impacts. Cumulative impacts to special status species from non-PWC sources would be the same as the no-action alternative. In addition, PWC use would contribute to cumulative impacts, but only minimally, as the extended flat-wake zoning under alternative B would serve to minimize impacts to the listed species. Cumulative impacts from visitor activities, including PWC use, within the national seashore could affect, but are not likely to adversely affect, special status species within the national seashore.

Conclusion. Reinstating PWC use within the national seashore and establishing a PWC flat-wake zone would minimize the likelihood of adverse effects on threatened or endangered species in the national seashore boundaries from PWC use. PWC use may affect, but would be unlikely to adversely affect, any federally or state-listed species. In combination with prior mandated closures of sensitive habitat areas, the extension of flat-wake zoning to a minimum of 300 yards from the shoreline under alternative B would serve as a measure of protection against impacts from PWC use to terrestrial and avian special status species. PWC use would have no effect on the white-top pitcher plant.

Cumulative impacts to special status species from non-PWC sources would be the same as under alternative A. PWC use would contribute slightly to cumulative effects, but PWC or other visitor use and activities would not be likely to cause adverse impacts to special status species within the national seashore (see table 55).

Implementation of this alternative would not result in an impairment of threatened or endangered species.

VISITOR USE AND 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 personal watercraft are no different from other watercraft and that people have a right to enjoy the sport. The primary concern involves changes in noise, pitch, and volume due to the way personal watercraft are operated. Additionally, the sound of any watercraft can carry for long distances, especially on a calm day.

TABLE 55: POTENTIAL IMPACTS OF ALTERNATIVE B TO FEDERAL AND STATE LISTED WILDLIFE IN GULF ISLANDS NATIONAL SEASHORE

Common Name	Impact	Cumulative Impact
Marine Mammals		
Florida (West Indian) manatee	Collisions from PWC use within the national seashore may affect, but are unlikely to adversely affect.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Perdido Key beach mouse	PWC use within the national seashore may affect, but is not likely to adversely affect the Perdido Key beach mouse.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Santa Rosa beach mouse	Adverse impacts from PWC use are unlikely due to the nocturnal lifestyle of the mouse and the resulting avoidance of direct exposure to human activities.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Aquatic Reptiles		
American alligator	PWC use may affect, but is unlikely to adversely affect.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Leatherback sea turtle	PWC use within the national seashore may affect through collisions and noise impacts, but is not likely to adversely affect.	Motorized vessels, including personal watercraft, and other visitor activity may affect but are not likely to adversely affect.
Atlantic green turtle	PWC use within the national seashore may affect through collisions and noise impacts, but is not likely to adversely affect.	Motorized vessels, including personal watercraft, and other visitor activity may affect but are not likely to adversely affect.
Kemps ridley sea turtle	PWC use within the national seashore may affect through collisions and noise impacts, but is not likely to adversely affect.	Motorized vessels, including personal watercraft, and other visitor activity may affect but are not likely to adversely affect.
Atlantic loggerhead sea turtle	PWC use within the national seashore may affect through collisions and noise impacts, but is not likely to adversely affect.	Motorized vessels, including personal watercraft, and other visitor activity may affect but are not likely to adversely affect.
Alligator snapping turtle	PWC use may affect, but is unlikely to adversely affect.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Terrestrial Reptiles		
Gopher tortoise	Unlikely to be adversely affected by the activity of PWC users.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Fish		
Gulf sturgeon	May be affected but not likely to be adversely affected by PWC noise and water quality impacts.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Saltmarsh topminnow	Not likely to be adversely affected by negligible PWC noise and water quality impacts.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Birds		
Brown pelican	Adverse effects from PWC use are unlikely due to the short-term nature of potential disturbance and lack of breeding individuals within the national seashore.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
American bald eagle	Short-term effects from PWC noise and physical disturbance may occur to foraging or roosting individuals, but adverse effects to the species from PWC activity are unlikely.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Piping plover	PWC activity within the national seashore may affect but is unlikely to adversely affect overwintering populations of piping plover.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Peregrine falcon	Resting or feeding peregrine falcons could be disturbed by PWC activities within the national	Motorized vessels, including personal watercraft, may affect but are not likely to

Common Name	Impact	Cumulative Impact
	seashore on a short-term basis, but adverse effects to the species are unlikely to occur.	adversely affect.
Southeastern snowy plover	Disturbances from noise and physical disturbance from PWC activity may temporarily affect loafing or foraging individuals, but is unlikely to adversely affect populations.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Least tern	Adverse effects from PWC use to the species are unlikely due to the seasonal closures of primary nesting areas to public access during the nesting season, though PWC activity may cause short-term flight responses to loafing and foraging least terns.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Southeastern American kestrel	Not likely to be affected by PWC use within the national seashore because primary habitat is located in inland areas that are not adjacent to PWC use areas.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Black skimmer	Short-term effects to foraging and loafing individuals could potentially occur from PWC noise and physical disturbance. PWC activity may affect but is unlikely to adversely affect.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Reddish egret	PWC activity may occasionally affect reddish egrets when they gather with other wading birds in the area, but, due to the infrequent occurrence of the reddish egret within the national seashore, they are unlikely to be adversely affected by PWC use.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Little blue heron	Short-term effects from PWC noise and physical disturbance to migratory loafing or foraging may infrequently occur, but adverse impacts from PWC activities are unlikely due to the uncommon occurrence of the species in areas of PWC use.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Snowy egret	Effects from PWC noise and physical disturbance may temporarily disturb foraging or loafing individuals within the national seashore on a short-term basis, but adverse impacts to the species are unlikely as they do not nest within the national seashore.	Motorized vessels, including personal watercraft, may affect but are not likely to adversely affect.
Plants		
White-top pitcher plant	No effects.	Not likely to be adversely affected by cumulative impacts from visitor activities.
Cruise's golden aster	PWC use within the national seashore may affect, but is unlikely to adversely affect.	Not likely to be adversely affected by cumulative impacts from visitor activities.
Godfrey's golden aster	PWC use within the national seashore may affect, but is unlikely to adversely affect.	Not likely to be adversely affected by cumulative impacts from visitor activities.
Curtiss' sandgrass	Adverse impacts are unlikely as it is not present in the open shoreline areas of the national seashore where visitor exploration and access is likely to occur by PWC users.	Not likely to be adversely affected by cumulative impacts from visitor activities.
Large-leaved jointweed	Unlikely to be adversely affected by PWC activity within the national seashore due to the isolated occurrence of the species in locations away from open shoreline areas where personal watercraft would be likely to land and explore.	Not likely to be adversely affected by cumulative impacts from visitor activities.

GUIDING REGULATIONS AND POLICIES

NPS *Management Policies 2001* (NPS 2000d) 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. 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
- Would create an unsafe or unhealthful environment for other visitors or employees
- Are contrary to the purposes for which the park was established
- Would 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.

Gulf Islands National Seashore preserves certain outstanding natural, cultural and recreational resources along the Northern Gulf Coast of Florida and Mississippi. Part of the purpose of Gulf Islands National Seashore is to provide for the public use and enjoyment of these resources. The seashore is remarkable in that it contains nationally important historical coastal defense forts, has several mostly undisturbed, natural areas in close proximity to major population centers that provide a benchmark to compare environmental conditions in developed areas of the Gulf Coast, and has areas of high quality beaches, dunes, and water resources. One of the national seashore's goals is to ensure that "Seashore visitors safely enjoy and are satisfied with the availability, accessibility, diversity and quality of park facilities, services and appropriate recreational opportunities." To achieve the park's goals, two long-term (five-year) visitor goals were identified in the *Strategic Plan* (NPS 1997b):

- *Visitor Satisfaction* — By September 30, 2002, 80% of visitors to Gulf Islands National Seashore are satisfied with appropriate facilities and services.
- *Visitor Safety* — By September 30, 2005, reduce the visitor safety incident rate 10% from 1997 levels.

Both goals focus on maintaining high visitor satisfaction by means of appropriate and safe recreational opportunities and experiences.

METHODOLOGY AND ASSUMPTIONS

The purpose of this impact analysis was to determine if PWC use at Gulf Islands National Seashore is compatible or in conflict with the purpose of the park, its visitor experience goals, and the direction provided by NPS *Management Policies* (NPS 2000d). 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 PWC closure was calculated for the national seashore (see the "PWC and Boating User Trends" section). Staff observations and visitor surveys were evaluated to determine visitor attitudes and satisfaction in areas where personal watercraft were used.

The potential for change in visitor experience was evaluated by identifying projected increases or decreases in both personal watercraft and other visitor uses, and determining whether these projected changes would affect the desired visitor experience and result in greater safety concerns or additional user conflicts.

IMPACT ANALYSIS AREA

In terms of PWC use, the impact area is defined as all areas of Gulf Islands National Seashore that are open to PWC use as described in the *Superintendent's Compendium* (NPS 2003a) and detailed in the "Alternatives" chapter. In addition, PWC use may affect visitors at beaches, trails, and campgrounds near the shoreline, such that visitors within 200 feet of the shorelines of Gulf Islands National Seashore waters are considered to be within the affected area.

MAGNITUDE OF EFFECTS

The following thresholds were defined:

Negligible: Visitors would not likely be aware of the effects associated with changes proposed for visitor use and enjoyment of national seashore 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 national resources would remain available for similar visitor experience and use without derogation of 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 experience and use without derogation of park resources and values, but visitor satisfaction might be measurably affected (visitors could be either satisfied or dissatisfied). Some visitors who desire 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 desire 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.

Impacts of the No-Action Alternative — Continue Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. Personal watercraft would continue to be prohibited from Gulf Islands National Seashore and visitors would not be allowed to participate in this form of recreation within the national seashore managed waters.

Impact 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, although it would eliminate the ability to experience the park on a PWC. PWC users could still use a motorboat or other watercraft and could continue to experience activities such as windsurfing, hiking, swimming, or camping. In the Mississippi District, most PWC are towed by motorboat to the islands and used for recreation there. Such users would still be able to visit and recreate in these areas with their motorboats. In addition, the park does not have jurisdiction over the waters around Cat Island or the Mississippi mainland, where PWC use would be permitted. It is not expected that park visitation would decrease as a result of continuing to prohibit PWC use.

In addition, PWC users have numerous options for recreation in the area around the park. The Pensacola Bay system consists of nearly 170 square miles of open surface water available for boating activities. The prohibition of personal watercraft in park waters would eliminate 18 square miles, or just over 10%, from PWC use. Nearly 90% of the bay system would remain available for personal watercraft use. The Mississippi Sound consists of approximately 789 square miles of open water. The PWC ban in park waters would remove 28 square miles, or less than 4% of the sound waters, from PWC use. Therefore, the continued PWC ban would result in long term, adverse, but minor impacts to PWC users.

Impact on Other Boaters. Continuing to ban PWC use within Gulf Islands National Seashore would eliminate interactions between other boaters and PWC operators within the park. Other boaters, including motorized and non-motorized boaters, would not have to watch out for PWC users, resulting in a continuation of long-term, minor to moderate beneficial impacts.

Impact on Other Visitors. Continuing to ban PWC use within the park would also eliminate interactions between PWC and other watercraft users, swimmers, anglers, and divers, a continuing long-term, beneficial impact for these visitors. The experiences of other shoreline users, such as hikers, campers, and beachcombers, would be positive because no PWC use would be allowed within the national seashore. Continuing the PWC ban would also have a beneficial impact on visitors to the wilderness islands of Horn and Petit Bois, who may view their visit as an opportunity for solitude and remoteness, thus preserving this experience.

Cumulative Impacts. The primary activities at Gulf Islands National Seashore that could affect visitor experiences include anticipated increases in population in the area and accompanying increases in park visitation, as well as increases in military activity or construction activity around the seashore. Increases in visitation would therefore increase the number of vehicles and motorboats at the seashore. The

proposed canal at Navarre Beach on Santa Rosa Island could potentially increase the number of watercraft in both the Gulf and Sound waters adjacent to the park. Visitors at the wilderness islands of the Mississippi District could be negatively affected by light pollution from the floating gambling casinos. Should these casinos eventually rent PWC to their visitors, they would not be permitted to access the seashore's islands, which would be unlikely anyway given the distance to the seashore. Other cumulative impacts include removing short-term adverse parts from construction related to highway improvements and other developments near the seashore boundaries. When combined with the absence of PWC (a beneficial impact to managers), cumulative impacts would be adverse and negligible to minor.

Conclusion. The no-action alternative would have a long-term, minor to moderate, beneficial impact on the experiences of most park visitors because PWC use would continue to be banned. Conversely, the experiences of the few PWC users within the park would be adversely affected and these visitors would experience long term, minor, and adverse impacts because of the restrictions.

Cumulative impacts would result from all visitor activities within the national seashore and from the effects of other users and development/construction within the immediate areas. These impacts would be negligible to minor and adverse over the short and long term. Impacts would potentially increase with projected increase in boating and other visitor use of the national seashore.

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. PWC operators under alternative A would be allowed throughout the Gulf Islands National Seashore, with limitations only in areas previously managed with use restrictions described in the "Alternatives" chapter. No additional management prescriptions would be imposed on PWC users.

Impact on PWC Users. Implementation of alternative A would have a beneficial impacts on the visitor experience of PWC users at Gulf Islands National Seashore, as PWC users would have access to the national seashore islands. However, because PWC use is so minimal at the seashore, these long-term beneficial impacts would be minor because a small percentage of visitors would be affected.

Impact on Other Boaters. In the Florida District, the majority of motorized boating occurs in Gulf waters on the south side of the islands (4,500 boats in Gulf waters compared to 500 in non- Gulf waters in 2002). In contrast, PWC favor the bay and sound areas, where waters are calm (2 PWC in Gulf waters compared to 37 in non-Gulf waters in 2002). It is estimated that only 5 PWC would be operating in Gulf waters by 2012, compared to 6,470 boats. Impacts to boaters in the Florida District would most likely be highest in the Perdido Key area, where as many as 39 PWC have been noted on a busy summer holiday weekend. Therefore, interactions between motorized boaters and PWC in the Florida District would be most concentrated in non- Gulf waters, resulting in long-term, negligible to minor, adverse impacts due to the small amount of PWC that use the Florida District.

PWC are more prevalent and more evenly distributed in the Mississippi District (a total of 161 PWC in Mississippi in 2002). Conversely, far fewer boaters visit the Mississippi District (1,607 in Mississippi compared to 5,000 in Florida in 2002). East and West Ship islands experience the heaviest visitor use and boaters there would likely experience the biggest impacts. PWC concentrate in areas that boaters also prefer, usually on the east and west ends of the islands, and the north side of Spoil Island, and around the West Ship Island Pier. Under alternative A, all vessels would be restricted to 5 mph within 500 feet of the West Ship Island Pier and the flat-wake zone at Spoil Island, which would benefit both PWC and motorboat users. PWC are not typically used for transportation to these islands, but are towed behind other boats for recreational use at the islands, so some boaters would likely view PWC use as compatible

with boating. As in the Florida District, impacts to motorized boaters in the Mississippi District would also be long-term adverse because more watercraft would be operating in the same areas. However, these impacts would likely be minor.

Generally, few non-motorized watercraft (sea kayaks, canoes, and windsurfers) use the Mississippi islands and the Gulf-side waters of the Florida District. Non-motorized watercraft users and PWC users prefer similar waters (calmer waters close to shore) and interactions between user groups would occur in these areas. The county of Escambia, Florida, prohibits PWC operation above idle speed 200 feet from the shoreline; therefore, the park's proposed kayak/canoe trail would be within this boundary. Park staff have received no documented complaints from canoeists or kayakers concerning PWC interaction, and very few canoeists and kayakers visit the park. For these reasons, non-motorized watercraft users would likely experience negligible to minor, long-term, adverse impacts from PWC operation.

Impact on Other Visitors. Swimmers, divers, anglers, campers, hikers, and other shoreline visitors would be impacted by PWC use as described below. Shoreline areas that are popular with both personal watercraft and other users include the Perdido Key area in Florida and the north sides of the Mississippi islands. State, county, and park boating regulations related to shoreline users would be enforced, but no additional prescriptions would be applied.

Swimmers. Swimming is permitted and occurs at all open beaches in Gulf Islands National Seashore, and swimming and PWC use could potentially occur together in park waters. High-density beach use occurs on Rosamond Johnson Beach at Perdido Key, Opal Beach in the Santa Rosa area, Langdon Beach at Fort Pickens, and West Ship Island.

PWC use in the Florida District would likely be concentrated in the Perdido Key area. Even though PWC use is estimated to represent only 0.5% of all recreational boating in the Florida District, as many as 39 PWC have been noted at Perdido Key on a typical busy summer holiday weekend. Compared to only 6 or 7 PWC estimated to be in use during an entire summer month in more "typical" areas of the seashore, Perdido Key represents the highest concentration of PWC use at the park. Under this alternative, the lagoons of Perdido Key within Big Lagoon would be closed to all combustion engines, minimizing impacts to swimmers there. Before the PWC ban, most PWC use in Perdido Key concentrated primarily on the bay, or north side of the key. However, no vessels would be permitted above 5 mph within 500 feet of the north side of the Fort McRee site on Perdido Key, providing beneficial impacts to visitors in this area. Because few PWC traversed the south, or Gulf shoreline, impacts to the Rosamond Johnson Beach, which is located on the south shoreline on Perdido Key, would likely be long-term, adverse, but minor. Opal Beach and Langdon Beach are also located on the south side of Santa Rosa Island and would experience similar impacts.

Escambia County, Florida, restricts PWC to idle speed when within 200 feet of designated swim areas, which would beneficially affect swimmers at the Fort Pickens beaches. Therefore, impacts from PWC use would likely be long-term, adverse, and minor at these locations because PWC tend to operate more to the north in the waters of Pensacola Bay, and the designated swim beaches are located to the south, in Gulf waters.

More PWC use occurs at the Mississippi District, where PWC compromise approximately 4% of all recreational boating vessels. Most PWC use in the Mississippi District would likely occur as recreational riding on the north, east, and west ends of the islands, and around the West Ship Island Pier, where swimming is prohibited and vessel speed would be restricted. In addition to concentrated PWC use, West Ship Island experiences most of the high-density beach use in the Mississippi District because it is the only island accessible by tour boat. Therefore, concentrated PWC use around the east and west ends of West Ship Island, coupled with a high amount of beach use, would likely result in long-term, adverse,

minor to moderate effects on swimmers at this island. Under this alternative, the lakes, ponds, lagoons, and inlets of all the islands in the Mississippi District would be closed to motorized vessels, and no vessels would be permitted above mean high tide along the shorelines of Horn and Petit Bois islands. These islands would experience long-term, adverse, impacts, but they would likely be negligible compared to West Ship Island due to lower beach visitation and the restrictions described above.

For the reasons described above, overall impacts to swimmers in both districts would be long-term, adverse, and minor.

Divers. Diving and snorkeling are common at the seashore, particularly near Fort Pickens and the sea grass beds north of Santa Rosa Island, which are both in the Florida District. PWC prefer the calm waters of Santa Rosa Sound, which is north of the island, so divers there would be adversely impacted. Diving and PWC use are both prohibited within 200 feet of the Fort Pickens piers. Because most PWC use in the Florida District occurs in the Perdido Key area, impacts to divers would be long-term and adverse, but negligible due to the distribution of PWC in this district and the small number of both PWC users and divers that visit the park.

Anglers. Surf anglers commonly fish along a sand bar off the south shore, or Gulf side, of Santa Rosa Island, which is an area that was also popular with PWC users. However, despite this popularity, most PWC operation in the Florida District occurred north of Santa Rosa Island in the sound or bay, minimizing the amount of interaction between these two groups. Therefore, surf anglers in this area would likely experience long-term, adverse, minor impacts from PWC use under alternative A.

Fly fishing occurs on the north side of Santa Rosa Island, where PWC prefer the calmer waters of the bay and sound. A fishing pier at Fort Pickens on the Pensacola Bay, where PWC users concentrate, also experiences a high amount of use by anglers. However, under alternative A waters 200 feet from the Fort Pickens fishing pier would be closed to all boating operations. In addition, the lagoons of Perdido Key within Big Lagoon would be closed to all combustion engines. Escambia County, Florida, also restricts PWC to idle speed within 200 feet of any fishing pier, dock, or wharf, or within 200 feet of the shoreline, which would provide benefits to anglers in this county. Under alternative A, fly fisherman or anglers using bay waters would experience long-term, adverse, impacts, which would likely be minor because anglers and PWC users prefer similar waters.

A fishing pier on the Davis Bayou in the Mississippi District also provides access to park waters for anglers. The pier is located far enough from the boat launch as to not impact fishermen. However, PWC in the Mississippi District tend to concentrate on the east and west ends of the islands and around the West Ship Island Pier. All vessels would be required to operate below 5 mph within 500 feet of West Ship Island and the Horn Island piers. In addition, the lakes, ponds, lagoons, and inlets of the islands in the Mississippi District would be closed to motorized vessels, and no motorized vessels would be permitted above mean high tide around the islands of Horn and Petit Bois. Therefore, impacts to anglers in the Mississippi District would likely be long-term, negligible to minor, and adverse.

Overall impacts to all anglers in both districts would be long-term, adverse, and minor.

Campers and Hikers. The Florida District receives a much higher amount of camping visitation compared to the Mississippi District (134,700 overnight stays in both 2001 and 2002 compared to 36,500 overnight stays). The Florida District provides the highest number of campsites (200) at the Fort Pickens campground. Primitive camping is also allowed on the east end of Perdido Key, an area of concentrated PWC use. The Davis Bayou Campground in the Mississippi District provides 51 campsites. No designated campsites exist on the Mississippi islands, but backcountry camping occurs on the islands.

The Fort Pickens camping area, which receives the highest camping visitation, is not located on the shoreline. In addition, PWC comprised only 0.5% of all recreational boaters in the Florida District, and they tend to favor the Perdido Key area. Escambia County, Florida, restricts PWC use to idle speed within 200 feet of the shoreline, which would benefit campers in the Fort Pickens area. Therefore, impacts to visitors at the Fort Pickens campground would be negligible.

Backcountry campers on Perdido Key and on the Mississippi islands would experience adverse impacts from PWC users under alternative A, particularly at Perdido Key. Most island camping in the Mississippi District occurs on the east and west ends of the islands, where PWC use is also concentrated. Personal watercraft would be allowed to recreate around all islands in the national seashore, and thus would be in the vicinity of backcountry users. However, shoreline campers on the wilderness islands of Horn and Petit Bois would benefit from the restriction prohibiting motorized vessels above mean high tide on these islands.

Under alternative A, PWC operation would be prohibited from one-half hour after sunset to one half-hour before sunrise in the Florida District and would be limited to operating only during daylight hours in the Mississippi District. Therefore, PWC use would occur only during daytime hours, when campers may be participating in activities such as swimming, fishing, or hiking.

Due to operation restrictions and use distribution, described above, PWC use would have long-term, negligible to minor, adverse impacts on the experience of all camping and hiking visitors at the national seashore.

Other Visitors. Visitor use occurs on all open shorelines within the national seashore, including picnicking, sunbathing, running, beachcombing, fishing, snorkeling, scuba diving, observing wildlife, bird watching, waterskiing, and other waterside activities. PWC in the Florida District tend to favor the calmer waters in the Pensacola Bay, so visitors on the north side of Santa Rosa Island, including Santa Rosa Sound and the Naval Live Oaks Area, would experience the most impacts from PWC use. However, PWC use in the Florida District comprises only 0.5% of all recreational boating and is concentrated in the Perdido Key area. Visitors near the Fort Pickens Pier and the north side of Perdido Key near Fort McRee would experience fewer disturbances due to PWC speed and distance restrictions in these areas, including restrictions established by Escambia County, Florida, as described above.

The Mississippi islands of Horn and Petit Bois are designated wilderness areas. The *Wilderness Act* provides that designated wilderness areas must have primeval character without permanent habitation or improvements, be primarily influenced by the forces of nature, have outstanding opportunities for unconfined types of recreation, and contain features of scenic, ecological, scientific, educational, or historical value. People visit the wilderness islands for a more primitive experience than what is offered in other recreational areas, including those areas of the national seashore that see heavier use, such as Santa Rosa and Perdido Key area. No motorized vessels are permitted above the mean high tide line on the wilderness islands. In addition, most PWC use at these islands occurred at the east and west ends, and the lakes, ponds, lagoons, and inlets of the islands in the Mississippi District would be closed to motorized vessels. Visitors seeking a wilderness experience on Horn and Petit Bois islands would likely experience long-term, adverse minor to moderate impacts from PWC use. Although impacts could increase with projected increases in PWC use at the national seashore, backcountry visitors to the wilderness areas comprise a very small portion of the park's overall visitation.

Cumulative Impacts. With reinstated PWC use under alternative A, other boaters at Gulf Islands National Seashore would interact with PWC operators on a more frequent basis as overall boating and visitor use increases in the next ten years as described under the no action alternative. PWC use is expected to increase at a rate of 9.6% per year and boating use at a rate of 3.7% per year. Peak-use days

would experience an increase from approximately 200 to 500 personal watercraft per day by 2012. At the estimated rate of increase, personal watercraft would comprise approximately 0.8% of total boats in the Florida District and 6.7% of total boats in the Mississippi District of the national seashore in 2012. PWC operators using the Navarre Beach Canal and renting watercraft from Mississippi gambling casinos might access park waters, further increasing PWC use at the seashore in addition to the increases described above. However, park staff have received no documented complaints from visitors regarding PWC use, including PWC and motorboat interactions. Combined with the overall adverse, negligible to minor impacts to other visitors from PWC use, cumulative impacts would be minor and adverse in the short and long term.

Conclusion. Under alternative A, PWC users would experience long-term, minor, beneficial impacts because they would be permitted to ride at the seashore. Motorized and non-motorized boaters would experience long-term, adverse, negligible to minor to moderate impacts due to an increase in the number of vessels operating in the same space. Impacts to swimmers would be long-term, adverse, and minor to moderate. Impacts to divers would be also long-term and adverse, but negligible due to the distribution of PWC in the Florida District, where divers tend to concentrate. Anglers would experience long-term, minor to moderate adverse, impacts. PWC use would have long-term, negligible to minor to moderate, adverse impacts on the experience of camping and hiking visitors. Visitors desiring a wilderness experience on Horn and Petit Bois islands would likely experience long-term, moderate, adverse impacts from PWC use.

Overall impacts to all non-PWC visitors would be long-term, adverse, and negligible to moderate. Cumulative impacts would be moderate and adverse in the short and long term.

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. PWC use would be reinstated as described under alternative A, with additional management prescriptions. A flat-wake zone would be established 300 yards from all park shorelines at the low-water mark, with the exception of the West Ship Island Pier, where a flat-wake zone would extend 0.5 mile from the shoreline and 0.5 mile from either side of the pier. A flat-wake zone would also be established 0.5 mile from the shorelines at low-water mark around all designated wilderness boundaries, flat-wake zone, and no PWC operation would be permitted within 200 feet of non-motorized watercraft and people in the water.

Impact on PWC Users. Under alternative B, PWC use would be reinstated and all of the national seashore waters would be accessible to PWC use except where restricted. Implementation of the above mentioned flat wake areas would prohibit high speed maneuvering in these areas, but this type of activity would still be allowed outside of the flat wake areas within park waters. Compared to the baseline of no PWC use in the national seashore, alternative B would have beneficial impacts on PWC users, because they would be allowed to recreate with a personal watercraft in the national seashore. However, implementation of the restrictions described under this alternative would have negligible adverse impacts on the visitor experience of PWC users, because their access would be more limited.

Impact on Other Boaters. As described under alternative A, the majority of motorized boating in the Florida District occurs in Gulf waters on the south side of the islands (4,500 compared to 500 in non-Gulf waters in 2002). However, PWC favor the bay and sound areas, where waters are calm (2 PWC in Gulf waters compared to 37 in non-Gulf waters in 2002). The PWC restrictions defined by Escambia County, Florida, would also apply to this alternative, benefiting boaters in this area.

PWC are more prevalent and more evenly distributed in the Mississippi District (a total of 161 PWC in Mississippi in 2002). Conversely, far fewer boaters visit the Mississippi District (1,607 in Mississippi compared to 5,000 in Florida in 2002). East and West Ship islands experience the heaviest visitor use and boaters there would likely experience the biggest impacts. PWC concentrate in areas that boaters also prefer, usually on the east and west ends of the islands, around the West Ship Island Pier, and the north side of Spoil Island.

Under alternative B, PWC would be prohibited within 200 feet of non-motorized watercraft and people in the water; however, motorboats would be permitted in these areas at flat wake speed. The additional flat wake restrictions described under this alternative would also benefit motorized boaters in both districts, because they would likely share the same waters as PWC users. Therefore, impacts to motorized boaters would be long-term and adverse due to an increase in the number of vessels operating in the same space, but negligible to minor.

Personal watercraft would be operating in park waters along with non-motorized watercraft users. However, PWC would be prohibited from areas 200 feet from the old fishing pier and 200 feet from the new fishing pier at Fort Pickens, although other non-PWC motorized vessels would be permitted at no-wake speed (Snyder 2003). In addition, a flat-wake zone would be established 300 yards from all park shorelines at the low-water mark, except at the West Ship Island Pier, where the flat-wake zone would extend 0.5 mile from the shoreline and either side of the pier. The flat-wake zone would also extend 0.5 mile from the shoreline at low-water mark and around all wilderness boundaries. PWC would also be prohibited within 200 feet of non-motorized watercraft. The proposed canoe trail along the north side of Perdido Key would provide a non-motorized boat route for canoeists and kayakers to enjoy. The canoe trail would be within the flat-wake zone established 300 yards from the shoreline, providing beneficial impacts to these non-motorized boaters. In addition, park staff have received no documented complaints from non-motorized boaters concerning PWC use, and few canoeists and kayakers visit the park (Snyder 2003). Therefore, impacts to non-motorized watercraft under alternative B would be long-term, adverse, and negligible to minor.

Impact on Other Visitors. Swimmers, anglers, campers, hikers, and other shoreline visitors to the national seashore would have contact with personal watercraft users. Shoreline areas that are popular with both personal watercraft and other shoreline users include the north sides of the Mississippi islands and the Perdido Key area.

Swimmers. High-density beach use occurs on Rosamond Johnson Beach at Perdido Key, Opal Beach in the Santa Rosa area, Langdon Beach at Fort Pickens, and West Ship Island. As described under alternative A, PWC use in the Florida District would likely be concentrated in the Perdido Key area primarily on the bay, or north side of the key. However, few PWC traversed the south, or Gulf shoreline, reducing the amount of adverse impacts to the Rosamond Johnson Beach (in Perdido Key), as well as Opal and Langdon Beach, where PWC use was less frequent. Alternative B would further restrict PWC use by establishing a flat-wake zone 300 yards from all park shorelines, which would benefit swimmers at all swim beaches. This alternative would also prohibit PWC use within 200 feet of people in the water. Restrictions defined by Escambia County, Florida, would benefit swimmers at Langdon Beach near Fort Pickens. For these reasons, impacts from PWC use in the Florida District would likely be long-term, adverse, and minor.

Most PWC use in the Mississippi District would likely occur as recreational riding on the north side of the islands, as before the ban. PWC use would be concentrated on the east and west ends of the Mississippi islands and around the West Ship Island Pier. As described under alternative A, West Ship Island experiences most of the high-density beach use in the Mississippi District. However, swimming is prohibited within 200 feet of the West Ship Island Pier, and under alternative B a flat-wake zone would

be established 0.5 mile from the shoreline and either side of the pier, minimizing some impacts to beach users in the area. Therefore, impacts to swimmers from PWC use in this area of West Ship Island would likely be long-term, adverse, and minor. In addition, a flat-wake zone would also be established 0.5 mile from the shorelines around the wilderness areas of Horn and Petit Boise islands, limiting impacts to swimmers and beach users on these islands. As described under alternative A, the lakes, ponds, lagoons, and inlets of the islands in the Mississippi District would be closed to motorized vessels. These restrictions, coupled with lower visitation at the islands of Cat, East Ship, Horn, and Petit Bois, would likely result in long-term, adverse, negligible to minor impacts to swimmers in the Mississippi District.

For the reasons stated above, overall impacts to swimmers in both the Florida and Mississippi districts would be long-term, adverse, and minor.

Divers. As described under alternative A, diving and snorkeling are common near Fort Pickens and the sea grass beds north of Santa Rosa Island, which are both in the Florida District. PWC prefer the calm waters of Santa Rosa Sound, which is north of the island, so divers there would be adversely impacted. Diving and PWC use are both prohibited within 200 feet of the Fort Pickens piers. However, snorkelers would benefit from the restriction described under alternative B limiting PWC use to flat wakes 300 yards from all park shorelines. In addition, alternative B would further prohibit PWC operation within 200 feet of people in the water, which would benefit both snorkelers and divers. For these reasons, impacts to divers and snorkelers would be long-term and adverse, but negligible due to the distribution of PWC, the additional restrictions imposed under alternative B, and the small number of PWC users and divers that visit the park.

Anglers. Impacts to anglers would be similar to those described under alternative A. The same restrictions would apply to the lagoons of Perdido Key and the fishing piers at Fort Pickens. However, alternative B calls for an additional flat-wake zone 300 yards from all park shorelines at the low-water mark. In addition, a flat-wake zone would extend 0.5 mile from the shoreline and either side of the pier at West Ship Island, and a 0.5-mile flat-wake zone would be established around the wilderness islands of Horn and Petit Bois. Although the additional flat wake restrictions would benefit anglers in all areas of the park, impacts would likely be long-term and adverse, but negligible due to additional PWC restrictions.

Campers and Hikers. Impacts to campers and hikers would be similar to those described under alternative A, particularly in the Florida District since most of the restrictions under alternative B would apply to the Mississippi District. However, alternative B calls for establishment of a flat-wake zone 300 yards from all park shorelines at the low water mark, which would benefit all campers and hikers at the park. PWC use at Horn and Petit Bois islands in the Mississippi District would be restricted to flat-wake speed 0.5 mile from the shoreline, which would benefit users of these wilderness areas. As under alternative A, PWC operation would be limited to daylight hours in both districts, when campers may be participating in other activities.

PWC use would have long-term, negligible to minor, adverse impacts on the experience of all camping and hiking visitors due to the additional restrictions described under alternative B.

Cumulative Impacts. Cumulative impacts would be similar to those described under alternative A. Other boaters at Gulf Islands National Seashore would interact with PWC operators on a more frequent basis as overall boating use increases in the next ten years. However, the restrictions described under alternative B would benefit all non-PWC users by incorporating additional flat-wake zones and use prohibitions. These restrictions would help offset impacts due to projected increased use in the next 10 years. In addition, park staff have received no documented complaints from visitors regarding PWC or motorboat use. Therefore, combined with the overall long-term, adverse, negligible to minor impacts to visitor experience, cumulative impacts would be long-term, adverse, and minor.

Conclusion. Alternative B would provide overall beneficial impacts on PWC users, because they would be allowed to recreate with a personal watercraft in the national seashore, although PWC users would be required to comply with additional restrictions. Impacts of PWC use on motorized and non-motorized boaters would be negligible to minor, long-term, adverse. Impacts to swimmers would also be long-term, adverse, and minor. Impacts to divers, snorkelers, and anglers would be long-term and adverse, but negligible. PWC use would have long-term, negligible to minor, adverse impacts on the experience of all camping and hiking visitors. Overall PWC use would result in long-term, adverse, negligible to minor impacts to non-PWC users. Cumulative impacts would be long-term, adverse, and minor.

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). 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.

In Florida in 2000, personal watercraft comprised 12.5% of all registered vessels statewide and accounted for 32% of all boating accidents. In the Florida District in 2000, 44 boating violation citations were issued, 36% of which were to personal watercraft. An analysis of park boating violations in Mississippi from 1997 to September 2001 reveals that 58% of the violations involved a personal watercraft (NPS 2001a).

GUIDING REGULATIONS AND POLICIES

In addition to the guiding regulations and policies discussed in the "Visitor Experience" section, the NPS *Management Policies 2001* (NPS 2000d) state that the agency 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 capacity 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" (section 8.2.5.1) Further, the National Park Service will strive to protect human life and provide for injury-free visits (section 8.2.5).

Director's Order #9: Law Enforcement Program (NPS 2000a), in conjunction with *Reference Manual 9: Law Enforcement,* establishes and defines standards and procedures for NPS law enforcement. Along with education and resource management, law enforcement is an important tool in achieving this mission. 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. PWC users would continue to abide by Mississippi and Florida state watercraft laws and regulations as described in the "Alternatives" chapter of this document.

METHODOLOGY AND ASSUMPTIONS

The methodology for visitor conflicts and safety is similar to that used for visitor experience. The potential visitor-related impacts attributable to personal watercraft — a higher rate of accidents than for other watercraft, conflicts with other park users, and negative effects on some types of visitor experiences could potentially affect the mandate to provide for injury-free visits. Potential impacts were identified based on the number and activities of personal watercraft operating within the area, the number and activities of other visitors in an area, and the proximity of these user groups.

It is assumed that Florida and Mississippi state PWC regulations are 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

In terms of PWC use, the impact analysis area is defined as all areas of Gulf Islands National Seashore that are open to PWC use, as described in the *Superintendent's Compendium* (NPS 2003a) and detailed in the "Alternatives" section. In addition, PWC use may affect visitors at beaches, trails, and campgrounds near the shoreline, such that visitors within 200 feet of the shorelines of Gulf Islands National Seashore waters are considered to be within the affected area. Although there is visitor use year round, analysis is based on a high use day.

MAGNITUDE OF EFFECTS

The impact intensities for both visitor conflicts and safety follow. Where impacts to visitor experience or visitor safety become minor or moderate, 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 would be measurable or perceptible, and 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 Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. Under the no-action alternative all PWC use would continue to be banned, eliminating any conflicts between PWC operators and other visitors. No conflicts would occur with other park visitors at either park district, including anglers, sea kayakers, motorboats, and canoeists, or visitors to the wilderness islands. No PWC-related incidents would occur involving park visitors that are swimming, fishing, or diving in areas where PWC use historically occurred. This alternative would allow for an increase in visitor safety, continuing a beneficial impact.

Cumulative Impacts. The primary activities at Gulf Islands National Seashore that could affect visitor conflicts and safety include anticipated increases in population in the area and accompanying increases in park visitation, as well as increases in military activity and construction around the seashore. The proposed canal at Navarre Beach on Santa Rosa Island could potentially increase the number of watercraft in both the Gulf and sound waters, possibly resulting in more conflicts and accidents in the area. If the floating casinos in Mississippi eventually rent PWC to their visitors, these users would not be permitted to access the seashore's islands, which would be anyway given the distance to the seashore. Conflicts between motorboat users and other non-motorized craft would occur. When combined with the absence of PWC (a beneficial impact), cumulative impacts would be adverse and negligible, and could increase with increases in boating and other visitor use in the future.

Conclusion. Personal watercraft would not be reinstated at Gulf Islands National Seashore, providing continued beneficial impacts related to conflicts and visitor safety. Cumulative impacts would be negligible to minor in the long term.

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. PWC operators under alternative A would be allowed throughout the national seashore, with limitations only in areas previously managed with use restrictions described in the "Alternatives" section. No additional management prescriptions would be imposed on PWC users.

When PWC operators fall or are thrown from their personal watercraft, the machine can continue running, and documented cases describe unmanned personal watercraft harming swimmers in Michigan and Florida (NTSB 1998). However, both Florida and Mississippi require operators of personal watercraft to receive safe boating instruction and carry proof of completion of the course. In addition, Florida requires that personal watercraft be equipped with cut-off devices in the event that the operator is separated from the vessel, and Mississippi requires that PWC be equipped with these devices and that they be utilized.

Impact on PWC Users. Under alternative A, PWC use would be reinstated and all of the national seashore waters would be accessible to PWC use except where restricted. Implementation of the flat-wake zones would not permit high speed maneuvering use in these areas, but this type of activity would be permitted outside these areas in park waters. PWC users would experience beneficial safety impacts because the restrictions defined under alternative A would minimize conflicts and potential for accidents between PWC and other users. Overall, impacts to PWC users would be long-term, beneficial, and minor.

Personal Watercraft/Other Boat Conflicts. Personal watercraft represent an estimated annual average 0.5% of vessels in the Florida District and 4% of vessels in the Mississippi District of the national seashore. On peak use days, the potential for safety incidents with other motorized craft would increase in high use areas. However, in the Florida District, the majority of motorboat use occurs in Gulf waters

(4,500 boats in gulf waters compared to 500 in non-Gulf waters in 2002), and PWC prefer the calmer waters of the bay and sound (2 PWC in the Gulf compared to 37 in the sound in 2002). This natural distribution would help alleviate conflicts between boaters and PWC users in the Florida District. However, impacts to boaters would be highest in the Perdido Key area, where as many as 39 PWC have been noted on a busy summer weekend.

PWC are more prevalent and evenly distributed in the Mississippi District (a total of 161 PWC in Mississippi in 2002). Although far fewer boats use the Mississippi District (1,607 in the Mississippi District compared to 5,000 in Florida in 2002), there is more likelihood for conflict and safety issues in the Mississippi District, particularly on West Ship Island, which experiences the most visitor use. Impacts to other motorized boaters in both districts would be long-term, adverse, and minor to moderate as boaters and PWC operators tend to favor similar waters.

Personal watercraft could come into conflict with non-motorized watercraft, especially in the Perdido Key area and other areas where non-motorized vessel use occurs. Generally, few non-motorized watercraft (sea kayaks, canoes, and windsurfers) use the Mississippi islands and the Gulf -side waters of the Florida District. Non-motorized watercraft users and PWC users both prefer similar waters (calmer waters close to shore) and conflicts could arise between these user groups. The county of Escambia, Florida, prohibits PWC operation above more than idle speed 200 feet from the shoreline; therefore, the park's proposed kayak/canoe trail would be within this boundary. Park staff have received no documented complaints from canoeists or kayakers concerning PWC interaction, and very few canoeists and kayakers visit the park. In addition, both Florida and Mississippi require cut-off devices on all PWC, which would not necessarily reduce conflicts but would provide additional safety measures for non-motorized watercraft users. For these reasons, impacts to non-motorized watercraft users would likely be minor, long-term, adverse.

Personal Watercraft/Other Visitors Conflicts. Gulf Islands National Seashore shorelines are used by a variety of visitors, including anglers, hikers, wilderness seekers and campers. Shoreline areas that are popular with both personal watercraft and other shoreline users include the Perdido Key area and the ends and north sides of the Mississippi islands. In the past, conflicts between PWC users and other shoreline visitors have not been a major issue at Gulf Islands National Seashore, although conflicts have occurred between user groups.

Swimmers. An estimated 200 personal watercraft would have been operated within the national seashore during peak use days in 2002, many of which would likely concentrate near popular swim areas and may violate the speed restrictions to beach, pick up passengers, or change operators. Even though no PWC-related accidents have occurred involving swimmers, the park has received complaints regarding personal watercraft not slowing down as required in the presence of swimmers. Therefore, swimmers are the most likely user group at the seashore to experience safety impacts related to PWC use.

Lagoons of Perdido Key within Big Lagoon would be closed to all combustion engines, affording protection to swimmers there. PWC use in the Florida District would likely be concentrated on the bay (or north) side of the Perdido Key area, as it was before the ban. Few PWC traversed the south, or Gulf shoreline, therefore minimizing the amount of interaction between swimmers and PWC users at Rosamond Johnson Beach (on Perdido Key), as well as Opal Beach and Langdon Beach, which are also located on the south side of Santa Rosa Island in waters not favored by PWC users. In Escambia County, Florida, PWC cannot be operated above idle speed within 200 feet of designated swim beaches, which would benefit swimmers at Langdon Beach near Fort Pickens. These restrictions and distribution of use would help minimize conflicts between swimmers and PWC users.

PWC use in the Mississippi District would be concentrated on the east and west ends of the islands and around the West Ship Island Pier, where swimming is prohibited. In addition to concentrated PWC use, West Ship Island experiences most of the high-density beach use in the Mississippi District because it is the only island accessible by tour boat. However, under alternative A all vessels would be required to operate below 5 mph within 500 feet of Ship Island Pier, minimizing some impacts to beach users in this area. In addition, the lakes, ponds, lagoons, and inlets of the islands in the Mississippi District would be closed to motorized vessels.

Both Florida and Mississippi require cut-off devices on all PWC, which would not necessarily reduce conflicts but would provide additional safety measures for swimmers. Therefore, overall impacts to swimmers in both districts would be long-term, adverse, and minor to moderate.

Divers and Snorkelers. Divers and snorkelers are another user group that would be most impacted by safety issues related to PWC. Divers tend to favor locations in the Florida District, particularly the Fort Pickens area and waters of Santa Rosa Sound. PWC also prefer the calm waters of Santa Rosa Sound, so divers there would be adversely impacted. Diving and PWC use are both prohibited within 200 feet of the Fort Pickens piers. In addition, both Florida and Mississippi require cut-off devices on all PWC, which would not necessarily reduce conflicts but would provide additional safety measures for divers and snorkelers. Therefore, impacts to divers and snorkelers would be long-term, adverse, and negligible due to the distribution of PWC in this district and the small number of divers that visit the park.

Anglers. Surf anglers commonly fish along the south shore of the island and fly fisherman commonly fish on the north side of the island in the sound. Most PWC operation in the Florida District occurred north of Santa Rosa Island in the sound area. Both groups of anglers would likely experience conflicts with PWC users, although fly fishermen would experience more impacts because PWC prefer the calmer waters of the bay and sound. The Fort Pickens fishing pier on the Pensacola Bay was a favorite of PWC users, and this area also experiences high amount of use by anglers. However, under alternative A waters 200 feet from the Fort Pickens fishing pier would be closed to all boating operations, minimizing conflicts there. In addition, the lagoons of Perdido Key within Big Lagoon would be closed to all combustion engines. Therefore, both groups of anglers in the Florida District would experience long-term, adverse, minor impacts under alternative A.

A fishing pier on the Davis Bayou in the Mississippi District also provides access to park waters for anglers. The pier is located far enough from the boat launch as to minimize conflicts between PWC and fishermen. PWC in the Mississippi District also tend to concentrate on the east and west ends of the islands and around the West Ship Island Pier. All vessels would be required to operate below 5 mph within 500 feet of West Ship Island and the Horn Island piers. In addition, the lakes, ponds, lagoons, and inlets of the islands in the Mississippi District would be closed to motorized vessels, which would also be prohibited above mean high tide around the islands of Horn and Petit Bois. Therefore, impacts to anglers in the Mississippi District would likely be long-term, negligible to minor, and adverse. Overall impacts to anglers in both districts would be long-term, adverse, and negligible to minor.

Campers and Hikers. Campers, including backcountry users, at the national seashore would interact with PWC as described under the Visitor Use and Experience topic. Conflicts would be minimal because PWC would be restricted to operating only during daylight hours when campers are likely engaging in other activities. Most camping is concentrated in Perdido Key at the Fort Pickens area, which provides the largest number of campsites at the seashore. In addition, the campground at Fort Pickens is not located on the shoreline, which would minimize the amount of interaction between these user groups.

Backcountry campers on Perdido Key and on the islands of East Ship, Horn, and Petit Bois could come into conflict with PWC users under alternative A, especially those visitors seeking natural quiet. Most

island camping occurs on the tips of the islands, where PWC use is concentrated. Under alternative A, personal watercraft would be allowed to recreate around all islands in the national seashore, and thus would be in the vicinity of backcountry users and conflicts would be possible. However, the number of PWC users is small, as is the number of backcountry wilderness users. Campers and hikers would likely experience fewer safety issues than swimmers and anglers, who would be more apt to come into direct contact with PWC in the water. Therefore, conflicts or safety issues between wilderness users and PWC users would be negligible and adverse. Overall impacts to both campers and hikers would be long-term, adverse, and negligible to minor.

Under alternative A, long-term negligible to moderate adverse impacts related to conflicts and safety would occur between PWC and other user groups.

Cumulative Impacts. Conflicts and safety issues between PWC users and other visitors would be expected to increase with the projected increase in PWC use. PWC use is expected to increase at a rate of 9.6% per year and boating use at a rate of 3.7% per year. Peak use days would experience an increase from approximately 200 to 500 personal watercraft per day by 2012. At the estimated rate of increase, personal watercraft would comprise approximately 0.8% of total boats in the Florida District and 6.7% of total boats in the Mississippi District of the national seashore in 2012. High-use areas for PWC users and boaters include Perdido Key, East Ship, and West Ship islands. Motorboat use is also projected to increase, which could have adverse impacts on the safety and enjoyment of other users, particularly swimmers and anglers, who would be more likely to experience safety issues than hikers or campers. The proposed canal at Navarre Beach on Santa Rosa Island could potentially increase the number of watercraft in both the Gulf and sound waters, possibly resulting in more conflicts and accidents in the area. If the floating casinos in Mississippi eventually rent PWC to their visitors, these users are not likely to access the seashore's islands given the distance. In addition, park staff have received no documented complaints from visitors regarding PWC or motorboat use. Therefore, when combined with the long-term, adverse, negligible to moderate impacts to visitor conflicts and safety as described under this alternative, cumulative impacts related to the increased use of personal watercraft, motorized boats, and other visitor activities would likely be adverse and minor over the short term and long term.

Conclusion. Impacts to motorized and non-motorized boaters would be long-term, adverse, and minor as boaters and PWC operators tend to favor similar waters. Impacts to swimmers in both districts would be long-term, adverse, and minor to moderate. Impacts to divers and snorkelers would be long-term, adverse, and negligible due to the distribution of PWC in this district and the small number of divers and PWC that visit the park. Anglers would experience long-term, adverse, negligible to minor impacts. Impacts to campers and hikers would be long-term, adverse, and negligible to minor.

Cumulative impacts related to visitor conflicts and safety would be minor adverse for all user groups in the short and long term, particularly near the high-use areas.

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. PWC use would be reinstated as under alternative A, with additional management prescriptions. A flat-wake zone would be established 300 yards from all park shorelines at the low-water mark, with the exception of at the West Ship Island Pier, where a flat-wake zone would extend 0.5 mile from the shoreline and 0.5 mile from either side of the pier. A flat-wake zone would also be established 0.5 mile from the shorelines around all designated wilderness boundaries, and no PWC operation would be permitted within 200 feet of non-motorized watercraft and people in the water. In addition, PWC user and boater education would be provided through interpretive talks, onsite bulletins, and brochures given

to PWC registrants and visitors who rent personal watercraft. These educational efforts would benefit all seashore visitors described below.

Impact on PWC Users. Under alternative B, PWC use would be reinstated and all of the national seashore waters would be accessible to PWC use except where restricted. Implementation of the flat-wake zones would not permit high speed maneuvering use in these areas, but this type of activity would be permitted outside these areas in park waters. However, PWC users would experience beneficial safety impacts because the restrictions would minimize conflicts and potential for accidents between PWC, other PWC, and non-PWC users. Overall, impacts to PWC users would be long-term, beneficial, and minor.

Impact on Other Boaters. As described under alternative A, the majority of motorized boating in the Florida District occurs in Gulf waters on the south side of the islands. However, PWC favor the bay and sound areas, where waters are calm. This natural distribution would help alleviate conflicts between boaters and PWC users in the Florida District.

PWC are more prevalent and more evenly distributed in the Mississippi District, which has far fewer boaters than the Florida District. East and West Ship islands experience the heaviest visitor use and boaters there would likely experience the biggest impacts. PWC concentrate in areas that boaters also prefer, usually on the east and west ends of the islands, around the West Ship Island Pier, and the north side of Spoil Island. In addition, PWC would also be prohibited within 200 feet of non-motorized watercraft in both districts. A flat-wake zone would be established 300 yards from all park shorelines at the low-water mark, except at the West Ship Island Pier, where the flat-wake zone would extend 0.5 mile from the shoreline and either side of the pier. The flat-wake zone would also extend 0.5 mile from the shoreline around all wilderness boundaries. These restrictions would provide additional safety measures to both PWC and motorboat users at the seashore.

For the reasons described above, impacts to motorized boaters in both districts would be long-term and adverse. However, these impacts would be negligible to minor due to the additional restrictions and PWC prohibitions defined under this alternative.

PWC would interact with non-motorized boaters as well. PWC use would be prohibited 200 feet from the old fishing pier and 200 feet from the new fishing pier at Fort Pickens, although other non-PWC motorized vessels would be permitted at no-wake speed. The proposed canoe trail along the north side of Perdido Key would provide a safe, non-motorized boat route for canoeists and kayakers to enjoy because it would be within the flat-wake zone established 300 yards from the shoreline. In addition, park staff have received no documented complaints from non-motorized boaters concerning PWC use. Non-motorized boaters would also benefit from safety measures provided by additional restrictions described above. In addition, both Mississippi and Florida require that PWC operators use cut-off devices, which would not necessarily reduce the amount of conflict but would improve safety for non-motorized watercraft users at the seashore. Therefore, impacts to non-motorized watercraft under alternative B would be long-term, adverse, and negligible to minor.

Impact on Other Visitors. Swimmers, anglers, campers, hikers, and other shoreline visitors to the national seashore would have contact with personal watercraft users. Shoreline areas that are popular with both personal watercraft and other shoreline users include the north sides of the Mississippi islands and the Perdido Key area.

Swimmers. Impacts to swimmers would be similar to those described under alternative A. However, alternative B would further restrict PWC use by establishing a flat-wake zone 300 yards from all park shorelines, which would benefit swimmers at non-designated swim beaches. This alternative would also

prohibit PWC use within 200 feet of people in the water, providing additional safety and reducing the likelihood of conflicts and accidents.

In addition, a flat-wake zone would also be established 0.5 mile from the shorelines around the wilderness areas of Horn and Petit Boise islands, limiting impacts to swimmers and beach users on these islands. As described under alternative A, the lakes, ponds, lagoons, and inlets of the islands in the Mississippi District would be closed to motorized vessels.

Both Mississippi and Florida require that PWC operators use cut-off devices, which would not necessarily reduce the amount of conflict but would improve safety for swimmers at the seashore. Therefore, impacts to swimmers from PWC use in both districts would likely be long-term, adverse, and minor due to additional restrictions and the concentration of PWC activity to the north side of most designated swim beaches.

Anglers. Impacts to anglers would be similar to those described under alternative A. Alternative B calls for an additional flat-wake zone 300 yards from all park shorelines at the low-water mark. In addition, a flat-wake zone would extend 0.5 mile from the shoreline and either side of the pier at West Ship Island, and a 0.5-mile flat-wake zone would be established around the wilderness islands of Horn and Petit Bois. Although the additional flat wake restrictions would benefit anglers in all areas of the park, impacts would likely be long-term and adverse, but negligible due to additional PWC restrictions.

Campers and Hikers. As described under alternative A, the Florida District receives a much higher amount of camping visitation compared to the Mississippi District. The Fort Pickens campground provides the highest number of campsites (200) but is not located on the shoreline, and primitive camping is also allowed on the east end of Perdido Key. The Davis Bayou campground in the Mississippi District provides 51 campsites. No designated campsites exist on the Mississippi islands, but backcountry camping occurs on the islands.

Backcountry campers on Perdido Key and East Ship Island would experience long-term, minor, adverse impacts from PWC use under alternative B. A flat-wake zone would be established 300 yards from all park shorelines, which would reduce impacts to campers and hikers. PWC use at Horn and Petit Bois islands would be restricted to flat-wake speed one-half mile from the shoreline, which would benefit users of these wilderness areas. As under alternative A, PWC operation would be limited to daylight hours in both districts, when campers may be participating in other activities.

PWC use would have long-term, minor, adverse impacts on the experience of all camping and hiking visitors due to restrictions contained under alternative B and distribution of types of visitor activities.

Cumulative Impacts. Conflicts and safety issues between PWC users and other visitors would be expected to increase with the projected increase in PWC and motorboat use, as described under alternative A. Such increases could have adverse impacts on the safety and enjoyment of other users, particularly swimmers and anglers, who would be more likely to experience safety issues than hikers or campers. The proposed canal at Navarre Beach on Santa Rosa Island could potentially increase the number of watercraft in both the Gulf and Sound waters, possibly resulting in more conflicts and accidents in the area. If the floating casinos in Mississippi eventually rent PWC to their visitors, these users would not likely visit the seashore's islands due to distance. The PWC restrictions defined under alternative B would help minimize conflicts and accidents involving PWC and other users. Therefore, when combined with the long-term, adverse, negligible to minor impacts to visitor conflicts and safety as described under this alternative, cumulative impacts related to the increased use of personal watercraft, motorized boats, and other visitor activities would likely be adverse and minor over the short term and long term.

Conclusion. Impacts to PWC users would be long-term, beneficial, and minor. Impacts to motorized and non-motorized boaters would be long-term, adverse, and negligible to minor. Swimmers would likely experience long-term, adverse, and minor impacts. Anglers in all areas of the park would likely experience long-term and adverse, but negligible impacts due to additional PWC restrictions. PWC use would have long-term, minor, adverse impacts on the experience of all camping and hiking visitors due to restrictions contained under alternative B and distribution of types of visitor activities. Cumulative impacts would be adverse and minor over the short term and long term.

CULTURAL RESOURCES

GUIDING REGULATIONS AND POLICIES

The National Park Service's primary interest in these places 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 Native American Indians access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites
>
> *Archaeological Resources Protection Act* — responsibility to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites that are on public lands
>
> *Executive Order 13007* — responsibility to (1) accommodate access to and ceremonial use of Native American Indian sacred sites by Native American Indian religious practitioners, and (2) avoid adversely affecting the physical integrity of such sacred sites.

In accordance with the NPS *Management Policies 2001* (NPS 2001d), the National Park Service must be respectful of these ethnographic resources, and carefully consider the effects that NPS actions may have on them (NPS *Management Policies 2001,* sec. 5.3.5.3).

METHODOLOGY AND ASSUMPTIONS

In this environmental assessment, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the CEQ regulations. These impact analyses are intended, however, to comply with the requirements of both the NEPS and Section 106 of the *National Historic Preservation Act* (NHPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 (36 CFR 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 in or eligible to be listed on the National Register; and (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 also 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 (e.g., diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, "Assessment of Adverse Effects"). A determination of *no adverse effect* means there is 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.

CEQ regulations and *Director's Order #12* (NPS 2001b) also 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 only under the *National Environmental Policy Act*. 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.

Impact Analysis Area

For the purposes of this evaluation, the impact analysis area includes the shoreline and a 200-foot inland area where PWC operators may land and explore the shoreline but remain in sight of their personal watercraft.

Magnitude of Effects

Certain important research questions about human history can only be answered by the actual physical material of cultural resources. Archaeological resources have the potential to answer, in whole or in part, such research questions. An archaeological site(s) can be eligible to be listed on the National Register of Historic Places if the site(s) has yielded, or may be likely to yield, information important in prehistory or history. An archaeological site(s) can be nominated to the National Register in one of three historic contexts or levels of significance: local, state, or national (see National Register Bulletin #15, *How to Apply the National Register Criteria for Evaluation*). For purposes of analyzing impacts to archaeological resources, thresholds of change for the intensity of an impact are based upon 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: Impact is 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** – maintenance and preservation of a site(s). For purposes of section 106, the determination of effect would be *no adverse effect.*
Adverse impact – disturbance of a site(s) 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(s) results in loss of integrity. For purposes of section 106, the determination of effect would be *adverse effect.* A memorandum of agreement is executed among the NPS and 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 mitigative measures identified in the memorandum of agreement reduce the intensity of impact under NEPA from major to moderate.

Major: **Beneficial impact** – active intervention to preserve a site(s). For purposes of section 106, the determination of effect would be *no adverse effect.*
Adverse impact – disturbance of a site(s) results in loss of integrity. For purposes of section 106, the determination of effect would be *adverse effect.* The NPS and applicable State or Tribal Historic Preservation Officer are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Impairment: A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Gulf Islands National Seashore; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's master plan or other relevant National Park Service 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.

Impacts of the No-Action Alternative — Continue Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. Under this alternative PWC use would not be reinstated within the national seashore. Implementation of the no-action alternative would result in no impacts from PWC on archaeological sites or submerged features by continuing to limit the potential for illegal collection or damage attributable to PWC users.

Cumulative Impacts. Even without the potential for PWC users to access remote areas, the effects of other watercraft users and land-based user groups would still have the potential for minor to major adverse cumulative impacts. On a cumulative basis, potential visitor impacts from illegally collecting or damaging resources that are readily accessible would continue to be a possibility. Resources in more remote areas that are not as readily accessible to park visitors would likely still experience minor adverse impacts, but to a lesser degree. Erosion from both natural and human causes such as boat-caused wave action has been identified as a threat to some archaeological resources. This threat of erosion has the potential to affect archaeological resources more directly than PWC use. These potential threats could result in minor adverse impacts.

Conclusion. Continuing the ban on PWC use within national seashore waters would have no impacts on archaeological and submerged sites. Adverse cumulative impacts from erosion and all visitor activities would be minor to major, depending on the accessibility of the resource and the potential for illegal collection or damage.

Implementation of this alternative would not result in an impairment of cultural resources.

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. PWC users would have access to unknown archaeological and submerged cultural resources under this alternative. Of the archaeological sites and features currently listed on the National Register of Historic Places, none are within the impact analysis area. While some submerged resources are documented, the majority remains undocumented. With use area restrictions in Escambia County, Florida, PWC use is unlikely to damage submerged resources close to shore within the area. Water depth is likely to protect other submerged resources.

Potential impacts directly attributable to unrestricted PWC use are difficult to quantify. The most likely impact to archaeological sites would result from PWC users landing in areas otherwise inaccessible to most other national seashore visitors and illegally collecting or damaging artifacts. According to park staff, looting and vandalism of cultural resources has been a problem. A direct correlation of impacts attributed to PWC users is difficult to draw, since many of these areas are also accessible to other watercraft users and visitors. Under this alternative PWC users within the national seashore would have only minor adverse impacts on listed or potentially listed archaeological resources.

Reinstating PWC use is not expected to adversely affect the overall condition of cultural resources because project-by-project inventories and mitigation would still be conducted.

Cumulative Impacts. PWC users, other boaters, and land-based user groups would have access to remote areas with potentially listed archaeological sites. Erosion from both natural and human causes could result in minor adverse impacts. On a cumulative basis all visitor activities could result in minor to moderate adverse impacts on those resources that are readily accessible, due to the number of visitors and potential for looting or vandalism. Resources in more remote areas that are not as readily accessible to visitors would likely still experience minor adverse impacts on a cumulative basis, but to a lesser degree.

Conclusion. PWC use within the national seashore could have minor adverse impacts on listed or potentially listed archaeological sites from possible illegal collection and vandalism. Minor adverse impacts on listed or potentially listed archaeological sites are possible as a result of erosion. Cumulative impacts from visitor use on archaeological resources that are readily accessible could be minor to moderate adverse, due to the number of visitors and the potential for illegal collection or destruction.

Implementation of this alternative would not result in an impairment of cultural resources.

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. PWC users would have access to unknown archaeological and submerged cultural resources under this alternative. Both known and undocumented submerged resources exist. Given the expanded wake restrictions under this alternative, PWC use is unlikely to result in damage to submerged resources close to shore. Water depth is likely to protect other submerged resource.

Potential impacts directly attributable to unrestricted PWC use are difficult to quantify. The most likely impact to archaeological sites would result from PWC users landing in areas otherwise inaccessible to most other national seashore visitors and illegally collecting or damaging artifacts. According to park

staff, looting and vandalism of cultural resources has been a problem. A direct correlation of impacts attributed to PWC users is difficult to draw, since many of these areas are also accessible to other watercraft users and visitors. Under this alternative, PWC users within the national seashore would have only minor adverse impacts on listed or potentially listed archaeological resources.

Cumulative Impacts. On a cumulative basis all visitor activities, including PWC use could result in minor to moderate adverse impacts on those resources that are readily accessible, due to the number of visitors and the potential for looting or vandalism. Erosion from both natural and human causes could result in minor adverse impacts. All impacts not related to PWC use would continue at existing levels.

Conclusion. Restricting areas of use and the establishment of a flat-wake speed zone, would serve as a measure to minimize impacts on potentially listed archaeological resources from possible illegal collection and vandalism. Cumulative impacts from other activities on archaeological resources that are readily accessible could be minor to moderate and adverse, due to the number of visitors and the potential for illegal collection or destruction.

Implementation of this alternative would not result in an impairment of cultural resources.

SOCIOECONOMIC EFFECTS

This section summarizes the socioeconomic impacts associated with the proposed alternatives for PWC use in Gulf Islands National Seashore. A detailed description of these impacts and a complete list of references is provided in the draft report "Economic Analysis of Management Alternatives for Personal Watercraft in Gulf Islands National Seashore" (MACTEC Engineering 2003).

BENEFIT-COST ANALYSIS

The purpose of benefit-cost analysis is to determine whether a proposed action (in this case, the regulation of PWC use in Gulf Islands National Seashore) would promote an efficient allocation of resources. That is, it is used to assess whether the proposed action would generate more benefits than costs. These costs and benefits accrue directly to households that use personal watercraft, and indirectly to those who are affected by PWC use (e.g., those who benefit from reduced noise). The resulting changes in PWC use may also impose costs on those who own or work for PWC-related businesses.

Even individuals who do not visit this national recreation area can benefit from the knowledge that resources are being protected and preserved. In other words, protecting the Gulf Islands National Seashore environment by not allowing certain uses would be perceived as positive. These "nonuse" values can stem from a desire to ensure the enjoyment of these resources by others (both current and future generations) or from a sense that these resources have intrinsic value and are worth protecting even though they may not get used. Evidence of nonuse value for resources like Amistad has been established in the economics literature (Pearce and Moran 1994). Restrictions on PWC use could therefore provide benefits to both users and nonusers in a number of ways by protecting the national recreation area's ecological and other resources.

For the purpose of this study, six major affected groups have been identified:

> PWC users, in particular those who currently use personal watercraft in the national seashore and those who may wish to use personal watercraft in the future.

other visitors or potential visitors who may have a different experience at the national seashore if personal watercraft continue to be banned or restricted (canoeists, anglers, swimmers, hikers, boaters, and other visitors).

producers of PWC services in the area surrounding the national seashore who may experience a change in their welfare (e.g., PWC rental shops, PWC sales, restaurants, gas, hotels).

local residents of the area surrounding the national seashore

producers of services to other types of summer visitors (e.g., canoe rentals or powerboat rentals) who may experience a change in their welfare.

the general public who may care about the national seashore even if they do not visit the park.

Anticipated impacts of the proposed regulatory alternatives are identified in table 56.

The no action alternative maintains the baseline in this analysis. Under that alternative, all PWC use would remain prohibited from the national seashore. Alternative A would permit PWC use as managed in the park prior to the ban and alternative B would permit PWC use, but with additional restrictions compared with pre-ban management. The benefits of any alternative are measured relative to the baseline conditions, which are represented by the no-action alternative. Therefore, there are no incremental benefits associated with the no-action alternative. The primary beneficiaries of alternatives A and B would be the park visitors who use personal watercraft and the businesses that provide services to PWC users such as rental shops, restaurants, gas stations, and hotels. Additional beneficiaries include individuals who use personal watercraft outside the park where PWC users displaced from the park may decide to ride if PWC use within the park were prohibited. Benefits accruing to individual PWC users are called consumer surplus gains, and those accruing to businesses are called producer surplus gains.

As with the benefits described above, the costs of any alternative are measured relative to the baseline conditions, which are represented by the no-action alternative. Therefore, there are no incremental costs associated with the no-action alternative. The primary group that would incur costs under alternatives A and B are the park visitors who do not use personal watercraft and whose park experiences would be negatively affected by PWC use within the park. Non-PWC uses at the national seashore include boating, canoeing, fishing, and hiking. However, these costs could not be quantified because of a lack of available data. Additionally, the public could incur costs associated with impacts from alternatives A and B to aesthetics, ecosystem protection, human health and safety, congestion, non-use values, and enforcement. However, these costs could not be quantified because of a lack of available data.

Because the costs of the alternatives are not quantified, the benefits represent the quantified net benefits of alternatives A and B. As noted above, these net benefits do not account for the costs of enforcement; the costs to non-PWC users; or those costs relating to aesthetics, ecosystem protection, human health, and safety, congestion, or nonuse values as a result of a lack of available data. Therefore, these net benefit estimates do not reflect all costs. If all costs could be incorporated, the indicated net benefits for each alternative would be lower.

From an economic perspective, the selection of alternative B as the preferred alternative is considered reasonable because certain costs could not be quantified in the net benefits presented above. Those costs, relating to non-PWC use, aesthetics, ecosystem protection, human health and safety, congestion, or nonuse values, would likely be greater for alternative A than for alternative B. Given that the quantified net benefits of alternatives A and B are similar, further inclusion of these un-quantified costs could reasonably result in alternative B having the greatest level of net benefits. Therefore, based on these factors, alternative B is considered to provide the greatest level of net benefits.

TABLE 56: BENEFIT-COST ANALYSIS OF THE ALTERNATIVE REGULATIONS ECONOMIC ANALYSIS OF MANAGEMENT ALTERNATIVES FOR PERSONAL WATERCRAFT IN GULF ISLANDS NATIONAL SEASHORE

User Group	No-Action Alternative: Continue Prohibition of PWC in Gulf Islands National Seashore	Alternative A: Reinstate PWC Use under a Special NPS Regulation as Previously Managed	Alternative B: Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)
1. PWC users or potential PWC users	No change in consumer surplus.	Consumer surplus is expected to increase as a result of lifting the ban on PWC at Gulf Islands National Seashore.	Consumer surplus is expected to increase as a result of lifting the ban on PWC use at Gulf Islands National Seashore, though not as much as in alternative A because of additional flat wake zones and other restrictions on PWC use.
2. Other visitors or potential visitors: canoe users, anglers, other boaters, swimmers, hikers and other visitors	No change in consumer surplus.	• Consumer surplus is expected to decrease for current users of Gulf Islands National Seashore as a result of increased noise, decreased water quality, and an increase in the risk of accidents involving personal watercraft. • Consumer surplus is expected to decrease for potential visitors who would have visited GUIS with the ban on PWC use.	• Consumer surplus is expected to decrease slightly for current users of Gulf Islands National Seashore as a result of decreased solitude, decreased water quality, and an increase in the risk of accidents involving PWC, though not as much as in Alternative A because of the flat wake zone 300 yards from all shorelines and other restrictions on PWC use. • Consumer surplus is expected to decrease for potential visitors who would have visited Gulf Islands National Seashore with the ban on PWC use.
3. Producers of PWC services: PWC rental shops PWC sales shops other parts of the local economy providing services to PWC users	No change in producer surplus.	• Producer surplus may increase for PWC rental shops. • Producer surplus may increase for PWC dealerships as a result of a rise in sales and servicing of PWC. • Other parts of the local economy such as hotels, restaurants, and gas stations are not expected to have a significant increase in producer surplus.	• Producer surplus may increase for PWC rental shops. • Producer surplus may increase for PWC dealerships as a result of a rise in sales and servicing of PWC. • Other parts of the local economy such as hotels, restaurants, and gas stations are not expected to have a significant increase in producer surplus.
4. Local Residents of the area surrounding Gulf Islands National Seashore	No change in welfare.	Local residents of nearby areas are not expected to experience a measurable change in welfare.	Local residents of nearby areas are not expected to experience a measurable change in welfare.
5. Producers of services for visitors to Gulf Islands National Seashore who do not use PWC	No change in producer surplus.	Producer surplus is expected to decrease slightly as lifting restrictions on personal watercraft may result in a small decrease in demand for angling, canoeing, and other activities in the park, resulting in a decreased demand for the provision of services related to these activities.	Producer surplus is expected to decrease as lifting restrictions on personal watercraft may result in a decrease in demand for angling, canoeing, and other activities in the park, resulting in a decreased demand for the provision of services related to these activities. This decrease may be smaller than under alternative A.
6. The general public who may care about Gulf Islands National Seashore even if they do not visit	No change in welfare.	May experience a decrease in welfare as a result of degraded nonuse values resulting from decreased environmental quality in the seashore.	May experience a decrease in welfare as a result of degraded nonuse values resulting from decreased environmental quality in the seashore. The decrease in welfare is expected to be smaller than under the no-action alternative because of the additional restrictions on PWC use at Gulf Islands National Seashore.

The estimated impact of each proposed alternative on PWC users is discussed below.

Impacts of the No-Action Alternative — Continue Prohibition of PWC Use in Gulf Islands National Seashore

Conclusion. There are no incremental costs associated with the no-action alternative. There would be no change in consumer surplus, producer surplus, or welfare.

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Conclusion. Because the national recreation area would still be open to PWC, the National Park Service expects this alternative to result in a net benefit relative to the no-action alternative.

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Conclusion. Given that the quantified net benefits of alternatives A and B are similar, however, based on the factors described above, alternative B is considered to provide the greatest level of net benefits.

NATIONAL SEASHORE MANAGEMENT AND OPERATIONS

CONFLICT WITH STATE AND LOCAL ORDINANCES AND POLICIES REGARDING PWC USE

Some states 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 state and local plans must be evaluated in accordance with the NEPA.

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 Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. Continuing the ban of PWC use within the national seashore would not affect the enforcement of other Florida or Mississippi state boating regulations. There is a cooperative relationship between the national seashore, the Coast Guard, and the Florida Marine Patrol regarding the enforcement of the current park PWC ban.

Cumulative Impacts. Management of other motorized watercraft within the national seashore would continue to be consistent with Florida and Mississippi state boating regulations.

Conclusion. There would be no conflict with state regulations or local ordinances as a result of the no-action alternative. Continuing the ban on PWC use within the national seashore would not affect the enforcement of state boating regulations.

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. The reinstatement of PWC use within the national seashore would not affect the enforcement of Florida or Mississippi state regulations regarding PWC use. PWC regulations within the national seashore would not conflict with state regulations or local ordinances and policies regarding PWC use.

Cumulative impacts. Management of other motorized watercraft within the national seashore would continue to be consistent with Florida and Mississippi state boating regulations.

Conclusion. There would be no conflict with state regulations or local ordinances as a result of reinstatement of PWC use within the national seashore under alternative A. PWC use within the national seashore would not affect the enforcement of state boating regulations.

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. The reinstatement of PWC use within the national seashore with additional management prescriptions would not affect the enforcement of Florida or Mississippi state regulations regarding PWC use. Personal watercraft regulations within the national seashore would not conflict with state regulations or local ordinances and policies regarding PWC use.

Cumulative Impacts. Management of other motorized watercraft within the national seashore would continue to be consistent with Florida and Mississippi state boating regulations.

Conclusion. There would be no conflict with state regulations or local ordinances as a result of reinstatement of PWC use with additional management prescriptions within the national seashore. Managed PWC use within the national seashore would not affect the enforcement of state boating regulations.

IMPACT TO PARK OPERATIONS FROM INCREASED ENFORCEMENT NEEDS

NPS enforcement rangers at Gulf Islands National Seashore are responsible for ensuring the safety of national seashore visitors and the protection of resources. These duties include enforcing state boating regulations within seashore waters; however, the size of the national seashore and distance between districts and offshore barrier islands makes it difficult to effectively patrol. Due to the projected increase in PWC and boating use, accident rates, and visitor safety conflicts, additional park staff could be needed to enforce regulations, limits, and restricted areas such as wilderness islands. The National Park Service and U.S. Coast Guard have overlapping jurisdiction within national seashore waters. Both the states of Florida and Mississippi have strict boating regulations applicable to PWC use, and Mississippi includes a boater education and safety course requirement.

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 Prohibition of PWC Use in Gulf Islands National Seashore

Analysis. The no-action alternative, which continues the prohibition of PWC use that began on April 22, 2002, would not require additional NPS enforcement because the ban has been in place since April of 2002 and is understood and observed by PWC users. NPS personnel currently enforce this prohibition with existing permanent and seasonal staff, and boat patrols. Enforcing the prohibition on PWC use would continue to reduce the number of complaints related to user conflicts. Park staff would continue to make reasonable efforts to provide for the protection, safety, and security of all park visitors, employees, concessioners, and public and private property, and to protect the natural and cultural resources of the national seashore. Continuing the prohibition on PWC use would continue to limit the potential for accidents in and near other boats and people in the water, though it is anticipated that PWC users would sometimes operate illegally within restricted NPS waters.

Cumulative Impacts. The National Park Service and the U.S. Coast Guard would continue to share jurisdiction within national seashore waters. Other visitor activities in the national seashore besides PWC use require the presence of enforcement personnel. If seashore visitation numbers increase over time, the need for additional enforcement rangers could also increase. Depending on park visitation and the ability of the park to hire additional permanent or seasonal staff, potential impacts to enforcement operations within the national seashore would be long-term and could be negligible to minor adverse.

Conclusion. The no-action alternative would cause no impacts to the enforcement needs of the seashore resulting from the continued ban of PWC use. If seashore visitation numbers increase over time, the need for additional enforcement rangers could also increase. Depending on park visitation increases, potential cumulative impacts to enforcement operations within the national seashore would be long-term and negligible to minor adverse.

Impacts of Alternative A — Reinstate PWC Use under a Special NPS Regulation as Previously Managed

Analysis. Under this alternative, a special NPS regulation would be written to reinstate PWC use within national seashore waters as was managed prior to April 22, 2002, with a need for enforcement and rescue operations related to potential increases in accident rates and visitor safety conflicts with PWC users. NPS rangers would continue to enforce Florida and Mississippi State boating regulations and protect resources. NPS staff would have difficulty maintaining an adequate number of enforcement personnel on the water to ensure compliance with regulations, and seashore specific management restrictions described in the *Superintendent's Compendium* (NPS 2003a). To provide more control over existing and future (2012) PWC operations, daily boat patrols would potentially need to increase causing minor to moderate long-term impacts to park operations.

Cumulative Impacts. The National Park Service and U.S. Coast Guard would continue to share jurisdiction within national seashore waters. NPS rangers would continue to provide enforcement and rescue assistance to the various user groups within the national seashore, both to resolve conflicts and to ensure safety. Seasonal staff would continue to be required to meet existing and future (2012) needs.

Conclusion. Impacts under alternative A would be long-term and minor to moderate adverse due to the need for additional law enforcement capability within the national seashore to enforce national seashore specific management restrictions in addition to existing federal and state boating regulations.

Impacts of Alternative B — Reinstate PWC Use under a Special NPS Regulation with Additional Management Prescriptions (Preferred Alternative)

Analysis. Under alternative B, a special regulation would be written to reinstate PWC use within Gulf Islands National Seashore, including management actions listed under alternative A. Under alternative B, PWC use would be managed to protect natural and cultural resources, mitigate watercraft safety concerns, visitor health and safety, and enhance overall visitor experience through additional management prescriptions including flat wake zoning along all park shorelines, barrier islands, and visitor areas, and enhanced boater education and enforcement. This could be completed using existing boat patrols, with the anticipation that PWC users would sometimes operate illegally within restricted NPS areas. To provide more control over existing and future (2012) PWC operations, daily boat patrols would potentially need to increase, causing long-term minor to moderate adverse impacts to park operations.

Cumulative Impacts. The National Park Service and the U.S. Coast Guard would continue to share jurisdiction within national seashore waters. However, existing park operations would not be sufficient to adequately monitor and assist current seashore users. NPS rangers would continue to provide assistance the various user groups within the national seashore, both to resolve conflicts and to ensure safety. Operations and enforcement needs for these user groups would be the same as under alternative A, since the number of people and boats would not change under this alternative.

Conclusion. Impacts to park operations would be long-term and minor to moderate adverse, due to the need for additional law enforcement capability within the national seashore to enforce additional management prescriptions as well as existing federal and state boating regulations.

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 continue to 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 under alternatives A and B. These impacts would not be noticeable and would not cause long-term changes in vegetation.

- Continued 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.

LOSS IN LONG-TERM AVAILABILITY OR PRODUCTIVITY TO ACHIEVE SHORT-TERM GAIN

None of these resources would be impacted to the point of impairment or long-term permanent loss.

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 continue using the national seashore under alternatives A and B. The use of fossil fuels to power personal watercraft would be an irretrievable commitment of this resource; however, this use is minor.

CONSULTATION AND COORDINATION

Various management and safety issues regarding PWC use were discussed throughout the development of the *PWC Determination* (NPS 2001a) for the national seashore from 2000 through completion in 2001. National seashore visitors, local governments, conservation interests, the state's Congressional delegation, and the general public were consulted extensively throughout development of the *PWC Determination* in public meetings, newsletters, and the draft and final *PWC Determination.*

During the PWC Determination process (2000–2002), the park received well over 1,000 written individual comments. Comments received revealed that approximately one-third of the commenters were in favor of the PWC prohibition, and two-thirds were opposed on the basis of discrimination against personal watercraft. During the Environmental Assessment process, public scoping open house meetings were held on January 28, 2003 at park Headquarters in Gulf Breeze Florida, and on January 30, 2003 at the Mississippi headquarters in Ocean Springs. Eighty-five people attended the Florida open house and 51 attended the Mississippi meeting. Information stations were set up in the visitor centers, and Gulf Islands National Seashore staff, a National Park Service Environmental Quality Division representative, and representatives from the contracting company, EDAW, Inc., were available for answering questions, distributing additional information, and providing opportunities for the public to comment on preliminary alternatives.

Public comments were collected for 30 days after the meetings, from January 28 to February 28, 2003, and were based on preliminary alternatives that were presented at the open house meetings. The preliminary alternatives were revised to reflect public concerns and comments. Comments received fell into one of the following formats: 18 individual letters, 9 letters from organizations, 54 comment forms, 11 comments written on flip charts, and 249 emails.

A total of 206 commenters supported the ban of personal watercraft in national seashore waters and 86 opposed the ban. Many commenters that supported PWC use within park waters understood that some restrictions might be necessary to protect resources, but they expressed that having some access to the islands on personal watercraft was very important. Comments that supported the ban mentioned issues related to soundscapes, impacts of personal watercraft on visitor experience, safety issues, and pollution effects of personal watercraft. Commenters that opposed the ban were concerned that personal watercraft were being singled out among other watercraft, and that their right to recreate in public waters using this form of watercraft was being denied.

CONSULTATION WITH OTHER AGENCIES

Request for consultation letters have been sent to the U.S. Fish and Wildlife Service for both the Florida and Mississippi districts of the park. Comments have been received from the Fish and Wildlife Service.

The distribution list for this document includes federal, state, and local agencies as well as adjacent landowners, interest groups, and the public at large.

Reviewing Agencies for the Environmental Assessment

The following agencies, groups, and organizations were sent requests for consultation, or expressed interest in the document, and will receive a copy of this environmental assessment. Additional businesses and individuals not included on this list will also be sent a copy of the document due to expressed interest.

Federal Agencies

Department of the Interior
Bureau of Land Management
Office of Environmental Policy & Compliance
Fish and Wildlife Service

U.S. Air Force
Eglin Air Force Base Natural Resources
Keesler Air Force Base
Regional Environmental Office

US Navy
Pensacola NAS Public Affairs Office

U.S. Environmental Protection Agency
U.S. Forest Service

U.S. House of Representatives
Cong. Jeff Miller (Florida) and Cong. Gene Taylor (Mississippi)

U.S. Senate
Senators Bob Graham and Bill Nelson (Florida) and Senators Trent Lott and Thad Cochran (Mississippi)

U.S. Coast Guard
Marine Safety Officer (Mobile Dist Office)

State Agencies

Florida
Department of Environmental Protection
Division of Historic Resources
Division of Wildlife
Fish and Wildlife Conservation Commission
Marine Patrol
Public Affairs Office
Big Lagoon State Recreation Area
State Historic Preservation Officer
State House of Representatives (Rep. Jerry Melvin)

Mississippi
Department of Archives and History
Department of Econ Div Tour
Department of Environmental Quality
Department of Marine Resources
Department of Transportation
Department of Wildlife, Fisheries, and Parks
Forestry Commission
Office of the Secretary of State
State Senate (Senator Billy Hewes)

State Historic Preservation Officer

Local and Regional Agencies

Biloxi Chamber of Commerce
Center for Biological Diversity

City of Gulf Breeze
Mayor

City of Ocean Springs
Mayor

City of Pensacola
Mayor
Pensacola Visitor and Information Center

Escambia County
Board of County Commissioners
Citizen Environmental Comm.
Marine Res.
Soil and Water
Department of Environment and Neighbors
Extension Office

Gulf Coast Native American Association
Gulf Reg. Planning Comm.
Gulf States Marine Fish Com.
Gulfcoast Fisheries
Gulfport Chamber of Commerce

Hancock County
Chamber of Commerce

Harrison Central High School

Harrison County
Board of Superintendents

Jackson County
Area Chamber of Commerce
Board of Supervisors
Conservation District

National Marine Fisheries Service (Panama City, Florida Field Ofc. & Pascagoula, Mississippi Field Ofc.)
Natural Resources Defense Council
National Audubon Society
National Parks and Conservation Association
Santa Rosa Island Authority

Organizations and Businesses

Audubon Center Res. End. Spec.
Audubon Society
Biloxi Lions and Mississippi Coast Power Squad
Bluewater Network
Bombardier
Chevron USA
Chevron Pascagoula REF
Clean and Green
Competition Marine
Dudley Food and Beverage
Earthjustice
Environmental Defense
Forte Cycle
Ft. Walton Motor Sports
Gulf Coast Audubon Society
Gulf Coast Environmental Defense
Gulf Coast Native American Assoc
Gulf Coast Research Lab
Gulf Islands NS Friends Group
Gulf States Marine Fisheries Comm
Gulf Coast Native American Assoc.
Gulf Islands Conservancy
Institute of Marine Mammal Stranding
Louisiana Nature Center
Mississippi Sandhill Crane National Wildlife Refuge
Marine Safety Office
Mobile Bay Sierra Club
Mississippi-Alabama Sea Grant Consort
Mississippi Coast Audubon Society
Mississippi Coast RES & EXT CTR
Mississippi Coastal Conserv Association
Mississippi Gulf Coast Fly Fishers
Mississippi Gulf Coast V C
Ocean Marine Group
Pan Isles Inc.
Panama City Field Office
Pensacola Beach Chamber
Pensacola Gulf Coast Keepers, Inc.
Pensacola Motorsports
Personal Watercraft Industry Assoc
Santa Rosa Sound Coalition
Seeman Composite, Inc.
Ship Island Excursions
Sierra Club
Sports Country Polaris
The Nature Conservancy
The Wilderness Society
West Florida Canoe Club

APPENDIX A: APPROACH TO EVALUATING SURFACE WATER QUALITY IMPACTS

Objective

Using simplifying assumptions, estimate the minimum (threshold) volume of water in a waterbody below which concentrations of gasoline constituents from personal watercraft 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 waterbody) 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 5 hours at 25°C (Verschuren 1983; EPA 2001b).

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 [ug]/L) for PAHs, benzene, and MTBE.

4. Divide the estimated loading for each constituent (ug) by a toxicity benchmark (ug/L) to determine the waterbody threshold volume (L) below which toxic effects may occur (convert liters to acre-feet).

Estimated hydrocarbon (HC) emissions from personal watercraft and outboards will be significantly reduced in the near future, based on regulations issued by the Environmental Protection Agency and the California Air Resources Board (CARB).

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; EPA 2001b).

- 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 personal watercraft: 3 gal/hour at full throttle (CARB 1998)

- Gasoline emission rate for two-stroke outboards: estimated at approximately the same as for personal watercraft. Gasoline emission rate for four-stroke inboards estimated at 10% of that of two-stroke outboards.

- 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: up to 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 premium gasoline (octane of 90 and higher) in Florida: 3.5%, or 3.5 g/100 g (or approx. 2.57×10^4 mg/L) (Dickson 2003); the same concentration is assumed for Mississippi.

- Estimated emission of B(a)P in exhaust: 1080 ug/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 Springier, 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 1999a). There are, however, a limited number of EPA criteria for the protection of human health (via ingestion of water and aquatic organisms or ingestion of aquatic organisms only). Chronic ecotoxicological and human health benchmarks for contaminants were acquired from various sources.

Ecological benchmarks for benzo(a)pyrene, naphthalene, and benzene are from *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision* (Suter and Tsao 1996). The ecological benchmarks for benzo(a)pyrene (0.014 ug/L) and benzene (130 ug/L) are Tier II Secondary Chronic Values in Table 1 of Suter and Tsao (1996), which were calculated using methods in the Great Lakes Water Quality Initiative (EPA 1993). The ecological benchmark for naphthalene (62 ug/L) is the EPA Region 4 chronic screening value (Table 3 of Suter and Tsao 1996). This screening value was chosen for use as a conservative mid-range value considering the wide range of chronic values for naphthalene (12-620 ug/L) shown in Suter and Tsao (1996). The ecological benchmark for 1-methyl naphthalene (19 ug/L) is based on the LC_{50} value of 1900 ug/L for the Dungeness crab (*Cancer magister*), a marine invertebrate (USFWS 1987). The MTBE benchmark of 18,000 is for marine waters, and is based on the preliminary chronic water quality criteria presented in Mancini et al. (2002). The human health benchmarks for benzo(a)pyrene (0.031 ug/L) and benzene (71 ug/L) are Florida human health criteria for the consumption of aquatic organisms (F.A.C. 2002-Chapter 62-302.530). For Mississippi, human health benchmarks for benzo(a)pyrene (0.018 ug/L) and benzene (51 ug/L) are human health criteria for the consumption of aquatic organisms (EPA 2002b). Following are the default toxicity benchmarks for the PAHs, benzene, and MTBE having gasoline concentration information:

Chemical	Ecotoxicological Benchmark (µg/L)	Source	Human Health Benchmark (Florida/ Mississippi, in µg/L)	Source
Benzo(a)pyrene	0.014	Suter & Tsao 1996	0.031/ 0.018	FAC 2002/ EPA 2002b
Naphthalene	62	Suter & Tsao 1996	—	—
1-methyl naphthalene	19	FWS 2000	—	—
Benzene	130	Suter & Tsao 1996	71/ 51	FAC 2002/ EPA 2002b
MTBE	18,000	Mancini et al. 2002	—	—

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 personal watercraft operate for four hours (40 PWC-hours), each discharging 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 ug/hr × 1/1000 mg/ug × 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 × 2.57×10^4 mg/L = 1.16×10^7 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 benchmarks listed above) are calculated by dividing the estimated daily loadings (mg of contaminant) for the number of operational hours (e.g., 40 PWC-hours) by the listed toxicity benchmark concentrations (ug/L), correcting for units (1 mg = 10^3 ug), and converting from liters to acre-feet (1 acre-foot = 1.234×10^6 L):

Protection of Aquatic Organisms

Benzo(a)pyrene: 956 mg B(a)P × 10^3 ug/mg / 0.014 ug/L = 6.8×10^7 L or 55 ac-ft

Naphthalene: 1.68×10^6 mg naphthalene × 10^3 ug/mg / 62 ug/L = 2.71×10^7 L or 52 ac-ft

1-methyl naphthalene: 2.62×10^6 mg 1-methyl naphthalene × 10^3 ug/mg / 19 ug/L = 1.38×10^7 L or 112 ac-ft

Benzene: 8.39×10^6 mg benzene × 10^3 ug/mg / 130 ug/L = 6.45×10^7 L or 52 ac-ft

MTBE: 1.16×10^7 mg MTBE × 10^3 ug/mg / 18,000 ug/L = 6.44×10^5 L or 0.52 ac-ft

Based on these estimates and assumptions, 1-methyl naphthalene appears to be the contaminant (of those analyzed) that would be the first to accumulate to concentrations potentially toxic to marine organisms (i.e., it requires more water [112 ac-ft] to dilute the contaminant loading to a concentration below the toxicity benchmark). The threshold volumes are very similar for benzo(a)pyrene, naphthalene and benzene.

Protection of Human Health

Benzo(a)pyrene: 956 mg B(a)P $\times$ 10^3 ug/mg / 0.031 ug/L = 3.08 $\times$ 10^8 L or 25 ac-ft

Benzene: 8.39 $\times$ 10^6 mg benzene $\times$ 10^3 ug/mg / 71 ug/L = 1.18 $\times$ 10^8 L or 96 ac-ft

Based on human health water quality criteria for ingestion of aquatic organisms, benzene would be the first PWC-related contaminant in these example calculations that would reach unacceptable levels in surface water [96 ac-ft]; however, volatilization of benzene from water to air was not included in the calculation. Benzo(a)pyrene would be the second PWC-related contaminant to reach unacceptable concentrations in surface waters [25 ac-ft].

As a result of the estimated reductions in HC emissions (from the unburned fuel) in response to EPA regulations (listed above), additional personal watercraft 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 twice the current number of personal watercraft/outboards may be used in a given area in 2012 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.

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% to 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 composition 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) becomes available, they should be considered in the site-specific evaluation.

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;* several studies reported		
	1. U.S. Geological Survey	1. <0.032 µg/l	1. 0.13 – 0.33 µg/l
	2. Miller and Fiore	2. ≤0.3 µg/l	2. just over 1 µg/l
	3. University of California	3. <0.1 µg/l	3. 0.1 – 0.9 µg/l
PAH	A. Mastran 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)	A. Total PAH – up to 4.12 µg/l in water column; total PAH – 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. Ortis et al.	B. Experiment #1 – 2.8 ng/l phototoxic PAH	B. Experiment #1 – ± 45 ng/l phototoxic PAH; 5–70 ng/L total PAH
MTBE	A. *Lake Tahoe Motorized Watercraft Report;* several studies reported		
	1. U.S. Geological Survey	1. 0.11–0.51 µg/l	1. 0.3–4.2 µg/l
	2. Miller and Fiore	2. ≤3 µg/l	2. 20 µg/l (up to approx. 31 µg/l)
	3. University of California	3. less than nearshore area	3. up to 3.77 µg/l
	4. University of Nevada – Fallen Leaf Lake	4. —	4. 0.7–1.5 µg/l
	5. Donner Lake (Reuter et al. 1998)	5. <0.1 µg/l	5. up to 12 µg/l (Dramatic increase from 2 to 12 µg/l from July 4 to 7)
	B. NPS, VanMouwerik and Hagemann 1999		
	6. Lake Perris	6. 8 µg/l (winter)	6. up to 25 µg/l
	7. Shasta Lake		7. 9–88 µg/l over Labor Day weekend
	8. Three-day Jet Ski event		8. 50–60 µg/l
	9. Lake Tahoe		9. often within range of 20–25 µg/l, with max of 47 µg/l

APPENDIX B: LETTERS OF CONSULTATION

United States Department of the Interior
NATIONAL PARK SERVICE
Gulf Islands National Seashore
1801 Gulf Breeze Parkway
Gulf Breeze, FL 32563

N1621 (GUIS RM)

February 18, 2003

Gail Carmody, Project Leader
U.S. Fish and Wildlife Service
1601 Balboa Avenue
Panama City, FL 32405

Dear Ms. Carmody,

We would like to request initiation of informal consultation under Section 7 of the Endangered Species Act with your office on possible personal watercraft (PWC) use at Gulf Islands National Seashore. The Seashore has begun the process of analysis required by the National Environmental Policy Act to consider opening waters under Seashore jurisdiction to use by PWC. Currently the Seashore is closed to PWC, but a determination has been made that this issue requires additional consideration and review.

As a first step in analysis, we are attempting to define the full scope of issues associated with opening the waters of the Seashore to PWC use. Attached are a scoping brochure which identifies possible alternatives and lists issues identified to date, and a Q and A sheet which provides background information.

The following species and critical habitats are listed or proposed in the Florida District of the Seashore:

Piping plover, designated critical habitat
Gulf sturgeon, proposed critical habitat
Manatee
Green sea turtle
Loggerhead sea turtle
Kemps Ridley sea turtle
Leatherback sea turtle
Perdido Key beach mouse, designated critical habitat
American bald eagle

The Seashore also desires to identify possible effects on Seashore species which require careful management to maintain their population status to avoid the need for listing, such as the Santa

Rosa beach mouse, the southeastern snowy plover, the southeastern American kestrel, the least tern and the reddish egret.

We would appreciate the opportunity to discuss with you the potential for effects on these species of re-opening park waters to PWC. Hank Snyder, (850) 916-3011, Chief of Resources, is the Seashore contact for Section 7 consultation on PWC management. Thank you for your assistance.

Sincerely,

Jerry A. Eubanks
Superintendent

Attachments

United States Department of the Interior
NATIONAL PARK SERVICE
Gulf Islands National Seashore
1801 Gulf Breeze Parkway
Gulf Breeze, FL 32563

N1621 (GUIS RM)

February 18, 2003

Ray Aycock, Field Supervisor
U.S. Fish and Wildlife Service
6578 Dogwood View Pky.
Suite A
Jackson, MS 39213

Dear Mr. Aycock,

We would like to request initiation of informal consultation under Section 7 of the Endangered Species Act with your office on possible personal watercraft (PWC) use at Gulf Islands National Seashore. The Seashore has begun the process of analysis required by the National Environmental Policy Act to consider opening waters under Seashore jurisdiction to use by PWC. Currently the Seashore is closed to PWC, but a determination has been made that this issue requires additional consideration and review.

As a first step in analysis, we are attempting to define the full scope of issues associated with opening the waters of the Seashore to PWC use. Attached are a scoping brochure which identifies possible alternatives and lists issues identified to date, and a Q and A sheet which provides background information.

The following species and critical habitats are listed or proposed in the Mississippi District of the Seashore:

Piping plover, designated critical habitat
Gulf sturgeon, proposed critical habitat
Manatee
Green sea turtle
Loggerhead sea turtle
Kemps Ridley sea turtle
Leatherback sea turtle
Brown pelican
American bald eagle

The Seashore also desires to identify possible effects on Seashore species which require careful management to maintain their population status to avoid the need for listing, such as the

southeastern snowy plover, the southeastern American kestrel, the least tern and the reddish egret.

We would appreciate the opportunity to discuss with you the potential for effects on these species of re-opening park waters to PWC. Hank Snyder, (850) 916-3011, Chief of Resources, is the Seashore contact for Section 7 consultation on PWC management. Thank you for your assistance.

Sincerely,

Jerry A. Eubanks
Superintendent

Attachments

IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Field Office
1601 Balboa Avenue
Panama City, FL 32405-3721

Tel: (850) 769-0552
Fax: (850) 763-2177

April 17, 2003

Mr. Jerry Eubanks
Gulf Islands National Seashore
1801 Gulf Breeze Parkway
Gulf Breeze, Florida 32561

Attn: Hank Snyder, Chief of Resources

Re: FWS Log No. 4-P-03-092
Date Started: February 18, 2003
Agency: Gulf Islands National Seashore
Project Title: Use of Personal Watercraft
Gulf Islands National Seashore, Florida District
Ecosystem: NE Gulf
County: Santa Rosa & Escambia Counties, Florida

Dear Mr. Eubanks:

This is in response to your request for initiation of informal consultation under section 7 of the Endangered Species Act, on the possible use of personal watercraft (PWC) within the Florida District of Gulf Islands National Seashore (GINS), Santa Rosa, Ft. Pickens, and Perdido Key Units in Santa Rosa County and Escambia County, Florida. You have provided us with a preliminary list of species that are known or potentially known to occur at GINS. Our comments are provided in accordance with the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

The evaluation of PWC use at GINS is part of a National Park Service-wide (NPS) review process that began in 1998 when the NPS published a proposed regulation to eliminate PWC use in most units of the national park system. The NPS published a final regulation on PWC use in March 2000. The regulation was challenged and the settlement agreement requires NPS to issue park-specific special regulations based upon an environmental analysis of impacts to park resources. Within the Florida District of GINS, PWC use has not been permitted since April 2002. Prior to that time, PWC use was unrestricted at GINS.

General Comments:

You have identified the following species as occurring in the Florida District of the GINS: piping plover (CH), Gulf sturgeon (PCH), manatee, green sea turtle, loggerhead sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, Perdido Key beach mouse (CH), and bald eagle. We also urge you to consider species of special concern including snowy plovers and the Santa Rosa beach mouse. To evaluate the potential for impacts to listed species and their habitats on the Florida District of GINS, the following information would be needed.

- Historical PWC use at GINS, including areas of highest use, seasonal use, and time of day use.
- Projected future use, if any, and types of restrictions on PWC use that might be considered at GINS as reasonable or prudent.
- Listed species occurrence data for GINS.
- Observations or documentation of effects on species or habitats from the past use at GINS or elsewhere.

Our library has reports and literature that may be pertinent to this issue and might be useful in your preparation of a biological assessment. We are providing some of the more current information to you (enclosures). We encourage you to use our library as well as other sources of information concerning effects of human disturbance and PWC. Generally, potential environmental disruptions due to PWC, include but are not limited to, noise, human intrusion and traffic, rapid movement, alteration of submerged vegetation and substrate, the introduction of harmful substances associated with PWC, and habitat changes due to recreational amenities that support PWC use.

PWC produce noise in the 75 to 85 decibels range. The high pitch continually variable level of noise may be disruptive to many species of wildlife. PWC have a disproportionate horsepower to length ratio in comparison to traditional watercraft. While a 16-foot boat with a 65-horsepower engine has a ratio of 4:1, a PWC can have a ratio as high as 12:1. Their high speeds, unpredictable movement, and maneuverability further contribute to disturbance of wildlife. Their small size allows access into remote areas and shallow waters previously undisturbed by motorized watercraft - providing an opportunity to follow and harass species such as shorebirds or manatee. Pollution from PWC is also a potential concern as two-stroke outboard motors discharge 25 to 30 percent of their raw fuel directly into the water and air. Finally, high PWC use may result in increased need for inlet and shoreline stabilization, dredging of inlets, and beach maintenance and re-nourishment.

The greatest concern may be potential effect to shorebirds. High PWC use in the vicinity of shorebird habitats could cause temporary or permanent displacement of birds especially species such as snowy plover that are not tolerant of human presence. Excessive noise or disturbance could cause nesting birds to abandon traditional nesting habitats and/or leave eggs or chicks in the nests vulnerable to excessive temperatures and predation. Undisturbed periods of resting and

feeding also are believed to be important to non-breeding shorebirds. Startled by pedestrians or vehicle operation, birds may leave and cease using their preferred nesting, feeding or roosting areas and possibly seek less desirable ones. This could result in increased energy expenditure via flight and alertness and a reduced energy intake via lower feeding rates. The greatest disturbance is likely during roosting when birds are more concentrated.

Sea turtles are most prone to human disturbance during the initial phases of nesting when they emerge from the sea, select a nest site, and excavate the egg chamber. Researchers have noted that the presence of people moving within the field of view of a turtle or people whispering on the beach may cause abandonment of the nesting process. Although sea turtles are less prone to abandon nesting attempts once egg deposition has begun, the normal post-egg laying behavior of covering and camouflaging the nest site can be abbreviated if a turtle is disturbed. Studies have shown that "watched" and hand-illuminated nesting turtles have shorter than average nest covering and camouflaging times.

Species to be considered in Informal Consultation

1. Shorebirds: (Piping plover, threatened, Snowy plover, species of special concern):

   There is limited documented use by piping plover on GINS. Wintering critical habitat (CH-2 Big Sabine) has been designated for the species within GINS, Santa Rosa Unit. More information may be found at www.plovers.fws.gov. Piping plover are in northwest Florida during the non-breeding season of July 15 to May 15.

   Snowy plover are under status review by the U.S. Fish and Wildlife Service. If conservation can be achieved and maintained for this shorebird, the need to federally protect would be alleviated. Snowy plover are year round resident shorebirds and are known to nests in all Units of GINS. GINS has implemented a snowy plover and general shorebird conservation plan that includes habitat restoration and maintenance, nest protection, predator control, and controlled parking and pedestrian access to the beach.

   Your assessment should consider any PWC use that may: 1) alter or modify the hydrology of habitat, 2) introduce emergent vegetation, 3) alter the topography of a site, 4) degrade sediment or water quality that affect prey organisms, and/or 5) alter or change the natural processes that create and maintain habitats including washover passes and sparely vegetated intertidal feeding habitats.

   Our informal consultation should consider measures to avoid or minimize affects of PWC use including: 1) avoiding piping plover critical habitat with appropriate sized buffers, 2) avoiding snowy plover nesting habitats with appropriate sized buffers, 3) conducting year round bi-monthly surveys to ascertain the presence and concentration of piping plover and snowy plover, 4) conducting additional surveys to determine the species' behavioral responses to disturbances so that allowed use of PWC can be adjusted accordingly, and/or 5) designating PWC launching sites to outside of piping plover critical habitat and snowy plover concentration areas.

2. Gulf Sturgeon, threatened.

Gulf sturgeon informal consultation in estuarine and Gulf of Mexico habitat should be conducted with the National Oceanic and Atmospheric and Administration - Fisheries, Office of Protected Species, 9721 Executive Drive North, St. Petersburg, Florida 33702.

3. Manatee, endangered.

Manatees may be found occassionally in the shallow coastal waters of Big Lagoon, Santa Rosa Sound, and the Gulf of Mexico during the warmer months of the year. For species occurrence information contact: Mary Morris, Florida Fish and Wildlife Conservation Commission, Office of Protected Species Management (850) 922-4338.

Your assessment should consider any PWC use that may: 1) cause direct manatee mortality, 2) interfer with movement, feeding, or natural behavior of manatees, and/or 3) reduce their feeding habitat.

Our informal consultation should consider measures to avoid or minimize affects of PWC use including: 1) posting of information signs in known manatee use areas, 2) designating PWC use sites outside of known manatee areas, and/or 3) improving monitoirng of manatee use.

4. Sea Turtles (Loggerhead, threatened; Green, endangered; Leatherback, endangered; and Kemp's Ridley, endangered)

The following information pertains to nesting sea turtles. For informal consultation on sea turtles in the estuarine and marine environment potentially used by PWC, you should contact NOAA-Fisheries.

All four species of sea turtles have been documented to nest on the Gulf of Mexico coastline at GINS. GINS has an excellent conservation and research program in place for sea turtles. GINS also works with the local community to address sea turtle issues including development, beachfront lighting, beach nourishment, etc.

Your assessment should consider any PWC use that may increase human activities along the Gulf beachfront during night time hours in the sea turtle nesting season from May 1 to October 31.

Our informal consultation should consider measures to avoid or minimize affects of PWC use including: 1) restricting night use of PWC and 2) continued monitoring of sea turtle nesting at GINS.

5. Beach Mouse subspecies: (Perdido Key endangered and Santa Rosa species of special concern.)

The Perdido Key Unit of GINS supports a sub-population of the beach mouse subspecies. The Unit is also designated critical habitat for the species. GINS has implemented a habitat conservation program that has resulted in significant benefit for recovery of the beach mouse including controlled pedestrian access to the beach, controlled parking at the Unit, predator control, and dune restoration. GINS also works with the local community to address beach mouse issues including habitat protection and conservation and coastal development.

The Santa Rosa beach mouse occurs on the Santa Rosa and Ft. Pickens Units of GINS. The status of the subspecies is currently stable because the majority of its occurrence is on GINS and Eglin Air Force Base. An increase in impacts to the subspecies that significantly threatens the population stability could result in the need for federal protection. GINS has implemented a habitat conservation program that has provided major benefits for the beach mouse including controlled pedestrian access to the beach, controlled parking at the Units, predator control, and dune restoration. GINS also works with the local community to address beach mouse issues including habitat protection and conservation and coastal development.

Your assessment should consider any PWC use that may: 1) increase human activities in night hours in the dunes, year round and/or 2) change pedestrian access policies,

Our informal consultation should consider measures to avoid or minimize affects of PWC use including: 1) restricting night use of PWC, 2) maintaining controlled pedestrian access policies, and 3) continued monitoring of beach mice subspecies.

6. Bald Eagle, threatened.

We do not have specific information concerning bald eagle use or nesting at GINS. We refer you to the following web sites for information: U.S. Fish and Wildlife Service Bald Eagle Management Guidelines – http://northflorida.fws.gov/baldeagle/bald-eagle.htm and Florida Fish and Wildlife Conservation Commission data base of known bald eagle nests – http://wld.fwc.state.us/eagle/eaglenests/default.asp. Note: due to the rapid expansion of bald eagles in the Florida panhandle, not all nests may be in the data base.

Your assessment should consider any PWC use activity that may: 1) increase human activities within 1500 feet of an eagle nest from October 1 to May 15, and/or 2) change pedestrian access policies.

Our informal consultation should consider measures to avoid or minimize affects of PWC use including: 1) limiting PWC use within the primary zone of bald eagle nests (750-foot radius) during nesting season and 2) restricting use within the secondary zone (750 to 1,500 feet) during the nesting season depending on site specific evaluation, vegetive screening, habituation of eagles to human activity, level of activity, and other factors.

Conclusion

We are available to meet with you to further discuss potential impacts of PWC use and measures needed to avoid or reduce impacts to listed species and species of concern from PWC use at GINS, Florida District. Please contact the appropriate biologist for species specific information: Bald eagles - Stan Simpkins ext. 234; Manatee - Mary Mittiga, ext. 236; Sea turtles and Perdido Key and Santa Rosa beach mice- Lorna Patrick, ext. 229; and Piping plover and Snowy plover - Patty Kelly, ext. 228. Lorna Patrick will be your primary point of contact for this consultation.

Sincerely,

Gail A. Carmody
Project Leader

enclosures:
species information

cc:
NOAA-Fisheries, NMFS, Southest Region, Protected Species, St Petersburg, FL
FWS, Daphne, Raleigh, Athens, Charleston, Jacksonville, Vero Beach, Jackson, and Lafayette Field Offices

Panama City FO:L.Patrick:lap:lp:04-16-02:850-769-0552x229:c:lorna1\t&e\GINS PWC 3.wpd

GLOSSARY

BTEX — benzene, toluene, ethylbenzene, and xylene

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.

The EPA Office of Air Quality Planning and Standards has set national ambient air quality standards for six principal pollutants, which are called "criteria" pollutants. They are listed below. Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air ($\mu g/m^3$).

NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Standard Value[a]		Standard Type
Carbon Monoxide (CO)			
8-hour Average	9 ppm	(10 mg/m^3)	Primary
1-hour Average	35 ppm	(40 mg/m^3)	Primary
Nitrogen Dioxide (NO_2)			
Annual Arithmetic Mean	0.053 ppm	(100 $\mu g/m^3$)	Primary and Secondary
Ozone (O_3)			
1-hour Average	0.12 ppm	(235 $\mu g/m^3$)	Primary and Secondary
8-hour Average[b]	0.08 ppm	(157 $\mu g/m^3$)	Primary and Secondary
Lead (Pb)			
Quarterly Average	1.5 $\mu g/m^3$		Primary and Secondary
Particulate (PM_{10}) *Particles with diameters of 10 micrometers or less*			
Annual Arithmetic Mean	50 $\mu g/m^3$		Primary and Secondary
24-hour Average	150 $\mu g/m^3$		Primary and Secondary
Particulate ($PM_{2.5}$) *Particles with diameters of 2.5 micrometers or less*			
Annual Arithmetic Mean[b]	15 $\mu g/m^3$		Primary and Secondary
24-hour Average[b]	65 $\mu g/m^3$		Primary and Secondary
Sulfur Dioxide (SO_2)			
Annual Arithmetic Mean	0.03 ppm	(80 $\mu g/m^3$)	Primary
24-hour Average	0.14 ppm	(365 $\mu g/m^3$)	Primary
3-hour Average	0.50 ppm	(1300 $\mu g/m^3$)	Secondary

a. Parenthetical value is an approximately equivalent concentration.

b. The ozone 8-hour standard and the $PM_{2.5}$ standards are included for information only. A 1999 federal court ruling blocked implementation of these standards, which the Environmental Protection Agency proposed in 1997. The Environmental Protection Agency has asked the U.S. Supreme Court to reconsider that decision.

Nonattainment Area — A geographic region usually designated by an air quality planning authority through a formal rulemaking process within which one or more national ambient air quality standards are subject to violation. Sources of air pollutants in a nonattainment area are subject to more stringent requirements and controls than those in attainment areas (i.e., in areas where national standards are met).

Nonroad Model — An air quality emissions estimation model developed by the 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 personal watercraft. It is available at <http://www.epa.gov/otaq/nonrdmdl.htm>.

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.

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CARB	California Air Resources Board
CDHS	California Department of Health Services
CPFPWS	Coalition of Parents and Families for Personal Watercraft Safety
FFWCC	Florida Fish and Wildlife Conservation Commission
IWL	Izaak Walton League of America
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NTSB	National Transportation Safety Board
ODEQ	Oregon Department of Environmental Quality
PWIA	Personal Watercraft Industry Association
USGS	U.S. Geological Survey

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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 Native American Indian reservation communities and for people who live in island territories under U.S. administration.

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