

Canaveral National Seashore

Florida

National Park Service
U.S. Department of the Interior



DRAFT General Management Plan Environmental Impact Statement

Draft
General Management Plan / Environmental Impact Statement

Canaveral National Seashore
Brevard and Volusia Counties, Florida

Canaveral National Seashore was created through congressional legislation on January 3, 1975 (by Public Law 93-626) to preserve and protect the natural, scenic, scientific, ecological, archeological, and historical values and resources within the national seashore, and to provide for public outdoor recreational use and enjoyment of those resources. The national seashore, which represents an excellent example of a relatively stable barrier beach backed by a productive lagoon system, is comprised of a barrier island ecosystem and contains nearly 58,000 acres of barrier island, open lagoon, coastal hammock, pine flat-woods, and offshore waters. The national seashore contains 24 miles of pristine, undeveloped beach along the Atlantic coast, is prime habitat for many threatened and endangered species, and provides nesting beaches for several thousand protected marine turtles. Mosquito Lagoon, which encompasses more than two-thirds of the national seashore, is designated an estuary of national significance and an outstanding Florida water. This lagoon is one of the most diverse and productive estuaries in North America. The national seashore also contains cultural resources that reflect human history in the Florida peninsula from 2000 BC to early 20th century Florida settlement.

The national seashore is managed by the National Park Service in partnership with the National Aeronautics and Space Administration (NASA), which owns approximately two-thirds of the national seashore, and the adjacent Merritt Island National Wildlife Refuge, which is administered by the U.S. Fish and Wildlife Service.

This *General Management Plan* provides comprehensive guidance for perpetuating natural systems, preserving cultural resources, and providing opportunities for quality visitor experiences at Canaveral National Seashore. The purpose of the plan is to decide how the National Park Service can best fulfill the national seashore's purpose, maintain its significance, and protect its resources unimpaired for the enjoyment of present and future generations. This *General Management Plan* describes the general path that the National Park Service would follow in managing the national seashore during the next 20 years or more.

The document examines four alternatives for managing the national seashore for the next 20 or more years. It also analyzes the impacts of implementing each of the alternatives. **Alternative A** is the "no-action" alternative, which describes how the national seashore is managed now and provides a basis for comparing the other alternatives. Under **alternative B**, the national seashore would be managed to preserve and enhance the natural and historic landscape features associated with the national seashore's eastern Florida coastal barrier island system. Emphasis would be placed on retaining the national seashore's relatively undeveloped character and providing uncrowded experiences by dispersing visitors via shuttle service or canoe, kayak, and bicycle trails. Under **alternative C**, the national seashore would be managed as a place where visitors would explore and experience a wide range of opportunities that would be designed to provide an in-depth understanding of the natural and cultural history of eastern coastal Florida. Alternative modes of access to land- and water-based natural and cultural features would be available. Under **alternative D**, the national seashore would be managed to focus on enhancing the existing lands, resources, and facilities. Outdoor recreational and educational opportunities that are consistent with preserving the national seashore's natural and cultural resources would be promoted. There would be limited facility development. Coordination with partners would be increased to provide additional educational opportunities and programs for visitors and enhanced monitoring of Canaveral National Seashore resources.

The key impacts of implementing these alternatives are summarized in table 6 and detailed in chapter 4.

This *Draft General Management Plan / Environmental Impact Statement* has been distributed to other agencies and interested organizations and individuals for their review and comment. The public comment period for this document will last for 60 days after the Environmental Protection Agency's notice of availability has been published in the *Federal Register*. Readers are encouraged to submit their comments on this draft plan. Please see "How to Comment" on the next page for further information.

HOW TO COMMENT ON THIS PLAN

Comments on this plan are welcome and will be accepted for 60 days after the Environmental Protection Agency's notice of availability appears in the *Federal Register*. To respond to the material in this plan, written comments may be submitted by any one of several methods as noted below:

Mail:

Canaveral National Seashore
212 S. Washington Avenue
Titusville, FL 32796-3553

Internet Website:

<http://parkplanning.nps.gov/cana>

Hand Delivery:

Written and/or verbal comments may be made at public meetings. The dates, times, and locations of public meetings will be

announced in the media following release of this document.

Commenters are encouraged to use the Internet if at all possible. Please submit only one set of comments.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

SUMMARY

THE NATIONAL SEASHORE

Canaveral National Seashore was established as a new unit of the national park system by the U.S. Congress in 1975. The national seashore is situated on both a barrier island and the mainland along Florida's east coast; inviting highlights include pristine, undeveloped beach, and dunes and lagoon that offer sanctuary to an abundant blend of plants and animals. Year-round recreation includes fishing, boating, canoeing, surfing, sunbathing, swimming, hiking, camping, enjoying nature and historic trails, and exploring cultural resources. The national seashore has 57,662 acres total within the boundary.

PURPOSE OF THE PLAN

This *General Management Plan* provides comprehensive guidance for perpetuating natural systems, preserving cultural resources, and providing opportunities for quality visitor experiences at Canaveral National Seashore. Its purpose is to decide how the National Park Service can best fulfill the national seashore's purpose, maintain its significance, and protect its resources unimpaired for the enjoyment of present and future generations.

This *General Management Plan* describes the general path that the National Park Service would follow in managing the national seashore during the next 20 years or more.

Based on public and partner comment and NPS concerns, the following questions were identified as major issues for the plan to address:

- What are the appropriate types of visitor activities and levels of access to natural and cultural sites?
- What opportunities exist to provide education and orientation so visitors recognize that they are in a national

seashore and they understand the resources?

- What strategies should the national seashore use to minimize impacts on resources?
- What types and levels of facilities are needed to remain consistent with the national seashore's legislation, where are the most appropriate areas to locate functions and facilities, and what is the appropriate use of land at Bill's Hill and newly developed areas such as Seminole Rest?

THE ALTERNATIVES

Both the National Environmental Policy Act and the NPS planning process require development and evaluation of a range of alternatives to compare the advantages of one course of action to another. The alternatives provide guidance for protecting resources, meeting the needs of visitors, and addressing the concerns of neighbors and partners. Consistent with the national seashore's legislated purpose, public input, and consultation with other government agencies, the planning team developed three "action" alternatives that would provide the foundation for decision-making in the national seashore and form the core of the management plan. The fourth alternative is the "no-action" alternative that describes how the national seashore is managed now, providing a basis for comparing the other alternatives.

Additional feasibility studies and more detailed planning and environmental documentation would be required before development proposed in any alternative would be built. It is also important to remember that implementation of any alternative depends on the availability of funds and could occur in phases. The approved *General Management Plan* will guide year-to-year management of

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the national seashore, but full implementation of the plan could take many years.

For each alternative there is a concept statement or “vision statement,” which is an overarching philosophy that directs and shapes the desired resource conditions, visitor experiences, and facilities. Management zones describe general desired conditions in specific areas of the national seashore that address natural resources, cultural resources, and visitor experiences, as well as levels of management, visitor access, and development. For each alternative, management zones are shown on the alternative maps in different locations and configurations based on the alternative’s concept.

Alternative A (No-Action Alternative)

There would be no change in the current management direction for the foreseeable future. The National Park Service would continue to manage Canaveral National Seashore under the overall operational direction provided in its enabling legislation and interagency/cooperative agreements with its two federal agency partners. One agreement is between the Department of the Interior and the National Aeronautics and Space Administration. The other agreement is between the National Park Service and the U.S. Fish and Wildlife Service, which manages the Merritt Island National Wildlife Refuge. The latter agreement defines the general boundaries of jointly managed areas in and around Mosquito Lagoon and delineates responsibilities of the two agencies for cooperative administration and management of the area.

Impacts to soils, water resources, floodplains and wetlands would be negligible to minor over both the long- and short-term, due to construction activities and localized increases in impervious surfaces. Both adverse and beneficial impacts to wildlife and vegetation would be expected under this alternative due to continued high visitation with some protections for natural resources. No substantive change to cultural resources

would be expected under this alternative and any impacts would be negligible to minor. No adverse effects would occur on archeological resources, historic structures, or cultural landscapes; beneficial effects would be realized for ethnographic resources and sites of cultural importance. Minor adverse impacts to soundscapes, noise, and air quality would occur in the long-term, due to increased visitation. Visitor experience would largely remain the same under the no-action alternative, though in the long-term, projected increases in visitor use levels would result in a minor adverse effect. Impacts to operations would be long-term, adverse, and minor to moderate intensity due to increased demands on the national seashore staff and resources.

Alternative B (NPS Preferred)

Under this alternative, Canaveral National Seashore would be managed to preserve and enhance the natural and historic landscape features associated with the national seashore’s eastern Florida coastal barrier island system. Emphasis would be placed on retaining the national seashore’s relatively undeveloped character and providing uncrowded experiences by dispersing visitors via a shuttle service or canoe, kayak, hiking and walking trails, and bicycle trails.

Impacts to soils, water resources, floodplains and wetlands would be negligible to minor over both the long- and short-term, due to construction activities and localized increases in impervious surfaces. Both adverse and beneficial impacts to wildlife and vegetation would be expected under this alternative due to improved habitat conditions and visitor access near key habitat areas. No substantive change to cultural resources would be expected under this alternative and any impacts would be negligible to minor. No adverse effects would occur on archeological resources, historic structures, or cultural landscapes; beneficial effects would be realized for ethnographic resources and sites of cultural importance. Minor adverse impacts to soundscapes, noise, and air quality would occur in the long-term, due to increased

visitation, though some actions such as a slow-speed zone in northern Mosquito Lagoon would have beneficial impacts on these resources. The impacts of alternative B would be moderate and beneficial in the long-term for visitors seeking additional recreational opportunities. However, increased future visitation may also have long-term, minor adverse impacts due to crowding and noise. Impacts to national seashore operations would be both adverse and beneficial in the long-term. Adverse impacts may occur due to increasing management responsibilities, but beneficial impacts would also be realized by redesigning facilities such as at Playalinda and Apollo beaches, and by consolidating administrative functions.

Alternative C

Under this alternative Canaveral National Seashore would be managed as a place where visitors would explore and experience a wide range of opportunities that would be designed to provide an in-depth understanding of the natural and cultural history of eastern coastal Florida. When visitors enter the national seashore, they would be presented with choices for alternative modes of access to land- and water-based natural and cultural features, appropriate recreational opportunities, and educational pursuits.

Impacts to soils, water resources, floodplains and wetlands would be negligible to minor over both the long- and short-term, due to construction activities and localized increases in impervious surfaces. Both adverse and beneficial impacts to wildlife and vegetation would be expected under this alternative due to an increase in managed visitor use. No substantive change to cultural resources would be expected under this alternative and any impacts would be negligible to minor. No adverse effects would occur on archeological resources, historic structures, or cultural landscapes; beneficial effects would be realized for ethnographic resources and sites of cultural importance. Minor adverse impacts to soundscapes, noise, and air quality would occur in the long-term, due to increased

visitation. The impacts of alternative C would be major and beneficial in the long-term for visitors seeking additional recreational opportunities. However, increased future visitation may also have long-term, minor adverse impacts due to crowding and noise. Impacts to national seashore operations would be both adverse and beneficial in the long-term. Adverse impacts may occur due to increasing management responsibilities, but beneficial impacts would also be realized by redesigning facilities such as the Apollo Beach visitor center, and by consolidating administrative functions.

Alternative D

Under alternative D Canaveral National Seashore would be managed to focus on enhancing the existing lands, resources, and facilities. The national seashore would be managed to promote outdoor recreational and educational opportunities that are consistent with preserving the national seashore's natural and cultural resources. Limited facility development would provide more efficient NPS administration and operations and enhanced visitor amenities. Coordination with partners would be increased to provide additional educational opportunities and programs for visitors and enhanced monitoring of Mosquito Lagoon resources.

Impacts to soils, water resources, floodplains and wetlands would be negligible to minor over both the long- and short-term, due to construction activities and localized increases in impervious surfaces. Both adverse and beneficial impacts to wildlife and vegetation would be expected under this alternative. No substantive change to cultural resources would be expected under this alternative and any impacts would be negligible to minor. No adverse effects would occur on archeological resources, historic structures, or cultural landscapes; beneficial effects would be realized for ethnographic resources and sites of cultural importance. Minor adverse impacts to soundscapes, noise, and air quality would occur in the long-term, due to increased

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NEXT STEPS

After the distribution of this *Draft General Management Plan / Environmental Impact*

Statement there will be a 60-day public review and comment period. After this comment period, the NPS planning team will evaluate comments from other federal agencies, tribes, organizations, businesses, and individuals regarding the draft plan and incorporate appropriate changes into a *Final General Management Plan / Environmental Impact Statement*. The final plan will include letters from government agencies, substantive comments on the draft document, and NPS responses to those comments. Following distribution of the *Final General Management Plan / Environmental Impact Statement* and a 30-day no-action period, a “Record of Decision” approving a final plan will be prepared for signature of the director of the NPS Southeast Region Office. The “Record of Decision” documents the NPS selection of an alternative for implementation. With the signing of the “Record of Decision,” the plan can then be implemented, depending on available funding and staffing.

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A GUIDE TO THIS DOCUMENT

This *Draft General Management Plan / Environmental Impact Statement* is organized into five chapters plus appendices. Each section is described below.

Chapter 1: Introduction describes the context for the entire document. It provides an overview of Canaveral National Seashore, explains why the plan is being prepared and what issues it will address. It provides guidance (e.g., national seashore purpose, significance, fundamental resources and values, special mandates, and servicewide laws and policies) for the alternatives that are being considered. How this plan relates to other plans and projects is also described.

The chapter also details the planning opportunities and issues that were raised during public scoping meetings and initial planning team efforts (see insert box below); the alternatives in the next chapter address these issues and concerns to varying degrees.

The primary goal of **scoping** is to gather information and to identify the range of issues, concerns, and opportunities to be addressed in the management plan. Scoping is done with the national seashore staff and with the general public.

Chapter 2: Alternatives, Including the Preferred Alternative, discusses management zones, user capacity, and the four management alternatives (the focus of this plan). Mitigative measures proposed to minimize or eliminate the impacts of some proposed actions are described just before the discus-

sion of future studies and/or implementation plans that would be needed. The evaluation of the environmentally preferred alternative is followed by a discussion of alternatives or actions that were dismissed from detailed evaluation. The chapter concludes with summary tables of the alternative actions and the environmental consequences of implementing those alternative actions.

Chapter 3: Affected Environment describes those areas and resources that would be affected by actions proposed in the various alternatives—natural and cultural resources; visitor experiences; national seashore operations; and regional socioeconomics. It also includes a discussion of impact topics considered but dismissed from detailed analysis.

Chapter 4: Environmental Consequences analyzes the anticipated impacts of implementing the alternatives. Methods used to assess impacts are outlined at the beginning of the chapter and for each topic.

Chapter 5: Consultation and Coordination describes the history of public and agency coordination during the planning effort; it also lists agencies and organizations who received copies of the document.

The **Appendixes** present supporting information for the document, along with bibliographic references, a list of the planning team and other consultants, and an index.

Chapter

1

Introduction



OVERVIEW OF THE NATIONAL SEASHORE

Midway along Florida's east central coast between New Smyrna Beach and the John F. Kennedy Space Center in southeast Volusia and northeast Brevard counties, Canaveral National Seashore was established on January 3, 1975 (Public Law 93-626; a copy of this legislation may be seen in appendix A). Canaveral National Seashore (the national seashore) is accessible via Interstate 95 (exits 220 and 249), U.S. 1, State Route 44, and State Route 406/402. The national seashore, which represents an excellent example of a relatively stable barrier beach backed by a productive lagoon system, is comprised of a barrier island ecosystem and contains nearly 58,000 acres of barrier island, open lagoon, coastal hammock, pine flat-woods, and offshore waters (see Vicinity map). On its eastern edge, the park boundary extends 0.5 miles into the Atlantic Ocean.

AREAS OF THE NATIONAL SEASHORE

The seashore has undeveloped beaches and limited services. The eastern shore of the national seashore is a series of three beaches—Playalinda Beach, Klondike Beach, and Apollo Beach (from south to north). There are lifeguards in the summer and access for visitors with disabilities in certain areas of Apollo and Playalinda beaches (see National Seashore map).

Playalinda Beach has an entrance station/administrative complex and a lifeguard operations area.

Klondike Beach is a remote 12-mile beach reached by foot, horseback (seasonally), or boat. Access is only by permit.

Apollo Beach has one entrance station and a visitor information center; there is also a ranger station and an NPS maintenance complex (for the North District) in the area, including several storage garages, a carpenter shop, a life guard office, and a fire cache.

Turtle Mound, a 35-foot-high mound of oyster shells constructed by Native Americans, offers a magnificent view of the lagoon, ocean, and barrier island. There is also a beach operations area at Apollo Beach and a boat launch outside the national seashore entrance gate but within national seashore boundaries.

The Eldora Hammock area has a number of former residential properties that are currently used for NPS administrative purposes — such as the Hebner, Grey, and Feller properties and the Schultz house. The historic Eldora State House, which includes a visitor contact station and dock, is also in this area. There are two interpretive trails (the Eldora Hammock and Castle Windy trails), a canoe/kayak landing, and access to Mosquito Lagoon.

Mosquito Lagoon, the northernmost body of water in the Indian River Lagoon system, makes up about two-thirds of the area within the boundaries of the national seashore. This lagoon is one of the most species-rich and diverse estuaries in North America. Species composition varies greatly on a seasonal basis. The average depth is about 4 feet, with the exception of the Intercoastal Waterway that runs through the northern half of Mosquito Lagoon, and the lagoon is dominated by shallow flats that support dense submerged aquatic vegetation, primarily seagrass. There are several natural and dredge spoil islands in the lagoon.

The Oak Hill area includes Seminole Rest, the 10-acre Stuckey property, and Bill's Hill. There is a rehabilitated historic main house and caretaker's house, a dock, and an interpretive trail at Seminole Rest. The first floor of the main house is a visitor contact station where there are exhibits and where an orientation film is shown. The Stuckey property and Bill's Hill area are currently undeveloped.

USFWS/NPS Joint Management Area, as the name implies, is managed jointly by the U.S. Fish and Wildlife Service and the National Park Service. This central/southern portion of Mosquito Lagoon area is south of the Gomez Grant line. Pole/troll areas (where boaters are required to shut off their outboard motors and switch to a nonmotorized power source such as drifting or using push poles or paddles) exist in the joint management area, and more may be developed by the U.S. Fish and Wildlife Service. There are also boat access areas, a boat launch, dock, and parking area at Eddy Creek, a manatee viewing area, interpretive trails, and several historic properties — including Target Rock, Ross Hammock, the “Confederate salt works,” the old Haulover Canal, the Clifton Schoolhouse site, and Dummit Cove. Bio Lab Road and associated boat ramp are also in this area.

The Merritt Island National Wildlife Refuge, south and west of the national seashore boundary, includes the USFWS visitor information center, a maintenance facility, administrative offices and a fire cache. Limited information about Canaveral National Seashore is provided at this visitor center.

The NPS maintenance area (for the South District) is at Wilson’s Corner along Highway 402 east of the USFWS visitor information center.

The NPS headquarters for the national seashore is at 212 South Washington Avenue in Titusville.

NATURAL RESOURCES

The barrier island ecosystem in the national seashore features a narrow island 24 miles in length — the longest stretch of undeveloped beach along Florida’s east coast — that separates the Atlantic Ocean from Mosquito Lagoon. A sandy beach lies on the east side of the island. The beach is backed by a single dune ridge, averaging 12 feet in height; however, in some areas, the dune has been breached by storm overwash. The back side of

the dune is gradually sloping and anchored by dense vegetation. High marsh, mangrove and pockets of live oak/cabbage palmetto hammock occur along the shore of the lagoon.

Comprising more than two-thirds of the national seashore, Mosquito Lagoon is the northernmost body of water in the Indian River Lagoon system. Approximately 1 mile wide and averaging 4 feet deep, the lagoon supports dense growth of submerged aquatic vegetation. This lagoon has no outlet, but is connected to the ocean by the Ponce de Leon Inlet, 10 miles north of the national seashore, and to the Indian River by the Haulover Canal on the west side of the lagoon. The northern third of the lagoon contains numerous islands, consisting of hammock, mangrove, and high marsh vegetation, and features many small, intertidal oyster reefs; the southern two-thirds of the lagoon are open waters. The lagoon supports nationally recognized commercial and recreational fisheries for finfish, clams, oysters, blue crabs, and shrimp.

In 1990 the U.S. Environmental Protection Agency, through the National Estuary Program, designated Mosquito Lagoon, along with the rest of the 155-mile long Indian River Lagoon complex, as an estuary of national significance. The Indian River Lagoon is considered one of the most diverse and productive estuaries in North America. The state of Florida has also designated Mosquito Lagoon and the upper Indian River proper as an Outstanding Florida Water, a designation intended to preserve exceptional ecological and recreational resource values. The lagoon has also been designated as an aquatic preserve by the state because of its exceptional biological, aesthetic, and scientific values.

Mainland portions of the Canaveral National Seashore consist of pine flat-woods, live oak/cabbage palm hammock, and live oak scrub. A system of ridges and alternating swales can be seen in the south end of the national seashore, revealing the location of shorelines formed in the past. The highest point in the national seashore is Turtle Mound, a 35-foot-high mound of oyster shells constructed by Native Americans between 800 AD and 1400 AD.



TENNESSEE

NORTH CAROLINA

SOUTH CAROLINA

ALABAMA

MISSISSIPPI

GEORGIA

ATLANTIC OCEAN

GULF OF MEXICO

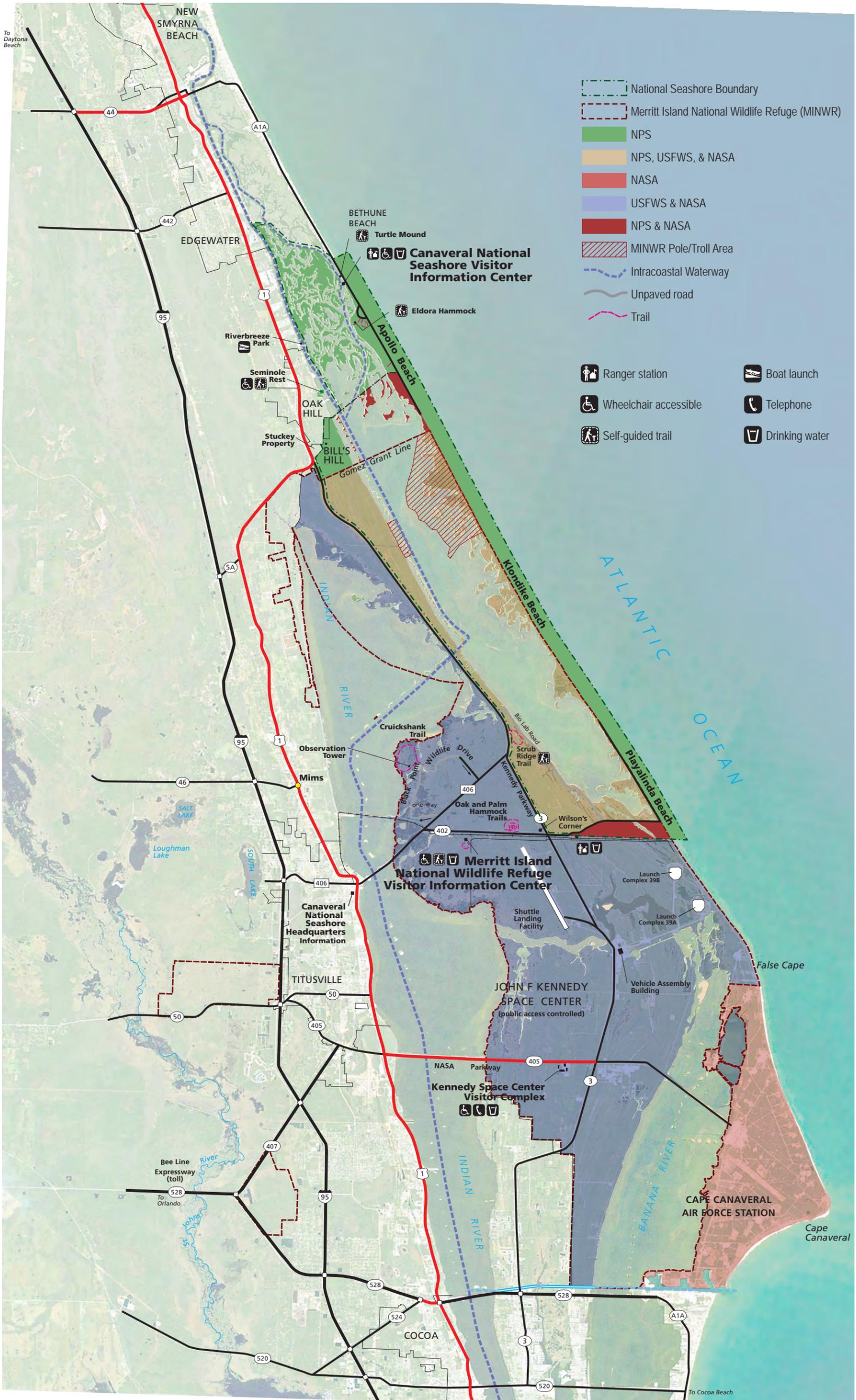
**Canaveral
National
Seashore**

VICINITY

Canaveral National Seashore

United States Department of the Interior / National Park Service

639 • 100,240 • DSC • Aug 2009



Federal Land Management

United States Department of the Interior / National Park Service

639 • 100,242A • DSC • JULY 2011

The summit of Turtle Mount offers a magnificent view of the lagoon, ocean, and barrier island.

A 12-foot-deep channel is maintained along the northwest side of Mosquito Lagoon for the Intracoastal Waterway, which then extends eastward through the Haulover Canal about halfway down the west side of the lagoon and into the Indian River.

Canaveral National Seashore has a diverse and fascinating variety of aquatic and terrestrial fauna and provides habitat for 14 federally listed threatened and endangered animal species, as well as other special status species. These special status species include, but are not limited to, loggerhead, green, and leatherback sea turtles; Florida manatees (a subspecies of the West Indian manatee), piping plovers; wood storks; peregrine falcons; eastern indigo snakes, and Florida scrub-jays. Three sea turtle species deposit approximately 4,000 nests on the beach each year. Many waterfowl, wading birds, and shorebirds (more than 300 species of birds can be found in the national seashore) use the national seashore as a migratory stopover and wintering ground.

More than 1,000 species of plants have been recorded in the national seashore and surrounding area. Located along the frost line, the national seashore contains a rich and unique mixture of subtropical and temperate plants that are found nowhere except central Florida. Several temperate species extend no farther south than the national seashore, while a number of subtropical species occur no farther north. Signs of this unusual mixture include the hammocks, which contain an overstory dominated by temperate species and an understory comprised of subtropical plants. Another sign of this mixture is the significant shift in vegetation along the edge of Mosquito Lagoon—from salt marsh cord grass, which predominates in coastal areas north of the national seashore, to mangrove species, which predominate to the south. Primary plant communities in the national seashore include coastal dune, coastal strand, oak scrub, slash pine flat-woods, hardwood

and palm hammocks, mangrove swamps, and salt marsh.

CULTURAL RESOURCES

Canaveral, from a word given by Spanish explorers meaning “place of canes,” is one of the oldest recorded geographical names in North America. Merritt Island is thought to have been named by Pedro Marratt, a surveyor who charted the island in the early 1800s. But humans left their imprint here long before European explorers ventured ashore. American Indians, attracted by the fertile estuaries and temperate climate, harvested oysters and clams and discarded the shells in heaps that archeologists study today in the national seashore, such as the mounds at Seminole Rest, Turtle Mound, and Castle Windy. In April 1513, Ponce de Leon claimed the land for Spain. Spain retained control until 1821, except for a 20-year period (1763–83) when the British gained control of Florida’s east coast. But the extensive wetlands, clashes with Seminole Indians, and clouds of salt marsh mosquitoes delayed development until the 1830s, when Douglas Dummett (or Dummitt in other sources) planted an orange grove in the Merritt Island area that began the world-renowned Indian River citrus industry.

During the next century villages near citrus groves or water passageways took hold for a while and then lost out to storms, isolation, or occasional killing frosts. One town was Eldora, a late-19th century community built near Mosquito Lagoon in what would later become part of the national seashore. Two houses associated with the early history of this community have been rehabilitated.

Seminole Rest, site of a prehistoric Indian mound, dates from about 4,000 to 500 years ago. Archeologists believe that the mound was a place for Timucuan Indians to gather and process clams. The two late-19th century rehabilitated residences are on top of the 18-foot-high mound. During the early 1900s the owners refused to sell the contents of the mound for road construction material, thus

preserving the evidence of the Timucuan people.

INTERAGENCY COOPERATION

Canaveral National Seashore is a superb example of a national park system unit where interagency cooperation is paramount. The Kennedy Space Center, a National Aeronautics and Space Administration (NASA) property, owns approximately 70% of the lands within the national seashore boundary (about 39,000 acres); much of that (34,000 acres) is co-managed by the National Park Service with the adjacent Merritt Island National Wildlife Refuge, which was established under the administration of the Bureau of Sport Fisheries and Wildlife (now the U.S. Fish and Wildlife Service [USFWS]) in 1963. (For more detail on land management and jurisdiction, please refer to the “Special Mandates and Administrative Commitments” section later in this chapter.) The national seashore is working with these agencies on numerous projects, such as feral hog control, exotic plant removal, restoration of impacted wetlands, long-term monitoring of natural resource conditions, and implementation of a prescribed fire program. Additional partnerships with state and local agencies include sea grass monitoring, mosquito control, water quality monitoring, and law enforcement patrols.

Ditches and impoundments were created in many wetlands bordering Mosquito Lagoon before the national seashore’s establishment. Under agreements with the National Aeronautics and Space Administration and the state, current landowners of national seashore lands, are required to allow mosquito control. NPS staff are working with several state and local agencies to accomplish this objective in an environmentally sound manner. An extensive system of ditches (beginning in the 1920s) and earthen dikes (in the 1960s and 1970s) was constructed to create impoundments to control water levels, salinity, and salt marsh mosquitoes. Many of these dikes are currently being breached or

removed to reconnect valuable marsh areas with the lagoon system.

NPS FACILITIES

Canaveral National Seashore headquarters are in Titusville. The national seashore is divided into three districts for administrative purposes.

The North District complex includes a new ranger station, a visitor center currently under construction, and a new education pavilion. The North District includes Apollo Beach and the islands north of the Gomez Grant Line (see map). There is a ranger station in the Oak Hill vicinity that includes Seminole Rest (east of U.S. 1 on River Road) and the Bill’s Hill area. The South District ranger station, in Brevard County, is 12 miles east of Titusville on State Route 402. The South District includes all lands east of State Route 3 south of the Gomez Grant Line and north of the Kennedy Space Center.

Besides the visitor information center, the North District includes visitor facilities such as beach parking areas, island campsites, hiking and canoe trails, comfort stations, and boat launches. Other sites include maintenance and research facilities.

The Oak Hill area includes a visitor contact station, restroom facilities, parking area, and trails.

The South District includes beach parking, boat launches, comfort stations, ranger station, and pole/troll water trails.

Self-guided walking (some with interpretive signs) nature and historical trails can be found at Seminole Rest, Turtle Mound, Castle Windy, Eldora, and Eldora Hammock in the North District. A canoe trail extends around the mangrove islands in the North District.

The national seashore has 24 miles of undeveloped beaches (Apollo Beach in the North District, Klondike Beach in the middle 12 of the 24 miles, and Playalinda Beach in the

South District). There are no designated picnic areas, public telephones, food services, beach showers (except at one location in the North District), or drinking water. Lifeguards are on duty from May 30 to September 1 at Playalinda Beach and at Apollo Beach. These beaches have boardwalk access from paved parking areas to protect the fragile sand dunes from foot traffic. Beach access points for visitors with disabilities are at Playalinda Beach and at Apollo Beach. Klondike Beach, a 12-mile stretch between Apollo and Playalinda beaches, can only be accessed by foot, boat, and horseback (seasonally) (under permit).

VISITOR ACTIVITIES

Canaveral National Seashore features pristine beaches, picturesque hammocks, several historic structures, wide expanses of open lagoon, and vast seascape vistas. Visitors to the national seashore may enjoy walking the nature and historical trails during the cool winter months. Throughout the year recreational opportunities for visitors (average annual visitation is about one million) include lagoon and surf fishing, boating, sailing, canoeing, kayaking, surfing, sunbathing, swimming, hiking, horseback riding, wildlife viewing, hunting, and backcountry camping. The national seashore and adjacent Merritt Island National Wildlife Refuge are well known for birding and are favored destinations for avid bird-watchers.

BACKGROUND

Planning for the national seashore is a decision-making process, and general management planning is the first and broadest level of decision-making for national park system units such as Canaveral National Seashore. General management plans (GMPs) are required for all units of the national park system and are intended to establish the future management direction of a park system unit. General management planning focuses on why the park unit was established (purpose), why it is special (significance, fundamental resources and values), and what resource conditions and visitor experiences should be achieved and maintained (desired future conditions).

General management plans look years into the future and consider the park unit holistically, in its full ecological and cultural context and as part of a surrounding region. Although a general management plan provides the analysis and justification for future funding, the plan in no way guarantees that money will be forthcoming. Requirements for additional data or legal compliance and competing national park system priorities can delay implementation of actions. Full implementation of a plan may extend many years into the future.

This *General Management Plan / Environmental Impact Statement* (GMP/EIS) was developed by an interdisciplinary team in consultation with NPS offices; tribes; federal, state, and local agencies; organizations; and other interested parties; and substantial input and participation from the general public.

PLAN PURPOSE AND NEED

This *General Management Plan* provides comprehensive guidance for perpetuating natural systems, preserving cultural resources, and providing opportunities for quality visitor experiences at Canaveral National Seashore. Its purpose is to decide how the National Park

Service can best fulfill the national seashore's purpose, maintain its significance, and protect its resources unimpaired for the enjoyment of present and future generations.

This *General Management Plan* describes the general path that the National Park Service would follow in managing the national seashore during the next 20 years or more. The plan does not provide specific and detailed answers to every issue facing the national seashore, but rather is a framework to assist NPS managers in making decisions today and in the future. The plan will

- identify and support the national seashore's purpose, significance, and fundamental resources and values
- provide general guidance for how to manage resources and provide for visitor use
- outline a general approach for facilities management, access strategies, and development patterns
- clearly define desired resource conditions and visitor experience opportunities
- ensure that the foundation for decision making has been developed in consultation with the public and adopted by NPS leadership after sufficient analysis of the benefits, impacts, and economic costs of alternative courses of action

This *General Management Plan* is needed to update the management framework for the national seashore, address changing issues and conditions, and incorporate new resource information. The national seashore's current *General Management Plan* was approved in 1982 and amended in 1998 to address management issues for the Seminole Rest property that was added to the national seashore in 1988. Conditions in the national seashore have changed substantially since the early 1980s. The beach access road in the South District has been realigned outside of the primary NASA security zone, greatly

increasing the number of days the district is open to visitation each year. Highly popular pontoon boat tours have made Mosquito Lagoon accessible to ever-increasing numbers of visitors.

The Seminole Rest property, with significant archeological and historic resources, has been added to the national seashore. The historic Eldora State House has been rehabilitated and opened for public visitation. A shipwreck survivor's camp associated with a French fleet's attempt to establish a settlement in Florida in 1565 has been discovered in the national seashore; as a significant incident in the history of colonial North America, the site should be interpreted to the public. These developments, along with other related issues, require more complete integration of archeological, historic, cultural landscape, and ethnographic resources into national seashore planning and management.

Other recent developments in the national seashore include acquisition of 13 retained use and life estates in 2002, thus necessitating a decision about what to do with the lands associated with those sites. One research facility has been established in the national seashore under agreement with the University of Central Florida, and a number of major studies are underway. The national seashore has developed several agreements with the U.S. Fish and Wildlife Service, several state agencies, and the local mosquito control districts. The agreement with the U.S. Fish and Wildlife Service controls commercial fishing and business licenses. The agreement for mosquito control is currently being renewed, to provide for the rehabilitation of impounded wetlands in several thousand acres of the national seashore.

Additionally, the national seashore is facing critical issues not addressed in the 1982 plan as amended in 1988. Population pressures in the area are increasingly impacting the national seashore. The University of Central Florida (UCF) has completed studies that show boat wakes are damaging certain oyster reefs. The University of Central Florida and

Dynamac at the National Aeronautics and Space Administration (now Innovative Health Applications) have documented damage to seagrass beds. Anecdotal evidence from anglers indicates that their enjoyment decreases as boating traffic increases. Studies are currently underway to better understand the effects of fishing and boat speed on aquatic resources. There are increasing pressures to allow personal watercraft and provide commercial services in the national seashore. On warm weekends the North District parking areas are full by 9:00 a.m., and all other visitors must be turned away.

Each of these changes and issues has major implications for how visitors access and use the national seashore, the facilities needed to support those uses, how resources are managed, and how the National Park Service manages its operations. Thus, a new general management plan is essential to provide long-range guidance for handling increasing numbers of visitors, addressing new resource and land protection issues, developing adequate visitor and administrative facilities, planning interpretive opportunities at sites recently opened to visitors, and providing an array of diverse quality experiences for visitors.

A general management plan also is needed to meet the requirements of the National Parks and Recreation Act of 1978 and NPS policy, which mandate development of a general management plan for each unit in the national park system.

PLANNING ISSUES AND CONCERNS

Issues and concerns relating to the national seashore were identified during scoping (early information gathering) for this general management plan. Those who participated in this identification process included the general public; NPS staff; representatives from other city, county, state, and federal government agencies; and representatives from various public and private organizations. An issue is defined as an opportunity, conflict, or problem regarding the use or management of public lands. Issues are considered in the planning

process because they represent obstacles to achieving desired conditions or goals.

Comments were solicited at public meetings, through planning newsletters, and on the NPS planning website. Comments received during scoping demonstrated that there is much that the public likes about the national seashore — its management, use, and facilities. The issues and concerns generally involve determining appropriate visitor use and types and levels of facility development, services, and activities that are compatible with desired resource conditions. The general management plan alternatives provide strategies for addressing the issues within the context of the national seashore's purpose, significance, and special mandates.

The following issues and management concerns were identified for Canaveral National Seashore. The issues in this document played a part in the identification of the impact topics (see chapter 3) analyzed in this document.

Natural Resources

The national seashore encompasses a relatively stable barrier island backed by a productive estuarine lagoon system that provides habitat for a variety of species. The national seashore provides habitat to 14 federally threatened and endangered species as well as other special status species. This complex ecological web is influenced by water quality degradation; water flow alterations; the introduction and spread of exotic, invasive and nuisance species; and increasing recreational uses such as boating and fishing. Without strategies to address these influences, it will be difficult for the national seashore to protect this ecosystem.

Questions to be addressed are as follows:

- What are the desired resource conditions for the various natural resources in the national seashore, and how should they be preserved, managed, and interpreted?

- What strategies should the national seashore use to manage recreation to eliminate and/or minimize impacts associated with visitor use?
- What should the National Park Service do to restore and or mitigate areas of the national seashore that have been impacted by historical and ongoing activities such as mosquito control efforts?
- What programs should be established to allow terrestrial and aquatic wildlife, including threatened and endangered species such as nesting sea turtles, to prosper in the national seashore while providing for visitor use?
- What opportunities should the national seashore pursue to work in partnership with other agencies and adjacent land-owners to address regional natural resource issues such as wildlife protection; beach erosion; and exotic, invasive, and nuisance species management?

Water Quality. The long-term health of national seashore resources—naturally occurring plant and animal life—is heavily dependent on outside influences, such as water quality. Especially critical is the quality of water that enters the Mosquito Lagoon from adjacent lands and waters. Degradation of the lagoon's water quality occurs from surrounding urban development runoff and pollution by mercury, lead, PCBs (polychlorinated biphenyls), septic tank leakage and overflows, and other contaminants. Mosquito Lagoon is part of the Indian River Lagoon system, for which numerous governmental agencies have some level of management responsibility. As part of the Indian River Lagoon complex, the Mosquito Lagoon is designated as an Estuary of National Significance. Some areas of Mosquito Lagoon are also designated class II, shellfish harvesting waterbodies. The National Park Service recognizes that without mutually beneficial working relationships and partnerships with agencies, organizations, and individuals beyond national seashore boundaries, it would be difficult to maintain or improve the lagoon's water quality.

Questions to be addressed are as follows:

- What management strategies should be adopted to maintain or improve Mosquito Lagoon's water quality?
- What partnerships with other agencies and adjacent landowners are needed to address regional issues such as water quality?

Fisheries. The appropriateness of fishing, both recreational and commercial, has been identified as a concern by many because of potential to deplete fish stocks, damage fragile seagrass beds and oyster reefs, and destroy other species through accidental captures. Members of the public have noted that some peoples' livelihoods are dependent on fishing, while others have voiced support to provide for sustainable fisheries.

Questions to be addressed are as follows:

- What is the appropriate type and level of fishing activities that can be provided on Mosquito Lagoon while maintaining sustainable fisheries and protecting seagrass beds and oyster reefs?
- What partnerships with the state and the U.S. Fish and Wildlife Service are needed to ensure sustainable fisheries?
- What management strategies should be adopted to maintain healthy and sustainable fish populations while providing for visitor use?

Cultural Resources

The national seashore's cultural resources were comprehensively surveyed in a 2008 Canaveral National Seashore Historic Resource Study. These cultural resources reflect the span of human history in the Florida peninsula from 4,000 BC to the early 20th century. These resources, which are both submerged and terrestrial, include more than 180 identified Native American middens and burial mounds and four historic buildings associated with late-19th and early-20th

century Florida settlement. Four cultural landscapes have also been identified. The eroding effect of natural processes and human activities creates a constant challenge to NPS managers for protecting, preserving, and interpreting these resources. As visitation increases, resources could be compromised, artifacts at shipwreck sites and historic fabric of historic buildings could be lost, and archeological sites could lose integrity. Without strategies to balance location and density of visitor activities, it will be difficult for the NPS managers to protect and preserve cultural resources

Questions to be addressed are as follows:

- What resource conditions are desired for archeological, cultural landscape, historic, museum collections, and ethnographic resources?
- In what ways and to what extent should Canaveral National Seashore emphasize cultural resource protection and preservation within the overall context of the seashore's natural landscapes?
- What would be appropriate levels of interpretation and visitor access to cultural resource sites?

Visitor Experience

Visitors to the national seashore enjoy various activities. These include hiking; horseback riding; picnicking; running/jogging; scenic driving; wildlife viewing; birding; photography; motorized boating—recreational and tour boating; nonmotorized boating—kayaking, canoeing, sailing, and rafting; bicycling; primitive camping—backcountry, beach, and island; swimming and sunbathing; surfing and wind surfing; fishing boat, shoreline, and freshwater/salt water; crabbing; and walking. Opportunities for activities have opened up at sites such as Seminole Rest and the rehabilitated Eldora State House.

The national seashore's proximity to the growing population of east central Florida is increasing pressure for the national seashore

to accommodate local recreational demands. The number of visitors to the national seashore is expected to increase as a result of the continuing population growth, expansion of tourism, and national seashore's proximity to the Kennedy Space Center. The continued increase in visitor numbers, as well as urban development of the area surrounding the national seashore, will likely degrade visitor experiences, and the uncrowded beach and lagoon experience anticipated by the national seashore's original congressional sponsors could be diminished. With more users, noise levels and the demand for services and facilities will likely increase, as well as the likelihood of visitor conflicts, accidents, and resource damage.

During the past 20 years, boating (associated with recreational activities as well as commercial fishing) has increased significantly in the national seashore, and the highly popular NPS pontoon boat tours has made Mosquito Lagoon accessible to ever-increasing numbers of visitors.

Some peoples' livelihoods depend on national seashore waters, and thus opposition exists to closing any areas to motorized vessels. Some people desire more boat launches and docks throughout Mosquito Lagoon. However, others have voiced concern that some national seashore users are abusing its natural and cultural resources through irresponsible boating activities. Among other resources, seagrass beds, oyster reefs, manatees, and archeological sites have been adversely impacted by boat propellers and speeding boats.

Questions to be addressed are as follows:

- What strategies should the national seashore initiate to manage anticipated visitation increases and diverse visitor needs and expectations while maintaining high quality visitor experiences and preserving national seashore resources?
- What are the amount, types, and diversity of opportunities the national seashore can

provide while still promoting resource preservation and stewardship?

- What is the appropriate type and level of boating activities that can be provided on Mosquito Lagoon while protecting and interpreting the national seashore's natural and cultural resources?
- What strategies can the National Park Service develop in partnership with the U.S. Fish and Wildlife Service and the state to protect and interpret the national seashore's fragile resources while providing for an appropriate type and level of boating?

Interpretation/Education. The national seashore needs to upgrade and improve its efforts to educate visitors and the general public on the ecological significance and values of the national seashore and its natural and cultural resources within the context of the ecosystem that encompasses east central Florida. Various recommendations to enhance the national seashore's interpretive efforts include more active and diverse guided and unguided interpretive programs — such as boat and eco tours, wayside exhibits, interpretive trails, guided walks and talks at significant historic and archeological sites, expanded museum exhibits, boater education, and formal seminar programs. New interpretive opportunities have also been provided with the addition of the Seminole Rest archeological and historic site, rehabilitation of the Eldora State House, and discovery of a shipwreck survivors' camp from a French fleet attempting to attack the Spanish in 1565.

Questions to be addressed are as follows:

- What opportunities exist in the national seashore to provide for interpretation and environmental education for visitors and the general public?
- In what ways could the national seashore's interpretive and educational programs be enhanced in partnership with the Fish and Wildlife Service, local school systems, environmental groups, guides, and other interested area organizations?

- What are the appropriate levels of interpretation and public access for the national seashore's natural and cultural resources?
- What strategies can be developed and addressed in a regional context that will enable visitors to know that they are in a unit of the national park system?

Orientation and National Seashore

Identity. Visitors have access to the national seashore from the open waters of the Mosquito Lagoon, Indian River, the ocean, and the Intracoastal Waterway. Access points at land-based developed areas include the Merritt Island National Wildlife Refuge in the southern portion of the national seashore and public beaches and private development associated with the New Smyrna Beach, Edgewater, and Oak Hill areas in the northern portion. The southern part of the seashore lacks facilities to orient visitors, and the visitor center in the northern district is small and can provide only limited information. National seashore boundary signs are inadequate in certain areas and tend to cause visitor confusion because of multiple signs relating to the national wildlife refuge, national seashore, and adjacent Kennedy Space Center. Many visitors—particularly boaters in Mosquito Lagoon and the Intracoastal Waterway—do not know when they are in the national seashore. These factors make it difficult for NPS staff to determine the type and level of visitor use it receives and provide advance information to visitors on recreational opportunities, events and activities, rules, regulations, and navigational information. Thus, many visitors find it difficult to gain a comprehensive understanding of the national seashore, its significant natural and cultural features, and the diversity of recreational experiences that it offers within the context of the regional ecosystem.

Questions to be addressed are as follows:

- What opportunities are there to develop regional partnerships between the national seashore and other public and private agencies, organizations, and groups to provide visitors with advance information to take advantage of the national seashore's and region's recreational opportunities?

Climate Change

Climate change refers to any substantial changes in average climatic conditions (such as average temperature, precipitation, or wind) or climatic variability (such as seasonality or storm frequencies) lasting for an extended period of time (decades or longer). Recent reports by the U.S. Climate Change Science Program, the National Academy of Sciences, and the United Nations Intergovernmental Panel on Climate Change (IPCC 2007) provide clear evidence that climate change is occurring and will accelerate in the coming decades. The effects of climate change on national parks are beginning to emerge as both science and impacts become clearer; however, it is difficult to predict the full extent of the changes that are expected under an altered climate regime.

The National Park Service recognizes that the major drivers of climate change are outside the control of the agency. However, climate change is a phenomenon whose impacts throughout the national park system cannot be discounted. Some of these impacts are already occurring or are expected in Canaveral National Seashore in the time frame of this management plan. Therefore, climate change is included in this document to recognize its role in the changing environment of the national seashore and provide an understanding of its impact; other factors driving environmental change include population growth in the area (subsidence of water table, increased visitation, pollution), shifts in visitor use patterns, and land-use change and development around the national seashore.

Although climate change is a global phenomenon, it manifests differently depending on regional and local factors. Climate change is expected to result in many changes to the Atlantic coast of the eastern United States, including warming ocean waters, hotter sum-

mer temperatures and fewer winter freezes, sea level rise, and higher storm surges. In addition to these likely widespread effects, specific impacts on Canaveral National Seashore could include shifting shorelines due to coastal erosion, erosion of archeological sites, saltwater intrusion into soils and vegetation, and changes in the output of the watersheds feeding into the national seashore area. This dynamic environment is expected to affect the natural and cultural resources in the national seashore, as well as visitor use patterns.

Questions to be addressed are as follows:

- What is the contribution of the proposed project to climate change, such as greenhouse gas emissions and the “carbon footprint”?
- What are the anticipated effects of climate change on the national seashore resources and visitors that are affected by the management alternatives?

Because the contribution of the proposed project to climate change is negligible under any alternative, the former issue has been dismissed. The latter issue, a discussion of the anticipated effects of climate change on national seashore resources, has been carried forward.

Access/Circulation

Visitors and the general public have expressed varying opinions as to the modes and levels of access and circulation that should be provided in the national seashore. Some people support expansion of the parking area that serves the public boat ramp at the national seashore's north entrance; expanded parking for vehicles and boat trailers throughout the national seashore; additional access to beaches via more dune crossings; access for birders before sunrise; more canoe/kayak access points, hours of access, and biking/hiking trails that are connected to adjacent city and county trail systems; provision for disabled visitors to access and park at appropriate sites throughout the

national seashore, including the Eldora State House.

Despite the increasing pressure for more public access to and enhanced circulation within the national seashore, some visitors and members of the general public are concerned that accommodation of these demands could impact significant natural, cultural, and scenic resources as well as the high quality visitor experiences. In the northern section of the national seashore, the parking areas fill up quickly, particularly during peak visitation periods. With continuing population growth, the potential exists for increased traffic, parking congestion, pollution, and public safety concerns.

Questions to be addressed are as follows:

- What opportunities are there to provide visitors with access to the national seashore using alternative transportation modes and services other than their personal vehicles?
- What level of public access and parking is appropriate throughout the national seashore and how should they be provided?
- What opportunities are there to circulate visitors and connect visitors with various places — such as cultural resource sites in the northern portion of the national seashore?

Commercial Use

Commercial services support various visitor activities. Although the National Park Service as a whole has a management framework for commercial services, the national seashore lacks the staffing numbers to adequately manage commercial services for sportfishing and commercial clamming. Some users acknowledge the value of commercial services but express concerns that irreparable damage to the sensitive cultural and natural resources could result from overuse unless visitation levels and types of activities and their locations are balanced by resource preservation.

Questions to be addressed are as follows:

- What are the desired amount, type, and distribution of recreational and commercial opportunities in Mosquito Lagoon and other areas of the national seashore?

Facilities

Visitors and the general public have expressed varying opinions as to the type and level of facilities that should be provided in the national seashore to support activities and visitor use. Some prefer minimal facilities, while others would like additional parking space, improved restrooms, drinking water, and showers at beach access locations. Others have indicated interest in more boat launches, ramps, and docks with temporary tie-ups throughout Mosquito Lagoon; facilities for picnicking, horseback riding, and hiking; and a diverse range of camping opportunities. There also is interest in developing sites for large group activities in areas that are near local communities to accommodate family and organized outings, environmental education, and community events.

The national seashore's headquarters is in Titusville, but congressional legislation in 1988 provided for a new headquarters and visitor center to be located on a 10-acre tract near the center of the national seashore on U.S. Highway 1. Other recent developments include the acquisition of 13 retained use and life estates in 2002. Additions to the national seashore, such as the Seminole Rest site,

rehabilitation and opening to the public of the Eldora State House, and discovery of the French shipwreck survivors' camp, present new opportunities for recreational use, interpretation, and resource preservation. Utility infrastructure, including the national seashore's comfort stations and water and telephone lines, are inadequate and need upgrading. Currently, there is an imbalance between visitation levels, facility and infrastructure capacity, and the need to maintain the national seashore's uncrowded and undeveloped qualities into the future in accord with its purpose.

Questions to be addressed are as follows:

- Without compromising national seashore natural, cultural, and scenic resources, what types and levels of facilities are needed to provide for visitor use and safety, interpretation, resource protection, and NPS administration and operations while remaining consistent with the national seashore's enabling legislation?
- Where are the most appropriate areas to locate functions and facilities, including the national seashore's headquarters and visitor center?
- What is the appropriate use of the land at the Bill's Hill area?
- What is the appropriate use of developed areas such as Seminole Rest?
- What level of facilities is needed to support visitor use in the Bill's Hill area?

FOUNDATION FOR PLANNING AND MANAGEMENT

PURPOSE

Purpose statements convey the reason for which the unit was set aside as part of the national park system. Grounded in an analysis of national seashore legislation (appendix A) and legislative history, purpose statements also provide primary criteria against which the appropriateness of plan recommendations, operational decisions, and actions are tested.

Canaveral National Seashore was set aside by Congress to preserve and protect its natural, scenic, scientific, ecological, archeological, and historic values and resources and to provide for public outdoor recreational use and enjoyment of those resources.

SIGNIFICANCE

Significance statements capture the essence of the park unit's importance to the nation's natural and cultural heritage. They describe the unit's distinctiveness and describe why an area is important within regional, national, and global contexts. This helps managers focus their efforts and limited funding on protection and enjoyment of attributes that are directly related to the purpose of the park unit. The significance of Canaveral National Seashore includes the following five components.

The 24 miles of beach within Canaveral National Seashore constitute the longest extent of undeveloped pristine beach along the Florida Atlantic Coast and provide opportunities for uncrowded seashore recreation.

Mosquito Lagoon is one of the most diverse and productive estuaries in North America and is designated an estuary of national significance and an outstanding Florida water.

The national seashore contains prime habitat that provides sanctuary for 14 federally listed threatened and endangered species of birds, mammals, and reptiles, including nesting beach for several thousand protected marine turtles.

The national seashore encompasses a transition zone between a variety of temperate and subtropical plant and animal species, found together only in east central Florida, and classic elements of subtropical dune and hammock plant communities.

The national seashore's cultural resources reflect the span of human history in the Florida peninsula from 2,000 BC to the early 20th century. These resources include more than 180 identified Native American middens and burial mounds and four historic buildings associated with late-19th and early-20th century Florida settlement.

FUNDAMENTAL RESOURCES AND VALUES

Fundamental resources and values are systems, processes, features, visitor experiences, stories, and scenes that deserve primary consideration in planning and management because they are critical to maintaining a park unit's purpose and significance. Fundamental resources and values are subject to periodic review and updates based on new information or changing conditions. The following fundamental resources and values are only a portion of the national seashore's total resources and values; all resources and values were considered in this planning effort.

Prime Terrestrial and Marine Habitat

- barrier island ecosystem; Mosquito Lagoon, an estuary of national significance; coastal hammocks; pine flat-woods; and ocean waters

- sanctuary for special status species, shorebirds, and migratory waterfowl
- prime beach nesting sites for endangered sea turtles
- temperate and subtropical ecosystem interface

Cultural Resources

- Historic Structures
 - Eldora State House and Cisterns
 - Instone House and caretaker's cottage at Seminole Rest
 - "Confederate salt works"
 - Old Haulover Canal and Portage
 - Schultz House
 - Elliot Plantation
 - Sugar Mill Ruins
 - King's Road
 - New Haulover Canal
- Cultural Landscapes (identified, but not inventoried or evaluated)
 - Eldora Historic District
 - Haulover Canal
 - Indian River Citrus Landscape
 - Seminole Rest
- Prehistoric Archeological Sites
 - Turtle Mound (shell middens)
 - Castle Windy (shell middens)
 - Seminole Rest (shell middens)
 - Ross Hammock (shell middens, burial mounds, and Timucuan Indian Village site)
- Museum Collections

Recreational, Educational, and Scenic Values

- There is a wide range of outstanding aquatic-based recreational opportunities including traditional beach activities, boating, and sportfishing.
- There are interpretive and educational programs that provide opportunities for visitors to discover, understand, and appreciate the national seashore's natural and cultural history.

- The national seashore's 24 miles of relatively undeveloped coastline and inland waters provide visitors opportunities to experience the outstanding scenery of Florida's east central coast in an uncrowded setting.

INTERPRETIVE THEMES

Interpretive themes describe ideas, concepts, or messages about a unit in the national park system that are so important all visitors should have the opportunity to understand them. They provide guidelines for selecting interpretive stories and for planning facilities and activities to tell those stories.

All interpretation should relate to the primary theme; each subtheme should be addressed by some part of the national seashore's interpretive program.

Primary Theme

From ancient times to the present, this barrier island ecosystem has provided sanctuary and sustenance to humans of many cultures; traces of their existence, along with the water, wildlife, and plant life, provide us with a timeless view of old Florida and a glimpse into our future.

Subthemes

1. The flora found here between the subtropical and temperate climates provide enjoyment for the amateur botanist and allow scientists to study this unique blending of plant life.
2. Although the national seashore serves as a retreat for visitors, Mosquito Lagoon provides a safe spawning ground and nursery for saltwater fish, crustaceans, marine mammals, and countless invertebrates.
3. Numerous shell mounds and burial sites spanning 4,000 years are a testament to early peoples' will and determination to reap the benefits found in this area and to

remain steadfastly a part of this harsh and unyielding environment.

4. From early advances in farming and fishing to the latest space technology, this area has been a proving ground for many scientific discoveries.
5. Humans have been drawn to the waters of Canaveral for survival, travel, economics, and recreation; we must find a way to protect aquatic resources that we are prone to destroy.
6. Canaveral's beaches provide nesting habitat for three species of endangered and threatened sea turtles and offer visitors opportunities to observe this amazing natural process and understand the plight of these animals.

SPECIAL MANDATES AND ADMINISTRATIVE COMMITMENTS

Special mandates and administrative commitments refer to requirements that are specific to each national park system unit, in this case the national seashore. These formal requirements are often defined in the enabling legislation authorizing a new unit of the national park system. Public Law 93-626, which established Canaveral National Seashore as a new unit on January 3, 1975, stated that the national seashore was established to "preserve and protect the outstanding natural, scenic, scientific, ecological, and historic values of certain lands, shoreline, and waters of the State of Florida, and to provide for public outdoor recreation use and enjoyment of the same." Earlier, on December 11, 1974, the Senate Committee on Interior and Insular Affairs reported that the national seashore's enabling legislation was intended "to ensure the continuing protection of the natural features and to afford opportunities for leisure activities in an undeveloped uncrowded setting."

Public Law 93-626 included the following stipulations:

Section 1 provided for a maximum size of the national seashore not to exceed 67,500

acres of land and water. Minor revisions of the boundary are permitted by the secretary of the Department of the Interior after publication in the *Federal Register*.

Section 2 specified that

"no new construction or development shall be permitted within the national seashore except for the construction of such facilities as the Secretary deems necessary for the health and safety of visitors or for proper administration of the Seashore."

Section 3 provided that, except for property deemed necessary for visitor facilities or for access to or administration of a seashore, owners of private noncommercial residential property may retain for themselves and their successors or assigns, a right of use and occupancy for a definite term not to exceed 25 years or for a term ending at the death of the owner or spouse, whichever is later.

Section 4 provided for hunting, fishing, and trapping on the lands and waters that are specifically authorized in accordance with the appropriate state and federal laws. Any restrictions can be effective only after consulting with the appropriate state agency.

Section 5 provided for continued management of sections of the national seashore for wildlife purposes by the U.S. Fish and Wildlife Service at the Merritt Island National Wildlife Refuge. A delineation of management areas between the U.S. Fish and Wildlife Service and the National Park Service was generally indicated in Section 5(c)1, which also provided for transfer of some NASA land at the center of the national seashore to the National Park Service.

This land, in the Oak Hill Area amounting to 1,088 acres near the junction of U.S. 1 and State Route 3, "may be used for the purpose of establishing such facilities as are

needed for the administration of the seashore, for the construction of the principal visitor center which shall be designated as the 'Spessard L. Holland Visitor Center,' and for a central access to the seashore." Any portion of this area, as well as any other of the NASA lands, may be closed to the public when necessary for space operations upon the request of the NASA Administrator.

In administering the shoreline and adjacent lands of the national seashore the Secretary would retain such lands in their natural and primitive conditions, prohibit vehicular traffic on the beach except for administrative purposes, and develop only those facilities deemed necessary for public health and safety.

Section 6 established the Canaveral National Seashore Advisory Commission to terminate 10 years from the date of establishment of the national seashore. The commission was terminated formally on January 2, 1985.

Section 7 provided that the NASA Administrator grant such use of the Kennedy Space Center area to the National Park Service as he determines is "not inconsistent with public safety and the needs of the space and defense programs of the Nation." Furthermore, "any portions of the John F. Kennedy Space Center within the Seashore not transferred to the Secretary shall remain under the control and jurisdiction of the Administrator."

Section 8 directed that within a three-year period of the national seashore's establishment, lands within the national seashore be reviewed for "suitability or non-suitability . . . for preservation as wilderness." A wilderness study was completed in 1982. As a result of this review, the National Park Service found that none of the lands or waters within Canaveral National Seashore was suitable for wilderness. The jurisdiction by the National Aeronautics and Space Admini-

stration and subsequent management by the U.S. Fish and Wildlife Service of about 70% of the national seashore is legislatively authorized and covered by a mandated agreement to ensure use of the lands in a manner that is consistent with the needs of the space and defense programs. More than 20% of the national seashore is owned by the state of Florida, and by legislation state lands can only be acquired by donation. (The amount of state lands is difficult to determine because these lands are submerged lands, literally under water.) Future land transfers are expected to contain jurisdictional limitations to provide the continuation of mosquito control activities. Because of these jurisdictional limitations, the National Park Service cannot ensure that management of the national seashore would be consistent with the Wilderness Act.

Section 9 imposed a limit of \$500,000 on the development of "essential public facilities." Section 9(a) also set a limit of "not more than \$7,941,000 for the acquisition of lands and interest in lands."

Interagency Agreements

Canaveral National Seashore is unusual among national park system units in that most of the area within its boundaries is under the jurisdiction of the state or under another federal agency. The national seashore is managed under interagency/cooperative agreements between (1) the National Aeronautics and Space Administration, which has jurisdiction over about 70% of the national seashore's acreage, and the Department of the Interior, and (2) between the National Park Service and the U.S. Fish and Wildlife Service. The provisions in these agreements provide much of the national seashore's operational direction.

Agreement between the National Aeronautics and Space Administration and the Department of the Interior, April 2,

1975. On April 2, 1975, the National Aeronautics and Space Administration transferred 1,088 acres in the Oak Hill area, generally known as the “Bill’s Hill” tract, to the National Park Service to be administered by Canaveral National Seashore pursuant to provisions in the national seashore’s enabling legislation.

An agreement dated the same day as the deed transfer established the basis for national seashore use of NASA lands pursuant to the national seashore’s enabling legislation. This agreement specified several important conditions to be imposed upon the Department of the Interior, including the requirement that any or all of the NASA lands and waters could be closed to the public upon request by the director of the Kennedy Space Center when called for by the nation’s space program. In general, all programs of the Department of the Interior on NASA lands shall be undertaken only after specific NASA approval, and no “permanent” facilities shall be constructed except those on the lands specifically deeded to the National Park Service for administrative purposes [i.e., the 1,088-acre “Bill’s Hill” tract]. Even on this 1,088-tract, the agreement required that the siting and nature of “permanent” facilities be coordinated with the Kennedy Space Center to “assure consistency with public safety and with the needs of the space defense programs of the Nation.”

Section 1 of the agreement stated that the portion of Kennedy Space Center lands transferred by the enabling act to the Department of the Interior —

described in the Act as bounded by the northern boundary of the H. M. Gomez Grant and containing 1,088 acres more or less . . . shall be used in accordance with the Act for the purpose of establishing such facilities as are needed for the administration of the Seashore. . .

Section 2 of the agreement provides that the Department of the Interior “shall enter upon and use the remainder of the property

(between 39,000 and 40,000 acres) for Seashore and Refuge purposes” and have “primary administration” of the area for all purposes unrelated to the U.S. space program (under some conditions that were listed).

Memorandum of Understanding between National Park Service and U.S. Fish and Wildlife Service, July 10, 1975. This document, which has been updated, renegotiated, and/or amended as an interagency agreement on a periodic basis since 1975 (the current agreement is dated January 15, 1996, and was signed February 7, 1997), established the individual and joint responsibilities of the two bureaus for administration of those lands and waters as described in Section 5 (1) of Public Law 93-626, the national seashore’s enabling legislation. The document established the basis for cooperation on mutual programs between the two bureaus for an overlap area, comprising 34,345 acres in and around Mosquito Lagoon, which it referred to as the “Joint Management Area.” (See National Seashore map.)

Article 2, Section 1 of the July 10, 1975, document stated that the U.S. Fish and Wildlife Service shall administer those lands and waters as described in Section 5 (1) of Public Law 93-626, and

both agencies agree that the line between the ‘marsh and the dunes’ as specified in this section shall refer specifically to the western toe of the primary dunes or eastern edge of the original ‘sand trail’ between the northern boundary of H.M. Gomez Grant Line extending southerly to the south end of the ‘sand trail’ near Camera Pad 10 and continuing southerly along the west edge of the Beach Road and/or beach parking areas, including the Eddy Creek launch site, to the intersection with the railroad and continuing westerly on Max Hoeck Wildlife Drive along the north edge of the railroad to the junction with State Road 3, and continuing north along the

east side of State Road 3 to Gomez Grant Line and then easterly along Gomez Grant Line and an extension of said Grant Line across Mosquito Lagoon to the beginning. The FWS will continue to manage for refuge purposes all of the lands and waters south of the Gomez Grant Line and west of the primary dunes and Beach Road, north of the government railroad track and east of State Road 3, including the mainland, Mosquito Lagoon, and east side of the barrier island. For the purposes of this agreement, this area was designated as the 'Joint Area.'

The July 10, 1975, document also contained a note that stated the following:

Upon completion of the Playalinda Beach Access Road . . . , Article II. 1 will read as follows: The FWS shall administer those lands and waters as described in Section 5 (1) of Public Law 93-626, and both agencies agree that the line between the 'marsh and the dunes' as specified in this section shall refer specifically to the western toe of the primary dunes or eastern edge of the original sand trail between the northern boundary of the H. M. Gomez Grant Line southerly to the north end of the beach road near Camera Pad 10, and continuing southerly along the west edge of the beach road and/or beach parking areas to the intersection with State Road 402 and continuing westerly on the north edge of SR 402 to the junction of Max Hoeck Road, continuing westerly on the south edge of Max Hoeck Road to the junction with State Road 3, continuing northerly on the east side of State Road 3 to H. M. Gomez Grant Line and continue easterly along Gomez Grant Line and an extension of said Grant Line across Mosquito Lagoon to the beginning. The FWS will continue to manage for refuge purposes all of the lands and waters south of the Gomez Grant Line and west of the primary dunes and Beach Road, north of State Road 3, including

mainland, Mosquito Lagoon and west side of the barrier land." For the purposes of this agreement, this area was designated as the 'Joint Area.'

The July 10, 1975, document also included a series of stipulations, paraphrased in the following list.

- The Fire Management Plan covering the Joint Area is the overall responsibility of the U.S. Fish and Wildlife Service, although various cooperative and coordinated efforts would be undertaken as specified.
- Search-and-rescue operations in all areas of the refuge and seashore would be provided by either bureau upon request on an "as available" basis.
- The U.S. Fish and Wildlife Service would act as the lead agency in any studies in the Joint Area involving wildlife species, including species listed by federal law as threatened or endangered. All studies would be conducted under USFWS permit.
- Information and/or interpretive signs or exhibits, including costs of purchase and maintenance within the Joint Area, would be the responsibility of the National Park Service upon consultation with the U.S. Fish and Wildlife Service. Any signing or exhibits relating specifically to wildlife or the mission of the U.S. Fish and Wildlife Service would be the responsibility of the U.S. Fish and Wildlife Service upon consultation with National Park Service. All signing would be included in the USFWS sign plan for the refuge.
- Maintenance of the "sand trail," dike road, or improved dike road adjacent to the line referred to in Section 1 of the agreement would be the responsibility of the U.S. Fish and Wildlife Service. The Beach Road and parking areas, Eddy Creek boat ramp, dock, and parking area, and informational and interpretive signs related to these areas would be the maintenance responsibility of the National Park Service.

- Administration of the citrus groves in the refuge and seashore would be the responsibility of the U.S. Fish and Wildlife Service.
- Research, interpretation, and protection of archeological and historical sites in the Joint Area would be the primary responsibility of the National Park Service. Any site protection and/or development of these cultural resource sites would be coordinated with the U.S. Fish and Wildlife Service.
- The National Park Service and U.S. Fish and Wildlife Service would have shared jurisdiction in the Joint Area. The U.S. Fish and Wildlife Service would act as the lead agency in enforcement activities in the Joint Area, and any enforcement actions in the Joint Area by the National Park Service could be approved informally.
- Mosquito control coordination in Brevard County would be conducted by the U.S. Fish and Wildlife Service, and that in Volusia County will be coordinated by the National Park Service. All planned overflights by Mosquito Control personnel would be coordinated with the National Aeronautics and Space Administration and comply with existing regulations. Any changes to the Mosquito Control Agreement desired by the U.S. Fish and Wildlife Service or National Park Service within the NASA boundary would be coordinated jointly with the National Aeronautics and Space Administration and the Brevard Mosquito Control District.
- The U.S. Fish and Wildlife Service agreed to: make a specified portion of its office complex/visitor information center available to the National Park Service; provide shop or building space at the USFWS maintenance compound to the National Park Service to facilitate its field operations; and provide parking space at the maintenance compound for NPS government-owned motor vehicles and employee parking, etc.

Mutual Aid Agreements. In addition to the aforementioned agreements/memoranda of understanding, current mutual aid agreements between Canaveral National Seashore and other agencies include the following:

Volusia and Brevard Counties, Local Municipalities — Rural Fire Agreements

Brevard County Sheriff's Department — Dispatch Services (800 MHz radio system)

Volusia County Sheriff's Department — Backup dispatch services

Agreements with the National Aeronautics and Space Administration provide for back-up law enforcement patrols as well as fire and emergency medical services on an "as available basis."

The National Park Service requested and the state of Florida granted concurrent law enforcement jurisdiction to all park areas in the state. Concurrent jurisdiction was later extended to all lands within the national seashore, including NASA-owned areas.

Brevard and Volusia counties have undertaken substantial mosquito control efforts in the form of ditching and diking around the edge of Mosquito Lagoon and on some of the islands within the Lagoon. The Department of the Interior is directed to "cooperate to the fullest extent possible" with the districts by the agreement between the National Aeronautics and Space Administration and the department.

Public Law 100-564, which was enacted into law on October 31, 1988, provided for expansion of Canaveral National Seashore by authorizing the Secretary of the Interior to acquire 25 acres of land known as Seminole Rest and approximately 10 acres of land known as Stuckey's. The Seminole Rest lands were to be managed "for the primary purpose of protecting and interpreting their archaeological and historic resources," and the Stuckey's property "for the primary purpose of establishing an administrative

headquarters and visitor center within Volusia County.” Section 2 of Public Law 100-564 amended Section 9(b) of the national seashore’s enabling act by striking out “not more than \$500,000” and inserting “\$2.6 million in addition to the sums previously appropriated” as the legislative limitation for development of essential public facilities in the national seashore.

LAWS AND POLICIES

NPS Laws and Policies

There are other laws and executive orders that are applicable solely or primarily to units of the national park system. These include the 1916 Organic Act that created the National Park Service; the General Authorities Act of 1970; the act of March 27, 1978, relating to the management of the national park system; and the National Parks Omnibus Management Act (1998). See appendix B for more detail on how these laws apply at the national seashore.

The NPS Organic Act (16 *United States Code*, Section 1) provides the fundamental management direction for all units of the national park system:

“[P]romote and regulate the use of the Federal areas known as national parks, monuments, and reservations . . . by such means and measure as conform to the fundamental purpose of said parks, monuments and reservations, which purpose is to conserve the scenery and the natural and historic objects and the 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.”

The National Park System General Authorities Act (16 *United States Code* Section 1a-1 et seq.) affirms that while all national park system units remain “distinct in character,” they are “united through their interrelated purposes and resources into one national park system as cumulative expressions of a single national

heritage.” The act makes it clear that the NPS Organic Act and other protective mandates apply equally to all units of the system. Further amendments state that NPS management of park units should not “derogate[e] the values and purposes for which these various areas have been established”

The National Park Service also has established policies for all units under its stewardship. These are identified and explained in a guidance manual entitled *NPS Management Policies 2006*.

More General Laws and Policies

As well as the specific mandates and commitments and NPS-specific laws and policies just described, national park system unit managers have management guidance from various other laws and policies that direct many of the management decisions that ensure that the resources are “preserved unimpaired for present and future generations.” For example, there are laws and policies about managing environmental quality (such as the Clean Air Act, the Endangered Species Act, and Executive Order 11990 “Protection of Wetlands”); laws governing the preservation of cultural resources (such as the National Historic Preservation Act and the Native American Graves Protection and Repatriation Act); and laws about providing public services (such as the Americans with Disabilities Act)—to name only a few. In other words, a general management plan is not needed to decide that it is appropriate to protect special status species, control exotic species, protect historic and archeological sites, conserve artifacts, or provide for access for disabled persons. Laws and policies have already decided those and many other things for us. See appendix B for more detail on how these laws apply at the national seashore.

All alternatives considered in this management plan incorporate and comply with the provisions of these mandates and policies—this guidance that provides the “givens.”

BOUNDARY ADJUSTMENTS

As part of general management planning, the National Park Service is required to identify and evaluate boundary adjustments that may be necessary or desirable to carry out the purposes of the park unit. Boundary adjustments may be recommended to

- 1) protect significant resources and values, or to enhance opportunities for public enjoyment related to park purposes,
- 2) address operational and management issues, such as the need for access or the need for boundaries to correspond to logical boundary delineations such as topographic or other natural features or roads, or
- 3) otherwise protect park resources that are critical to fulfilling park purposes.

For a boundary adjustment to be recommended, at least one of the above criteria must be met. Additionally, all recommendations for boundary changes must meet the following two criteria:

- 4) The added lands will be feasible to administer considering their size, configuration, and ownership; costs; the views of and impacts on local communities and surrounding jurisdictions; and other factors such as the presence of hazardous substances or exotic species.
- 5) Other alternatives for management and resource protection are not adequate.

The 1998 General Management Plan Amendment Development Concept Plan/ Environmental Assessment for the Seminole Rest area

included a minor boundary revision and identified additional lands for acquisition. Under the approved plan amendment, the boundary would be expanded to connect the site to the rest of the national seashore, which lies 1,000 feet away across Mosquito Lagoon. This would add approximately 66 acres of submerged land in the lagoon (currently owned by the state of Florida) to the national seashore. The land would continue to be owned by the state but would be dedicated to and managed by the National Park Service. Two privately owned parcels would also be added to the national seashore pending a willing-seller situation and fund availability. Approximately 38 acres adjacent to and south of Seminole Rest would be acquired for resource preservation and to serve as an undeveloped vehicle entrance corridor along the existing River Road, and about 3.6 acres adjacent to and north of the site would be acquired to provide visitor use facilities.

No action has been taken to date to complete these minor boundary adjustments. Pending a willing-seller situation and fund availability, these minor changes are still considered valid under this general management plan. Even though all the alternatives considered under this plan do not propose developing the 3.6 acres north of the site for visitor facilities, acquisition of the land would still be sought to help protect the Seminole Rest site from any future visual/audible intrusions that may be generated by development of the adjacent site.

RELATIONSHIP OF THE GENERAL MANAGEMENT PLAN TO OTHER PLANNING EFFORTS

Several plans for areas within or near the national seashore could influence or be influenced by actions presented in this *General Management Plan / Environmental Impact Statement* and must be considered. These relevant plans and studies are listed below.

NATIONAL PARK SERVICE

Fire Management Plan

A *Fire Management Plan* for Canaveral National Seashore was written in 1998 and revised in 2007. This plan consists of a program of activities designed to meet management objectives for protection of resource values, life, and property. Naturally ignited and human-ignited wildland fires function as appropriate management tools that allow fire to perform its natural role in the environment. In addition, an *Omnibus Prescribed Fire Plan* was completed in 2009 covering NPS-managed lands. A fire management plan is a detailed document that supplements the general direction of the general management plan.

Water Resources Management Plan

A *Water Resources Management Plan*, completed 2001, provides an overview of the water resources of the national seashore, related legislation, a summary of the hydrology and hydrologic environments within the national seashore, and it identifies water-related issues. This plan was used in the production of this general management plan.

Comprehensive Interpretive Plan

A comprehensive interpretive plan for the national seashore is in draft form. Because it tiers from the general management plan, it will be completed following the issuance of the final general management plan. This plan establishes a long-range vision for the interpretation of the national seashore and outlines the short-range actions necessary to achieve that vision. It includes all personal and nonpersonal interpretive and informational services for all audiences.

U.S.FISH AND WILDLIFE SERVICE

Merritt Island National Wildlife Refuge Comprehensive Conservation Plan

Similar to the policy of the National Park Service to provide general management plans for all units of the national park system, it is the policy of the US Fish and Wildlife Service to manage all lands within the national wildlife refuge system in accordance with an approved comprehensive conservation plan. These plans outline a vision for each refuge; guide management decisions; and outline goals, objectives and strategies to achieve the visions and purposes of each refuge unit. The plans will provide other agencies and the public with an understanding of the management strategies to be implemented. Merritt Island National Wildlife Refuge completed their comprehensive management plan in 2008. Of particular interest are the goals and strategies outlined in the plan that have set the baseline for resource management and visitor use within the Joint Management Area of the national seashore, and these are considered part of the existing management framework for this area of the national seashore.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Cape Canaveral Spaceport Master Plan prepared by Team ZHA, 2002

The *Cape Canaveral Spaceport Master Plan* provides leadership vision for land use management of the entire Cape Canaveral Spaceport, the unofficial name referring to the geographic area encompassing Cape Canaveral Air Force Station and Kennedy Space Center. The purpose of this document is to anticipate future challenges and to continue to provide assured and enhanced access to outer space. Of particular concern is the area reserved for future horizontal launching facilities located just inside the national seashore along the southern national seashore boundary. Because the primary purpose of this section of the national seashore is to support the space program, portions of the national seashore may at some future point be closed to public access. Therefore, development of visitor use facilities in this area is limited.

OTHER AGENCY PLANS

Indian River Lagoon Surface Water Improvement and Management Plan

The Florida legislature enacted the Surface Water Improvement and Management (SWIM) Act in 1987 and revised it in 1991. This act declares that many natural surface water systems in Florida, including the Indian River Lagoon (IRL) system, which includes Mosquito Lagoon, have been or are becoming degraded. Factors contributing to this degradation include point and non-point sources of pollution and the destruction of natural habitats. The act directed the South Florida and St. Johns River Water Management districts (SFWMD and SJRWMD), with the cooperation of state agencies and local governments, to design and implement a plan for the improvement of surface waters and habitats in the Indian River Lagoon. The districts complied with this

mandate in the development of the 1989 SWIM plan for the Indian River Lagoon. The three major goals of that plan include the following:

- 1. To attain and maintain water and sediment of sufficient quality to support a healthy estuarine lagoon ecosystem.*
- 2. To attain and maintain a functioning healthy ecosystem which supports endangered and threatened species, fisheries, commerce and recreation.*
- 3. To achieve heightened public awareness and coordinated interagency management of the Indian River Lagoon ecosystem.*

The 1989 SWIM plan was updated in 1994 and most recently in 2002. The 2002 update (Steward 2003) includes a status report on the state of the lagoon, a summary of progress on projects undertaken since the last update, and recommendations for future projects and other actions. Programs of interest for national seashore resource management include the seagrass and water quality program and the coastal wetlands program.

The seagrass and water quality program focuses on assessing the health of the lagoon's seagrass resource, defining impacts to this resource, setting restoration targets or performance measures, and recommending and evaluating strategies to achieve those targets. The St. Johns River Water Management District performs aerial reconnaissance and mapping of Mosquito Lagoon every two-three years to enable the detection of any short-term changes. Areas of seagrass loss or gain are determined by comparison with previous year's coverage. The ground transects extending across the seagrass beds are also monitored semiannually by the St. Johns River Water Management District to monitor changes.

The coastal wetlands program is engaged in the rehabilitation of impacted coastal wetlands, with a focus on reconnecting and managing mosquito control impoundments.

Canaveral National Seashore's *Water Resources Management Plan* (NPS 2001c) states the need to coordinate with other agencies on improving the management of land use and user activities throughout the watershed to better protect national seashore resources. Seashore staff will pursue opportunities for conducting cooperative studies on possible impacts to seagrass and water quality (e.g., septic tank discharge and commercial and recreational uses in Mosquito Lagoon). The St. Johns River Water Management District has reviewed the plan with NPS staff for possible collaboration on such studies, particularly those that may help answer some questions relative to the troubling water quality trends revealed in the southern Mosquito Lagoon.

Indian River Lagoon Comprehensive Conservation and Management Plan

With the Environmental Protection Agency's designation of the Indian River Lagoon as an "estuary of national significance," the Indian River Lagoon National Estuary Program (IRL NEP) was established. The plan covers the entire 156-mile length of the Indian River Lagoon; Canaveral National Seashore and Mosquito Lagoon comprise the northern section. This program is a nonregulatory, stakeholder-driven, collaborative approach to coastal watershed restoration and protection based on the following four cornerstones:

1. a watershed focus that moves beyond political jurisdictions,
2. integration of good science with sound decision-making,
3. collaborative problem-solving, and
4. public involvement

In 1996, a *Comprehensive Conservation and Management Plan* was developed in close coordination with the goals and objectives of the Indian River Lagoon SWIM plan described above. The 2008 plan update

reviewed the original action items in the 1996 plan to determine if they were still relevant, identified the need for new actions, described the goal and objectives to address new concerns, reviewed the prioritization of action items, and updated the financing mechanism.

Mosquito Lagoon Aquatic Preserve Management Plan

In Volusia County, the Mosquito Lagoon Aquatic Preserve includes 4,740 acres of submerged lands and islands of Mosquito Lagoon. Immediately adjacent to the northern boundary of the national seashore, the aquatic preserve provides an extended buffer zone to the northern portion of Mosquito Lagoon in the national seashore.

The Mosquito Lagoon Aquatic Preserve is part of a network of 41 aquatic preserves designated in the state of Florida whose purpose is to preserve aquatic areas of exceptional biological, aesthetic, and scientific values as sanctuaries. Aquatic preserves are managed on behalf of the state by the Florida Department of Environmental Protection's Office of Coastal and Aquatic Managed Areas. This preserve management plan was improved and updated in 2009.

The Mosquito Lagoon Aquatic Preserve fosters strong working partnerships with multiple agencies, including the National Park Service, and researchers, and as needed supports research projects and monitoring programs. The preserve also supports multi-agency efforts to restore wetland impoundments and seagrass habitat. Education and outreach is another management focus area that encourages responsible recreational use and promotes public participation in the stewardship of the preserve. The preserve works directly with Canaveral National Seashore on projects of mutual concern such as exotic plant control, water quality monitoring, and salt marsh restoration.

INTRODUCTION

This chapter presents four alternatives, including the NPS preferred alternative, for future management of Canaveral National Seashore. The alternatives were developed in concert with an ongoing public involvement process, described in detail in “Chapter 5: Consultation and Coordination.” The four alternatives, each of which is consistent with the national seashore’s purpose, significance, and fundamental resources and values, are **alternative A, continue current management trends** (“no-action” alternative); **alternative B** (NPS preferred alternative); **alternative C; and alternative D.** The no-action alternative is included as a baseline for comparing the environmental consequences of implementing each “action” alternative. To truly understand the implications of an

alternative, it is important to combine the national seashore-wide desired conditions and management strategies and servicewide laws and policies described in chapter 1 with the management actions described in each alternative.

This chapter also includes sections on implementation of the general management plan, management zones, user capacity, mitigative measures common to all action alternatives, and the environmentally preferred alternative. A table that compares the attributes of each alternative and another that compares the anticipated environmental consequences of implementing each alternative is provided at the end of the chapter.

IMPLEMENTATION OF THE GENERAL MANAGEMENT PLAN

IMPLEMENTATION FUNDING

Although this general management plan provides the analysis and justification for future national seashore funding proposals, this plan does not guarantee future NPS funding. Many actions would be necessary to achieve the desired conditions for natural resources, cultural resources, recreational opportunities, and facilities as envisioned in this plan. The National Park Service will request funding to achieve these desired conditions; although hoping to secure this funding and preparing accordingly, the national seashore may not receive enough funding to achieve all desired conditions. Because NPS funding may be insufficient to accomplish the goals set by the plan, national seashore managers will need to continue to pursue other options, including expanding the

service of volunteers, drawing upon existing or new partnerships, and seeking alternative funding sources, including the philanthropic community. Many people care deeply about their national parks, and these people are likely to continue to offer assistance in meeting NPS goals that matter most to them. Many potential partner groups exist whose missions are compatible with that of the national seashore, and these groups are likely to offer to work with NPS staff for mutual benefits.

Even with assistance from supplemental sources, national seashore managers may be faced with difficult choices when setting priorities. The general management plan provides the framework within which to make these choices.

MANAGEMENT ZONES

Management zones describe how different areas of the national seashore would be managed. Each management zone specifies complementary natural resource conditions, cultural resource conditions, opportunities for visitor experiences, and appropriate facilities, and combines these into a possible management strategy that could be applied to locations within the national seashore. As such, management zones give an indication of the management priorities for various areas.

The following seven management zones have been developed for the national seashore—visitor orientation/NPS administration, environmental/historical education, recreation, backcountry, sensitive resource,

NASA security/safety clearance, and joint management area. The action alternatives presented later in this chapter each propose a different configuration of the management zones within the national seashore based on the concept for each alternative. In every management zone, the national seashore intends to preserve and protect natural and cultural resources to the greatest extent possible given available funds. An overview of the management zones is provided on the following pages, with more detail in tables 1 and 2 that follow. The tables describe desired resource conditions, allowable visitor opportunities and activities, and the appropriate level of development for each management zone.

Visitor Orientation/NPS Administration Zone

This zone includes most facilities dedicated to visitor information/orientation and national seashore management. The zone would receive a high level of visitor use.



Environmental/Historical Education Zone

This zone would contain resources that are both environmental and historical with high interpretive or educational value. These areas would receive occasional high visitor use.



Recreation Zone

This zone is primarily used by visitors for active and passive recreational opportunities, most often associated with the surrounding waters. This zone includes some of the most heavily used areas of the national seashore.



Backcountry Zone

This zone allows visitors to access areas of the national seashore that provide a more solitary, tranquil opportunity to experience the sights, smells, and sounds of nature.



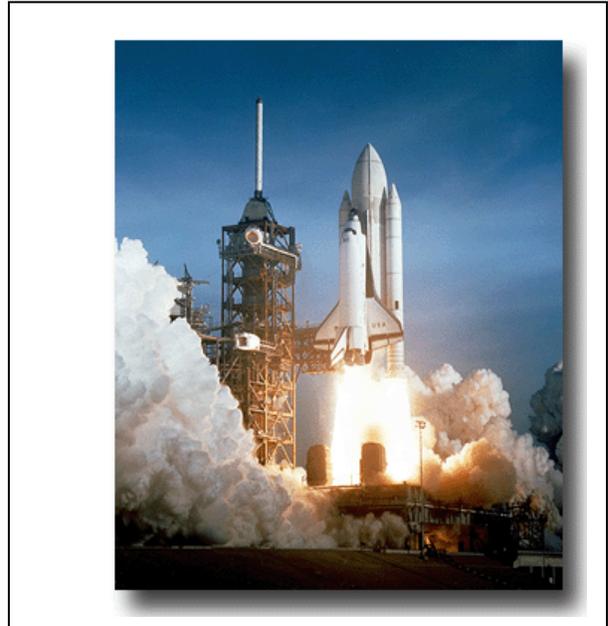
Sensitive Resource Zone

This zone protects primarily natural resources that are sensitive to or easily damaged by human use, such as the dune ridge between the Atlantic and Mosquito Lagoon. Visitor access into this zone would be restricted to designated trail corridors. Access beyond designated trail corridors would be by special permit only.



NASA Security/Safety Clearance Zone

This zone is periodically closed to all visitors before and during a launch. Access would be by special permit only.



Joint Management Area

This zone encompasses the portion of Merritt Island National Wildlife Refuge that overlaps the southern two thirds of the national seashore. The area is principally managed for wildlife and wildlife habitat



TABLE 1: MANAGEMENT ZONES

	Visitor Orientation/NPS Administration Zone	Environmental/Historical Education Zone
Overview	This zone includes most facilities dedicated to visitor information / orientation and national seashore management. The zone would receive a high level of visitor use.	This zone would contain resources that are both environmental and historical with high interpretive or educational value. These areas would receive occasional high visitor use.
Natural Resource Conditions	Impacts resulting from visitor use and administrative facilities would be minimized to the extent possible. Any new development would be sited and designed to minimize impacts and to be compatible with its environment. Natural sights and sounds would be diminished by human sights and sounds. Fires would be suppressed. Noxious invasive species would be managed to the fullest extent possible.	Natural resources would be managed to highlight their interpretive and educational values. Impacts resulting from visitor use and administrative facilities would be minimized to the extent possible. Any new development would be sited and designed to minimize impacts and to be compatible with the natural environment or with the historic landscape. Natural sights and sounds would be diminished by human sights and sounds. Fires would be suppressed. Noxious invasive species would be managed to the fullest extent possible.
Cultural Resource Conditions	National register listed (or eligible) properties would be preserved or rehabilitated to accommodate visitor use and national seashore operations.	National register listed (or eligible) properties would be preserved, rehabilitated to accommodate another interpretive or educational use, or restored to a historic state. The historic character of the surrounding landscape would be protected.
Visitor Opportunities and Access	This zone would be the primary orientation area where overall interpretive themes are introduced to the visitor. Exhibits, formal talks, walks, guided hikes, and other organized or self-directed visitor opportunities would occur in this zone. Public use would be limited in certain parts of this zone, such as NPS maintenance and administrative facility areas.	Visitors would be exposed to a variety of on-site interpretive services designed to enhance educational exploration of the national seashore. Visitor opportunities would include programs, guided tours, talks and roving rangers, self-guided activities, viewing and learning about the national seashore's flora, fauna, and cultural resources. Visitor use would be managed to prevent resource damage.
Visitor Skill Levels Needed	None required.	None required.
NPS Management Activities	This is the primary zone for NPS visitor, administrative, and maintenance facilities. When appropriate, management actions—especially those related to resource management—would be interpreted. NPS staff would be on-site.	This is the primary zone for NPS visitor educational and interpretive facilities and activities. NPS management activities would include those necessary to preserve and protect resources. When appropriate, management actions—especially those related to resource management—would be interpreted. NPS staff would often be on-site.

Table 1: Management Zones

	Visitor Orientation/NPS Administration Zone	Environmental/Historical Education Zone
Commercial Services	Commercial services that support visitor use and NPS administrative activities would be appropriate if compatible with desired resource conditions and visitor experience goals.	Commercial services that support visitor use and NPS administrative activities would be appropriate if compatible with desired resource conditions and visitor experience goals.
Types of Facilities	<p>Facilities would reflect a high level of development for the purposes of meeting visitor orientation and NPS administrative needs. Visitor facilities could include orientation centers, visitor centers, museums, historic buildings, comfort stations, boat ramps, formalized interpretive trails, picnic areas, paved and unpaved roads, and parking. Formalized design features such as boardwalks or signs would be used to help manage the high level of use within this zone. Appropriate administrative facilities could include staff and/or volunteer housing, maintenance, storage, offices, roads, parking areas, RV trailer pads, and comfort stations.</p> <p>Adaptive reuse of facilities would be encouraged before initiating new development.</p> <p>If new development is needed, it would reflect thoughtful design in composition, setting, structure, and materials indigenous to the area. Areas of low resource sensitivity would be targeted. If appropriate, some facilities could be located outside national seashore boundaries.</p>	<p>Facilities would reflect a moderate level of development for the purposes of enhancing visitor understanding and education of the national seashore's vast array of environmental and historical resources. The range of facilities might include historic buildings, roads, parking areas, boat ramps, courtesy docks, comfort stations, surfaced trails to direct use and access, boardwalks, wildlife blinds, viewing decks, pavilions, interpretive panels, kiosks, bulletin boards, navigation aids, and signs.</p> <p>Adaptive reuse of facilities would be encouraged before initiating new development.</p> <p>If new development is needed, it would reflect thoughtful design in composition, setting, structure, and materials indigenous to the area. Areas of low resource sensitivity would be targeted.</p>

Table 1: Management Zones (cont.)

	Recreation Zone	Backcountry Zone
Overview	This zone is primarily used by visitors for active and passive recreational opportunities, most often associated with the surrounding waters. This zone includes some of the most heavily used areas of the national seashore. It applies to both terrestrial and aquatic areas of the national seashore, including off-shore waters extending to the national seashore boundary 0.5 miles into the Atlantic Ocean.	This zone allows visitors to access areas of the national seashore that provide a more solitary, tranquil opportunity to experience the sights, smells, and sounds of nature. This zone applies to both terrestrial and aquatic areas of the national seashore, including off-shore waters extending to the national seashore boundary 0.5 miles into the Atlantic Ocean.
Natural Resource Conditions	The natural setting would be maintained and natural processes encouraged. Noxious invasive species would be managed to the fullest extent possible. The natural landscape could be modified to allow development of scenic vistas, allow visitor access and use, or to allow resource protection activities. Natural sights and sounds could be diminished by human sights and sounds. Natural fires would be suppressed.	Activities designed to preserve and maintain an intact ecosystem would be implemented. Restoration of degraded or impacted resources would occur. Otherwise, natural processes would be allowed to continue. Natural sights and sounds would prevail. Fires would be suppressed unless prescribed for ecosystem management. Noxious invasive species would be managed to the fullest extent possible.
Cultural Resource Conditions	National register listed (or eligible) properties would be preserved or rehabilitated to accommodate another function appropriate to the recreational emphasis of the zone. The historic character of the surrounding landscape would be protected.	National register listed (or eligible) properties would be preserved or rehabilitated to accommodate another backcountry use.
Visitor Opportunities and Access	<p>Visitors could hike, take scenic drives and boating trips, participate in beach activities and surf fishing, take photographs, study nature, picnic, and surf. Limited horseback riding could occur in designated areas. Interpretation would be provided through informal programs, guided tours, talks, roving rangers, and waysides.</p> <p>Visitation levels would be low to high. Levels could be highest at access locations throughout this zone.</p> <p>Visitor use would be managed to limit resource impacts.</p>	<p>Visitors could explore natural elements of the national seashore with minimal distraction from modern intrusions or other visitors. Boating in nonmotorized boats would be permitted in this zone, and some areas may also be designated poll/troll areas. Visitors could also participate in beach activities, study nature, hike, take photographs, camp in primitive camping area, and fish. Limited horseback riding could occur in designated areas. Minimal on-site interpretation would be related to management and protection of natural and cultural resources.</p> <p>Visitor access would be primarily by non-motorized means such as hiking, kayaking, and canoeing. Marked channels to allow controlled motorized access could be designated. Visitation levels would be low. Visitor use would be dispersed throughout the zone.</p> <p>Visitor use would be managed to limit resource impacts.</p>
Visitor Skill Levels	Visitors would need to be self-sufficient and have an understanding of opportunities and	Visitors would need to be self-sufficient and have an understanding of backcountry

Table 1: Management Zones

	Recreation Zone	Backcountry Zone
Needed	hazards associated with natural seashore lands and waters. Challenge, adventure, and discovery would be greatest further away from basic facilities.	etiquette and skills to safely experience this portion of the national seashore.
NPS Management Activities	On-site NPS management would be provided to help support the basic needs of visitors—such as access, information, and public health and safety. NPS staff would periodically patrol.	Periodic on-site NPS management activities would include mitigation of threats to resources and public safety. NPS staff would periodically patrol.
Commercial Services	Commercial services that support visitor use and NPS administrative activities could be provided if compatible with resource conditions and visitor experience goals. Guided fishing would be restricted and capped in 2013 in the Joint Management Area as outlined in the USFWS <i>Comprehensive Conservation Plan</i> . Commercial harvesting would be eliminated in the Joint Management Areas by 2018 as also outlined in the plan. Guided and unguided recreational fishing might be allowed in designated areas. The National Park Service would develop a plan for management of the fisheries in adjacent national seashore waters in relation to the USFWS plans.	Limited commercial services that support visitor use and NPS administrative activities could be provided if compatible with resource conditions and visitor experience goals. Guided fishing would be restricted and capped in 2013 in the Joint Management Area as outlined in the USFWS <i>Comprehensive Conservation Plan</i> . Commercial harvesting would be eliminated in the Joint Management Areas by 2018 as also outlined in the plan. Guided and unguided recreational fishing might be allowed in designated areas. The National Park Service would develop a plan for management of the fisheries in adjacent national seashore waters in relation to the USFWS plans.
Types of Facilities	Facilities would reflect a moderate level of development, particularly at key entry points for the purposes of safely accommodating recreational activities and protecting national seashore resources. The range of facilities may include roads, parking areas, boat ramps, courtesy docks, small-scale fishing piers, comfort stations, surfaced trails to channel use and access, boardwalks, interpretive panels, kiosks, bulletin boards, navigation aids, and signs. Adaptive reuse of facilities would be encouraged before initiating new development. If new development is needed, it would reflect thoughtful design in composition, setting, structure, and materials indigenous to the area. Areas of low resource sensitivity would be targeted for development of facilities.	Facilities generally would not be provided except for the protection of resources. Trail structures for resource protection might include sand ladders and narrow boardwalks for visitor access across the dunes. Other small-scale structures for resource protection might include limited signs to designate primitive campsites, fire rings, picnic tables, navigational aids and markings for water corridors, courtesy docks and mooring areas, markings for turtle nests, etc.

Table 1: Management Zones (cont.)

	Sensitive Resource Zone	NASA Security / Safety Clearance Zone	Joint Management Area Zone
Overview	This zone protects primarily natural resources that are sensitive to or easily damaged by human use, such as the dune ridge between the Atlantic and Mosquito Lagoon. Visitor access into this zone would be restricted to designated trail corridors. Access beyond designated trail corridors would be by special permit only.	This zone is periodically closed to all visitors before and during a launch. Access would be by special permit only.	This zone encompasses the portion of Merritt Island National Wildlife Refuge that overlaps the southern two thirds of the national seashore. The area is principally managed for wildlife and wildlife habitat.
Natural Resource Conditions	The natural environment would be managed to preserve and protect exceptional and critical ecosystems, habitats, and processes. Noxious invasive species would be managed to the fullest extent possible. Fires would be suppressed unless prescribed for ecosystem management purposes.	The natural environment could be modified to accommodate NASA or NPS support facilities or activities. Otherwise, natural conditions and natural processes would predominate. Noxious invasive species would be managed to the fullest extent possible. Fires would be suppressed unless prescribed for ecosystem management purposes.	This zone would be managed primarily under USFWS management guidelines with cooperation from the National Park Service. The natural environment would be managed to preserve and protect exceptional and critical ecosystems, native wildlife, habitat diversity, and natural processes. Migratory shorebird and waterfowl habitat would be preserved and enhanced. Noxious invasive species would be managed to the fullest extent possible. Fires would be suppressed unless prescribed for ecosystem management purposes.
Cultural Resource Conditions	National register listed (or eligible) properties and associated landscapes would be preserved or rehabilitated commensurate with the sensitive nature of the resources in this zone.	National register listed (or eligible) properties would be preserved or rehabilitated.	National register listed (or eligible) properties would be preserved or rehabilitated. Cultural resources might be adapted to accommodate interpretive and educational efforts. In consultation with refuge staff, NPS staff would continue to take the lead in research, interpretation, and protection of archeological and historic sites.
Visitor Opportunities and Access	Visitation would be restricted in this zone to protect sensitive resources. Any and all visitor activities would be highly directed or led by NPS guides. The significance of the	Visitation would be restricted in this zone, consistent with NASA security needs. Visitors would be able to see the area from roadside pulloffs with associated interpretive signs.	Visitor opportunities would include wildlife viewing, fishing, motorized and nonmotorized boating, nature study, and photography. Interpretation would include a

Table 1: Management Zones

	Sensitive Resource Zone	NASA Security / Safety Clearance Zone	Joint Management Area Zone
Visitor Opportunities and Access (continued)	<p>resources would primarily be interpreted in the visitor orientation/ NPS administration zone through interpretive and educational exhibits and programs.</p> <p>Visitor access would be restricted or highly directed and controlled over established pathways.</p>	<p>Additional resource information would be available in the visitor orientation/ NPS administration zone.</p>	<p>combination of on-site interpretation (i.e., occasional wayside exhibits, brochures) and off-site interpretation in the visitor orientation/ NPS administration zone.</p> <p>Visitation levels would be low to high. Levels could be highest at access locations throughout this zone.</p>
Visitor Skill Levels Needed	<p>Minimal as visitors must stay on existing trails.</p>	<p>None required.</p>	<p>In some areas, visitors would need to be self-sufficient and have an understanding of the opportunities and hazards associated with national seashore lands and waters. Challenge, adventure, and discovery would be greatest further away from basic facilities.</p>
Management Activities	<p>NPS staff and other researchers would occasionally be present and involve permitted research and monitoring activities, mitigation of threats to resources, and improving habitat for targeted species.</p> <p>NPS staff would periodically patrol.</p>	<p>NPS staff and permitted activities would occasionally be present and involve NASA security; other concerns would include public safety, research and monitoring activities, and mitigation of threats to resources.</p> <p>NPS staff would periodically patrol.</p>	<p>NPS and USFWS staff and other researchers would occasionally be present and involve permitted research and monitoring activities, mitigation of threats to resources, improvement of habitat for targeted species, and efforts to improve public safety.</p> <p>There would be USFWS patrols with assistance from NPS staff when requested.</p>
Commercial Services	<p>Not available.</p>	<p>Not available.</p>	<p>Commercial services would be managed in accord with the <i>USFWS Comprehensive Conservation Plan</i>.</p>
Types of Facilities	<p>Facilities would be limited to those essential for resource protection, research, and monitoring purposes.</p>	<p>Facilities would be limited to those essential for NASA security, resource protection, research, and monitoring purposes.</p>	<p>Facilities would reflect a low level of development, particularly at key entry points for safely accommodating recreational activities and protecting national seashore resources. Facilities might include roads, parking areas, wayfinding and interpretive signs. Other facilities might be developed for resource protection and research.</p>

TABLE 2: VISITOR ACTIVITIES AND DEVELOPMENTS BY MANAGEMENT ZONE

An “X” means the activity occurs. A blank means the activity does not occur. Text explains exceptions.

TYPES OF VISITOR ACTIVITIES AND DEVELOPMENTS	Visitor Orientation / NPS Administration	Environmental / Historical Education	Recreation	Backcountry	Sensitive Resource	NASA Security/Safety Clearance	Joint Management Area
Orientation	X						
Interpretation	X	X	X	minimal, on-site in Bill’s Hill only	off-site		off-site; minimal on-site
Guided Tours	X	X	X	X	limited		X
Motor Touring		X	X				X
Motorized Transportation	X	X	X				X
Bicycling			X				limited
Hiking / Walking	X	X	X	X	only over designated dune crossover trails		X
Horseback Riding			Bill’s Hill; Apollo Beach (limited)	Bill’s Hill only			
Boating – Motorized & Nonmotorized	X	X	X	nonmotor only			X
Pole / Troll			X	X			X
Canoeing / Kayaking	X	X	X	X			X
Fishing – Recreational		X	X	X			X
Fishing – Commercial			X	X			X
Sightseeing / Nature Study	X	X	X	X		roadway pullouts	X
Photography	X	X	X	X			X
Sunbathing / Swimming			X	X			X
Camping		X	X	X			
Picnicking	X		X	X			

Table 2: Visitor Activities by Management Zones

TYPES OF VISITOR ACTIVITIES AND DEVELOPMENTS	Visitor Orientation / NPS Administration	Environmental / Historical Education	Recreation	Backcountry	Sensitive Resource	NASA Security/Safety Clearance	Joint Management Area
Special Events	X	X	limited locations				
Scientific Research	X	X	X	X	X	occasional	X
Commercial Services	X	X	X	limited			limited
Alternative Transportation	X	X	X				X
Roads	X	X	X			administrative use only	X
Parking Areas	X	X	X				X
Boardwalks	X	X	X	X	X		X
Trails – Paved	X	X	X				X
Trails – Unpaved	X	X	X	X			X
Trails – Horse use			Bill's Hill, Apollo Beach (limited)	Bill's Hill only			
Boat Ramps	X	X	X				X
Docks	X	X	X	X			
Navigational Aids		X	X	X			
Signs	X	X	X	minimal			minimal
Kiosk		X	X				
Wayside Exhibits	X	X	X	Bill's Hill only	X	roadway pullouts	minimal
Viewing Decks	X	X	X		X		
Campsites – Primitive				X			
Comfort Stations	X	X	X				X
Concession Facilities	X	X	X				
Shelters	X	X					
Picnic Areas	X		X	tables			

CHAPTER 2: ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

TYPES OF VISITOR ACTIVITIES AND DEVELOPMENTS	Visitor Orientation / NPS Administration	Environmental / Historical Education	Recreation	Backcountry	Sensitive Resource	NASA Security/Safety Clearance	Joint Management Area
Visitor Center, Headquarters, Maintenance, Ranger Station, Storage	X					NASA structures, maintenance, ranger station, lifeguard, management	
Research Facilities	X	X	X	unobtrusive	unobtrusive		X
Staff Housing	X	X					

VISITOR USE MANAGEMENT

The National Park Service defines user capacity as the types and levels of visitor use that can be accommodated while sustaining the quality of park resources and visitor experiences consistent with the purposes of the park. General management plans for national park system units are required by law to identify and address implementation commitments for user capacity, also known as carrying capacity. Managing user capacity in national parks is inherently complex and depends not only on the number of visitors, but also on where they go, what they do, and the “footprints” they leave behind. In managing for user capacity, the park staff and partners rely on a variety of management tools and strategies rather than relying solely on regulating the number of people in a park or simply establishing limits on visitor use. In addition, the ever-changing nature of visitor use in parks requires a deliberate and adaptive approach to user capacity management.

The foundations for making user capacity decisions in this general management plan are purpose, significance, special mandates and management zones. The purpose, significance, and special mandates define why the national seashore was established and identify the most important resources and values, including visitor opportunities that would be protected and provided. The management zones in each alternative describe the desired resource conditions and visitor experiences, including appropriate types of activities and general use levels, for different locations throughout the national seashore. The zones, as applied in the alternatives, are consistent with and help the national seashore achieve its specific purpose, significance, and special mandates. As part of the National Park Service’s commitment to implement user capacity, the national seashore staff would abide by these directives for guiding the types and levels of visitor use that would be accommodated while sustaining the quality of national

seashore resources and visitor experiences consistent with the purpose of the national seashore.

In addition to these important directives, this plan also includes indicators and standards for the national seashore. Indicators and standards are measurable variables that would be monitored to track changes in resource conditions and visitor experiences. The indicators and standards help NPS staff ensure that desired conditions are being attained, supporting the fulfillment of the national seashore’s legislative and policy mandates. The general management plan also identifies the types of management actions that would be taken to achieve desired conditions, and related legislative and policy mandates.

User capacity decision making is a form of adaptive management. It is an iterative process in which management decisions are continuously informed and improved by monitoring the indicators and standards. Adjustments are made as appropriate. As monitoring of the national seashore’s conditions continues, managers may decide to modify or add indicators if better ways are found to measure important changes in resource and social conditions. Information on the NPS monitoring efforts, related visitor use management actions, and any changes to the indicators and standards would be available to the public.

Canaveral National Seashore is a popular, highly visited national park system unit, with extensive and diverse visitor opportunities that are in great demand. In addition, the national seashore contains unique natural and cultural resources including oyster reefs, seagrass, and dune vegetation that are highly vulnerable to visitor use impacts. Further, visitor use opportunities occur over an extensive area of land and water with multiple access points, use areas, and types of resources that make regulating use levels,

activities, and patterns complex. Managing user capacity in this unique setting is highly challenging.

For all areas of the national seashore, the management zones provide the most important implementation commitment for user capacity, because they describe the desired resource conditions and visitor experiences — including appropriate types and levels of use, visitor services, and development — for all sites within the national seashore. These management zones are consistent with and help achieve the national seashore’s purpose, significance, and special mandates. Further, there are many existing visitor use management strategies already in use that would continue to be implemented to help NPS staff achieve these desired conditions. Examples of some of these existing management strategies include the following:

- visitor education on low-impact practices (e.g., Leave No Trace principles)
- maximum group size limits (e.g., no more than 10 people at campsite 4)
- closure of sensitive resource areas (e.g., no visitor access to vegetated dune areas)
- regulations on visitor activities (e.g., beach access restricted to dune walkovers)
- permit requirements (e.g., all access in the backcountry requires a permit)

In addition to the implementation commitments for the desired conditions, NPS staff have selected user capacity indicators and standards. Table 3 includes the indicators, standards, and potential future management strategies (allocated by management zones) that would be implemented as a result of this planning effort. The planning team considered many potential issues and related indicators that would identify impacts of concern, but those described below were considered the most salient given the importance and

vulnerability of the resource or visitor experience affected by visitor use. These indicators were also evaluated for their feasibility with regards to long-term evaluation. Standards that represent the management decision on the minimum acceptable condition for each indicator were then assigned, taking into consideration the qualitative descriptions of the desired conditions, data on existing conditions, relevant research studies, staff management experience, current management policies, and scoping on public preferences.

The priority resource indicators for Canaveral National Seashore are associated with the following issues:

- impacts from boat activities on seagrass and oyster reefs
- amount of auto use
- levels of visitor use in the backcountry
- resource impacts on campsites

The conditions of these resources are already being monitored and managed in various forms, but the indicators identified below would help NPS staff track specific influences to these resources as a result of visitor use.

Impacts on seagrass from visitor activities include scarring from propellers, vessel groundings, and anchoring. These impacts can be widespread, with dense scarring found in more shallow depths and near areas that are heavily used by boats. The loss of seagrass from boating activities is a significant concern because seagrass beds are highly productive and provide food and shelter to a host of animals including macroinvertebrates, manatees, sea turtles, and many fish species, including the highly sought red drum (*Sciaenops ocellatus*) and common snook (*Centropomus undecimalis*). In fact, Mosquito Lagoon is considered one of the most diverse and productive estuaries in North America. In addition, minimizing propeller scarring from seagrass through

TABLE 3: INDICATORS, STANDARDS, AND POTENTIAL MANAGEMENT STRATEGIES

General Visitor Impact Topic	Indicators	Assigned Zone	Recommended Standard	Potential Management Strategies
<i>Levels of use in the backcountry beach areas, which influences opportunities for solitude, resource conditions, and visitor safety</i>	Number of people per day in Klondike Beach	Backcountry	No more than 25 people per day accessing Klondike Beach by way of Apollo Beach No more than 25 people per day accessing Klondike Beach by way of Playalinda Beach	Continue permitting system to these areas of the national seashore. Greater efforts towards public education on NPS regulations and to encourage voluntary redistribution of use. (Visitors would have knowledge and appreciation to space themselves out on the beach, to preserve their own and others' experiences, rather than dictating spacing through site management such as designated camping areas.) Better posting of regulations for access to these areas. Increased enforcement.
<i>Levels of overnight use, which influences opportunities for solitude and resource conditions</i>	Number of groups per campsite	Backcountry	No more than one group* at any one time at each designated campsite *Each campsite has an existing group size limit that would continue to be enforced	Continue permitting system for backcountry camping. Greater efforts towards public education on regulations and campsite availability. Better posting of regulations for access to campsites. Increased enforcement.
<i>Amount of auto use in the national seashore, which influences resource conditions (e.g., unauthorized parking in nondesignated areas) and crowding conditions on the beach</i>	Number of cars in the national seashore	Recreation	No additional cars in any district beyond the authorized number of spaces for each parking lot	Continue to actively redistribute auto use to areas with available parking. Greater efforts towards public education on regulations and toward encouraging voluntary redistribution of use (includes advanced planning information that encourages visitation to lesser-used areas or at off-peak times). Provide real-time information on parking availability. Continue temporary district gate closures when parking lots are full for that district. Evaluate alternative modes of transportation access to the national seashore.

General Visitor Impact Topic	Indicators	Assigned Zone	Recommended Standard	Potential Management Strategies
<i>Amount of prop scarring</i>	Level of scarring* *exact metric to be determined in collaboration with the St. Johns Water Management District, state of Florida, and the US Fish and Wildlife Service	Recreation Backcountry	The recommended standard is to be determined in collaboration with the St. Johns Water Management District, state of Florida, and the U.S. Fish and Wildlife Service based on recent and upcoming baseline condition assessments (Dynamac 2008)	Greater efforts towards education and awareness of regulations and sensitive resources. Increase in staff and greater enforcement of regulations. Better posting of regulations, including pole/troll areas. Better marking of shallows, and other improved aids to navigation. Expansion of pole/troll areas. Increased idle or slow-speed zones. Mandatory education and/or permits. Access limitations (e.g., regulations for sizes of boats) and/or area closures.
<i>Influence of boat wakes on oyster reefs</i>	Change in oyster reef mortality (extent of visible dead shells) at individual reefs, both adjacent to primary boat corridors and in the national seashore's more remote waters * Problem analysis would be needed to isolate visitor-caused impacts from naturally caused oyster reef mortality.	Recreation Backcountry	No more than a 5% increase in mortality above the 2009 baseline for any individual oyster reef directly adjacent to any of the following primary boat channels: Old Channel, Government Cut, Slippery Creek, and Shotgun No additional mortality above the 2009 baseline for any individual oyster reef in the national seashore's more remote waters (any reefs not directly adjacent to the primary boat channels as noted in the above standard)	Greater efforts towards education and awareness of regulations and sensitive resources. Increase in staff and greater enforcement of regulations. Better posting of regulations, including pole/troll areas. Better marking of shallows, and other improved aids to navigation. Expansion of pole/troll areas. Increased idle or slow-speed zones. Mandatory education and/or permits. Access limitations (e.g., regulations for sizes of boats) and/or area closures.

Table 3: Visitor Use Management

General Visitor Impact Topic	Indicators	Assigned Zone	Recommended Standard	Potential Management Strategies
Resource impacts associated with camping activities	Maximum campsite size in square feet	Backcountry	Achieve and maintain at least 80% of natural campsites within 500-750 square feet; achieve and maintain at least 80% of man-made campsites within 1,000 to 1,550 square feet.	Increase education on campsite regulations and Leave-No-Trace techniques. Relocate campsites to more durable and naturally constrained areas. Increase site management and maintenance (e.g., site boundary delineation, site ruination of periphery areas). Further regulate group size limitations per campsite. Designate use areas (e.g., tenting, cooking). Add visitor facilities (e.g., picnic tables, primitive toilets).
Resource impacts associated with camping activities	Number of fire and latrine sites on each campsite	Backcountry	No more than 15% of campsites with more than one fire and one latrine site	Increase education on campsite regulations and Leave-No-Trace techniques. Designate use areas (e.g., tenting, cooking). Add visitor facilities (e.g., picnic tables, primitive toilets). Regulate activities (e.g., no open fires). Consider permanent or temporary closures of sites

proactive management of boating activities is important because although active restoration of damaged seagrass communities is technically possible, it is expensive and time consuming (NPS, 2008d).

Recent assessments of propeller scarring of seagrass have been conducted in the south end of Mosquito Lagoon for the Merritt Island National Wildlife Refuge. The National Park Service is currently coordinating with the U.S. Fish and Wildlife Service, the St. Johns Water Management District, and the Florida Department of Environmental Protection to expand this propeller scarring assessment, using the same methodology, to the seagrass beds within the boundaries of the national seashore. This baseline assessment will not

be completed in time for consideration during this plan, but the National Park Service is committed to further development of the indicator(s) and standard(s) for propeller scarring in coordination with these other managing entities upon completion of the assessment.

Given the importance of this issue to the health of the lagoon and the need to strategically and comprehensively manage boating activities, NPS staff believe that a coordinated and long-term approach to this issue is necessary and prudent. Some of the management activities that NPS staff have already been employing in relation to this issue include visitor education, regulation of watercraft in specific areas, speed zones, and channel marking. Further, this general management plan calls for the addition of

poll/troll areas to the lagoon to minimize the extent and intensity of propeller scarring. This is a management technique that is becoming more regularly applied throughout Florida's coastal areas, and has also recently been employed in the national wildlife refuge (NPS 2008d).

Visitor use impacts from boating activities can also disturb the health and extent of oyster reefs in the intertidal and subtidal zones in the northern portion of Mosquito Lagoon. The reefs in the northern end of the lagoon are declining along the outer edges, and research by Dr. Linda Walters at the University of Central Florida has indicated that the reef decline may be influenced by boat wakes (Walters et al. 2007). Ray Grizzle from the University of New Hampshire has mapped the oyster reefs within Mosquito Lagoon and has found a 9.1% mortality amongst the oyster reef segments (2000 personal communication Ray Grizzle to John Stiner). The indicator and standard for oyster reef mortality was developed in consultation with the oyster reef experts that have been conducting research in the lagoon for a number of years. Similar to the strategies used to minimize propeller scarring of seagrass, the National Park Service has already been employing a variety of management techniques in relation to this issue—including visitor education, regulations on size and types of watercraft in specific areas, speed zones, and channel marking.

The national seashore is home to several types of nesting sea turtles including the loggerhead sea turtle (*Caretta caretta*), green sea turtles (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), and more recently the Kemp's Ridley turtles (*Lepidochelys kempii*). These animals are very sensitive to disturbance during nesting activities. Given the high degree of visitor interest in viewing sea turtle nesting and the need for education and structure for these activities, the state of Florida regulates the frequency of turtle watch tours and the amount of people per tour. In earlier stages of the planning process, indicators and standards were

developed to monitor the number of visitors participating in turtle watches. However, because the limits on participants and turtle watch tours are set by the state of Florida, and therefore cannot vary or be adjusted by the national seashore as a means of visitor use management, these indicators and standards were later deleted. The national seashore staff would continue its ongoing monitoring of sea turtles and impacts on sea turtles from human use in accordance with NPS, state, and federal policies.

Currently the amount of auto use in the national seashore is strictly regulated for both the protection of resources as well as visitor experiences. Informal parking in nondesignated areas can cause a variety of resource concerns including vegetation loss and erosion directly associated with parked vehicles. In addition, parking in nondesignated areas encourages visitors to access the beach and other use areas outside the designated dune walkovers and trails—causing additional vegetation loss, disturbance to wildlife, and possible impacts on cultural resources. The visitor experience concerns regarding the amount of auto use are described below. The indicator and standard for auto use was based on the national seashore's existing management policy, which has proven to effectively minimize informal parking in the national seashore. Some of the management activities the National Park Service has already been employing in relation to this issue include visitor education to encourage voluntary redistribution of use to off-peak times, signs on national seashore regulations and permitted parking areas, active redistribution of use to areas with available parking, restriction of foot traffic to dune walkovers and other designated use areas, and closure of districts when the parking spaces are full.

The National Park Service also currently regulates the amount of use at campsites and in the backcountry to protect resources and visitor experiences. The amount of use at campsites is limited by the number and size of each campsite to ensure that overnight

activities are well contained within the facility footprint that has been established for those activities. The indicator and standard for groups at campsites reflects the current group size limits established by the national seashore.

Camping is a popular activity within the national seashore that can impact resources. A widely used indicator related to camping is the maximum campsite size, which relates to the total amount of vegetation and soil disturbance resulting from camping activities. The national seashore staff would maintain natural campsites to no more than 500-750 square feet for 80% of the sites. The man-made sites (dredge spoil islands) have been designed to accommodate larger groups, and therefore the standard for campsite size would be higher—up to 1,000 to 1,550 square feet for 80% of man-made sites. In addition to campsite size, the national seashore staff would track the number of fire and latrine sites on campsites because both of these impacts present resource and visitor experience concerns. To minimize these impacts, most of the national seashore's campsites would only have one latrine and one fire site allowed. The National Park Service would employ management strategies such as Leave-No-Trace education programs, group size regulations, and signs to achieve these campsite related standards.

In addition, the amount of use to the national seashore's backcountry is managed via a permitting system to protect resources and visitor experiences. The seashore is highly valued for the significant amount of undeveloped, pristine shoreline within its boundaries. To protect those qualities, the backcountry area of the national seashore has minimal visitor facilities, so rationing the amount of use helps NPS staff minimize the amount and intensity of vegetation loss, wildlife disturbance, litter, and other resource concerns. In addition, the permitting system provides NPS staff direct contact with visitors entering the backcountry, allowing for improved education and awareness associated with resource con-

cerns and regulations. The indicator and standard for backcountry use is based on the current permitting system being used by the national seashore, which has proven to be effective in aiding the protection of resources in this area of the national seashore. The visitor experience concerns for use at campsites and in the backcountry area are described below. The management strategies being employed for these issues have already been described and include permitting, visitor education, and enforcement of NPS regulations.

Some of the resource issues and related indicators noted for Canaveral National Seashore, such as impacts on seagrass and oyster reefs and disturbance to dune vegetation, are also highly influenced by regional and global threats such as pollution, disease, and climate change. Isolating visitor use impacts to these resources is not easy and may seem less significant than these other serious threats. However, there are visitor management actions that can help minimize these impacts and reduce the stress on resources, providing tangible resource and social benefits.

The priority social indicators selected for Canaveral National Seashore are associated with the following issues of crowding and conflict:

- amount of auto use
- number of groups at campsites
- amount of use in the seashore's backcountry

Informal parking as a result of too much auto use in the national seashore can cause a variety of visitor experience issues, including additional crowding at already high-use beach areas, visitor safety concerns along the seashore's narrow roadways, and visual impacts from parked cars blocking the views. Given these concerns along with the resource issues already noted, the national seashore currently regulates the amount of auto use via a variety of strategies, and the

indicator and standard in table 3 reflects the current management policy.

The amount of use in the backcountry can lead to the perception of crowding and use conflicts if visitors are frequently seeing or hearing other groups while visiting an area where the expectation to see and hear other visitors is relatively low. Similarly, the number and size of groups at campsites can influence visitors' ability to camp out of sight and sound of other visitors, which contributes to perceptions of solitude and connection with nature. Part of the national seashore's purpose is to provide an "uncrowded" experience to Florida's coastal environment, and some of the best places for that experience are in the backcountry and during overnight visits. As noted previously, the indicators and standards for these issues are based on the current management policy that has proven effective at protecting the "uncrowded" nature of the visitor experience to the national seashore's backcountry area and campsites.

Currently, Canaveral National Seashore receives about 3,500 visitors per day during the peak season. This level of use is, and would continue to be, closely regulated through the amount of auto use permitted in the various districts of the national seashore. Given the National Park Service' knowledge of resource and social conditions in the national seashore, it is expected that this amount of use would continue to allow the National Park Service to protect resources and provide high quality visitor experiences, including meeting the standards outlined below. As the approved alternative for Canaveral is implemented, and new visitor opportunities and transportation into the national seashore are offered, it is possible that incremental increases in the levels of visitor use may be accommodated. It is expected that the proposed management actions in the approved alternative would allow NPS staff to better accommodate, distribute, and manage use throughout the national seashore. However, increases in use levels would be approached very carefully,

and in an incremental and experimental way using monitoring data and related research, to ensure that NPS implementation commitments to the desired conditions (and related standards) are always being achieved.

NPS staff would continue general monitoring of use levels and patterns throughout the national seashore. In addition, NPS staff would monitor the user capacity indicators. The rigor of monitoring the indicators (e.g., frequency of monitoring cycles, amount of geographic area monitored) may vary considerably depending on how close existing conditions are to the standards. If the existing conditions are far from exceeding the standard, the rigor of monitoring may be less than if the existing conditions are close to or trending towards the standard.

In addition, the initial phases of monitoring for the indicators and standards defined below would help the National Park Service determine if any revisions are needed. The initial testing of the indicators and standards would determine if the indicators are accurately measuring the conditions of concern and if the standards truly represent the minimally acceptable condition of the indicator. NPS staff may decide to modify the indicators or standards and revise the monitoring program if better ways are found to measure changes caused by visitor use. Most of these types of changes should be made within the first several years of initiating monitoring. After this initial testing period of monitoring indicators and standards, adjustments would be less likely to occur.

Finally, if use levels and patterns change appreciably, NPS staff may need to initiate additional monitoring of new indicators to ensure that desired conditions are protected. This iterative learning and refining process is the strength of the NPS user-capacity management program, in that it can be adapted and improved as knowledge grows.

THE ALTERNATIVES

Regardless of this planning effort, the National Park Service would continue to follow special mandates and servicewide laws and policies as noted in chapter 1. Similarly, desired conditions for the entire national seashore (and potential strategies to achieve those conditions) for topics ranging from ecosystem management to accessibility are presented in chapter 1 and would apply regardless of which alternative is ultimately selected for implementation. As this *General Management Plan / Environmental Impact Statement* was being developed, the national seashore was proceeding with a number of projects that are planned or already underway; these projects, discussed in chapter 4 (cumulative impacts), would also occur

regardless of this planning effort. The alternatives described on the following pages, each of which is consistent with maintaining the national seashore's purpose, significance, and fundamental resources and values, present different choices for how to manage resources, visitor use, and facilities within the national seashore.

Each alternative is presented first with a general discussion of the overall vision for the national seashore, outlining future visitor experience and resource conditions. These guiding concepts are then followed by a more specific description of actions and activities for each area of the national seashore.

IDENTIFICATION OF THE NPS PREFERRED ALTERNATIVE

Identification of the National Park Service's preferred alternative involved evaluating the alternatives using an objective analysis process called "choosing by advantages." This process included a multiday workshop in which staff members representing all divisions of the national seashore worked together to identify and compare the relative advantages of each alternative according to a set of predetermined factors. These factors were selected based on the benefits or advantages of each alternative to fulfill the purpose of the plan while addressing the planning issues identified in chapter 1. These factors include

Factor 1 — maximize resource protection

Factor 2 — maximize diversity of visitor experiences

Factor 3 — improve operational effectiveness and efficiencies

Decisions during the "choosing by advantages" process were based on the importance of advantages between the alternatives. This involved the identification of the attributes or characteristics of each alternative relative to the factors; a determination of the advantages for each alternative for each factor; and then weighing of importance of each advantage. The relationship between the advantages and costs of each alternative was also established. This information was used to identify the alternative that gives the National Park Service and the public the greatest advantage for the most reasonable cost.

The results of the "choosing by advantages" process identified alternative B as the agency's preferred alternative. This alternative provides the best combination of strategies to protect the national seashore's unique resources and diversity of visitor experiences while improving the national seashore's operational effectiveness and efficiencies. Ultimately, alternative B's significant

advantage to natural resource protection was one of the largest determining factors in identifying it as the agency's preferred management alternative. Key advantages for resource protection include the following:

- The largest portion of the national seashore would be zoned as backcountry, which is designed to preserve and maintain intact ecosystems.
- There would be increases in protection of oyster beds, fish spawning grounds, and seagrass habitat through the use of slow-speed and pole/troll boating areas.
- Habitat for threatened and endangered species would be improved, including scrub-jay habitat at Bill's Hill and the Stuckey property (if acquired).
- The national seashore's pristine environment would be improved by moving utility lines underground.
- Collaboration on resource projects with U.S. Fish and Wildlife Service would increase.
- Viewsheds would improve through screening facilities.
- Inventory, monitoring, and protection opportunities for archeological resources would increase.
- A broader range of research opportunities would be provided.

Alternative B advantages for maximizing the diversity of visitor experiences include enhanced opportunities for information, education, and interpretation at Apollo Beach, Eldora State House, Seminole Rest, and Bill's Hill. The availability of sales, services, and supplies would also be enhanced at Apollo Beach. Improvements in hiking trail access and parking would occur in the Bill's Hill area. A greater number of visitors would be allowed throughout the national seashore when parking lots are full because of a proposed shuttle service. Furthermore, alternative B provides more consistent security and

operating hours at the northern entrance near Apollo Beach.

Alternative B advantages for improving the operational effectiveness and efficiencies of the national seashore include more conveniently located facilities that provide quick access for visitors to beach and lagoon areas. Select national seashore facilities would also be strategically located to increase efficiencies in managing critical beach and

lagoon resources, as well as to separate public and administrative/maintenance traffic for enhanced visitor experiences. In comparison to the other alternatives, alternative B would also require the least amount of additional maintenance work because it proposes the least number of new structures. Facilities would also be located in areas of the national seashore that better withstand storms, lessening the potential for repairs due to storm damage.

ALTERNATIVE A: NO-ACTION ALTERNATIVE (CONTINUE CURRENT MANAGEMENT)

OVERALL CONCEPT

Alternative A, the no-action alternative, serves as a basis for comparison between Canaveral National Seashore's current management and the other alternatives and thus provides a baseline for evaluating changes and impacts in the other alternatives considered in this plan. This alternative is also useful in understanding why the National Park Service or the public may believe that changes in management direction are needed.

Under this alternative the National Park Service would continue to manage Canaveral National Seashore under the overall operational direction provided in its enabling legislation (PL 93-626 and as amended by PL 100-564), previous planning documents, and interagency/cooperative agreements between (1) the National Aeronautics and Space Administration (NASA), which has jurisdiction over about 70% of the national seashore's acreage, and the Department of the Interior (April 2, 1975), and (2) between the National Park Service and the U.S. Fish and Wildlife Service (USFWS) (July 10, 1975), which manages the Merritt Island National Wildlife Refuge. The latter agreement, which is periodically updated, defines the general boundaries of an overlap area (designated the "Joint Management Area") in and around Mosquito Lagoon and delineates responsibilities of the two agencies for cooperative administration and management of the area. Under this agreement the National Park Service would continue to support USFWS management direction and initiatives as outlined in the Merritt Island National Wildlife Refuge Comprehensive Conservation Plan (2008), assist that agency in preserving this area's cultural resources, and partner with them in seeking grants to support enhanced resource management efforts. The National Park Service would continue to coordinate and comply with NASA security concerns and policies as they relate to the national seashore.

For the foreseeable future there would be no major change in the management direction of the national seashore. Current legislation, NPS policies, management guidelines, administrative commitments, and plans, such as the national seashore's approved 1982 *General Management Plan* and 1998 *General Management Plan Amendment for Seminole Rest*, would continue to provide the guidance for managing the national seashore.

VISITOR EXPERIENCE

Most visitors would arrive at the national seashore by automobile via Florida State Route A1A from New Smyrna Beach on the north or via Florida 406/402 from Titusville and Merritt Island National Wildlife Refuge on the south. Seminole Rest, east of U.S. 1 in Oak Hill, would continue to be accessed via River Road.

Visitors arriving at the Seminole Rest/Bill's Hill area would be able to visit the prehistoric Indian mound and two historic structures. Exhibits and visitor information about Canaveral National Seashore would be available. Trails through Bill's Hill would be available.

Visitors would continue to have access to the national seashore from the open waters of the Mosquito Lagoon, Indian River, the Intra-coastal Waterway, and the Atlantic Ocean. Visitor confusion would be expected to continue because of the inadequacy of national seashore boundary signs in some areas and the multiplicity of signs relating to the national wildlife refuge, national seashore, and adjacent Kennedy Space Center in other areas. Some visitors—particularly boaters in the Mosquito Lagoon and Intracoastal Waterway—would not know when they are in the national seashore because there is a lack of boundary signs. Boaters would continue to be

subject to Florida state and U.S. Coast Guard regulations.

The national seashore's Apollo Beach visitor information center, 7 miles south of New Smyrna Beach on Florida State Route A1A, is currently under construction. An interim facility is in place, providing limited orientation and visitor information as well as permitting and administrative ranger activities. Although the South District would continue to lack facilities for orienting visitors, the Merritt Island National Wildlife Refuge Visitor Information Center, 4 miles east of Titusville on Florida State Route 402, would continue to provide information for national seashore visitors.

The current imbalance among visitation levels within the various zones, facility and infrastructure capacity, and the need to maintain the national seashore's uncrowded and undeveloped qualities in accord with its purpose would continue under this alternative. Despite efforts to manage the national seashore to accommodate low-density visitor use, some beach areas could be expected to have high-density use and overcrowding at times.

However, the national seashore would continue to feature safe and diverse low-impact, water-based recreational opportunities within the context of relatively pristine and undeveloped beaches (Apollo Beach on the north and Playalinda Beach on the south)—with parking lots, restrooms, and boardwalk access across the dunes from the parking areas—and would continue to provide limited visitor services. There would be no designated picnic areas, telephones, food, drinking water, or beach showers (with the exception of an unscreened outdoor shower facility at parking lot #1 in the North District). The 12-mile Klondike Beach, between Apollo and Playalinda beaches, would continue to be accessible by permit only. National seashore areas would continue to be closed if parking lots are filled or during shuttle launches at the Kennedy Space Center. Daily use fees to enter the national seashore would be continued.

RESOURCE PROTECTION

Under this alternative current and ongoing resource management programs in the national seashore would continue as NPS staff and funding permit. Resource stewardship and provision of appropriate recreational and educational opportunities would continue to be overriding considerations for management. The natural resource management program would continue to focus on protection, preservation, and restoration of special status species, the dune system, water quality, the soundscape, and other significant resources associated with the national seashore's ecosystem, as well as inventorying and monitoring resources and pursuing applied research. An existing agreement and partnership with the University of Central Florida Science Research Station would continue for inventorying and monitoring resources.

Beaches. Beaches would remain relatively pristine and undeveloped, with emphasis on preserving a healthy dune system, using boardwalks for public access across the dunes, and restoring impacted areas.

Additional agreements and partnership with educational institutions could be developed for research and inventory and monitoring of national seashore resources.

Cultural Resources. The cultural resource program would continue to focus on protection, preservation, and interpretation of the national seashore's more than 180 archeological resources and historic structures (e.g., Eldora State House, and the main house and caretaker's house at Seminole Rest).

Fisheries. Under this alternative, the National Park Service would continue to voluntarily adopt the Florida Fish and Wildlife Conservation Commission's commercial and recreational fishing regulations within the national seashore.

The National Park Service would continue to actively monitor and patrol fishing activities in

Mosquito Lagoon to ensure state regulations are met.

Commercial fishing within the lagoon waters of the national seashore would continue to be authorized by the National Park Service through a permit system. Although there is no cap on the number of permits issued, the National Park Service would continue to require commercial fishermen to submit catch logs to track harvest levels. The National Park Service would continue not to require permits for recreational fishing under this alternative.

In the NPS/USFWS joint management area of the national seashore (where the U.S. Fish and Wildlife Service has primary jurisdiction over natural resources and the Park Service has primary jurisdiction over cultural resources), the Fish and Wildlife Service would continue to manage fishing in accordance with state regulations. Within the joint management area, commercial fishing would continue to be authorized through a joint NPS/USFWS permit system. A USFWS permit would also continue to be required for recreational fishing. The Fish and Wildlife Service has decided to phase out commercial fishing by 2018 within the Merritt Island National Wildlife Refuge, which includes the joint management area.

The national seashore is not currently managing species in the Atlantic Ocean, but works with the state and other federal agencies to monitor fishery health.

NATIONAL SEASHORE OPERATIONS AND FACILITIES

Under this alternative the national seashore's administrative headquarters would continue to be in a leased building in Titusville and function under a three-district framework (North—Apollo Beach, Eldora Hammock, and Northern Mosquito Lagoon; Central—Seminole Rest and Bill's Hill; and South—Playalinda Beach). The North District would continue to be supported by the Apollo Beach maintenance area and the replaced ranger station at Apollo Beach. The Central District

would continue to be supported by a small satellite maintenance staging area and ranger station at Seminole Rest. The South District would be supported by the Playalinda Beach maintenance area on USFWS land at Wilson's Corner and the Playalinda Beach entrance station and administrative complex, which includes curatorial storage and a garage.

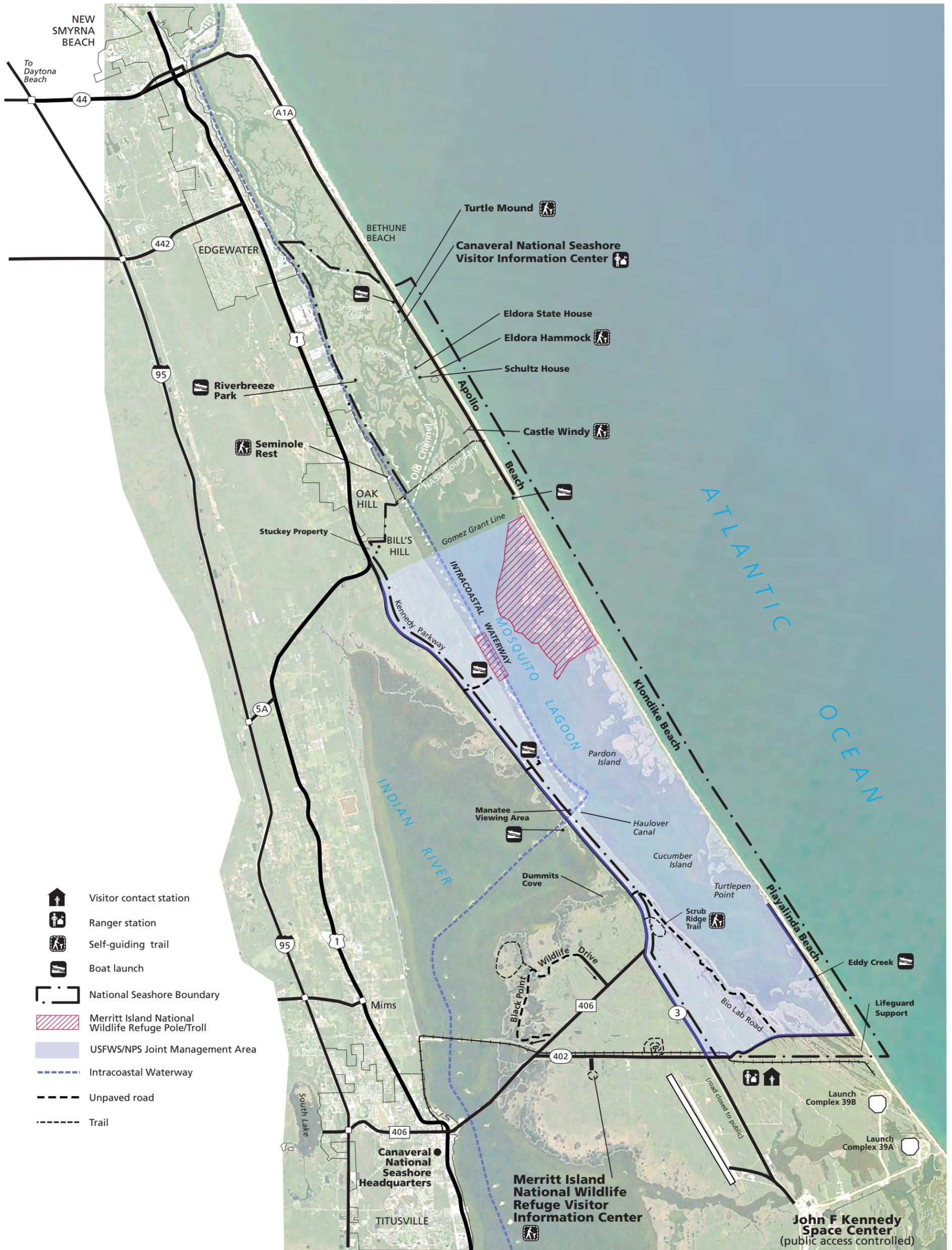
Under this alternative some national seashore facilities would continue to be inadequate and outdated. Utility infrastructure, including the national seashore's comfort stations and water and telephone lines, would continue to be inadequate and require upgrading.

The National Park Service would continue to foster its relationships with NASA and USFWS staff as well as partnerships with other federal, state, and local government agencies, American Indian tribes, private organizations, and academic institutions for resource management, preservation, interpretation, visitor recreational opportunities and protection, mosquito control, and other administrative purposes. The current Volunteers-in-the-Park program would continue to assist NPS staff in such activities as conducting the sea turtle protection program each summer; staffing the Apollo Beach visitor information center, Eldora State House, and Seminole Rest; assisting with environmental education programs and other public interpretive programs; conducting turtle programs in area schools; and helping with maintenance projects.

AREA-SPECIFIC MANAGEMENT ACTIONS

Playalinda Beach Area

Playalinda Beach. Current management trends, such as maintaining relatively pristine beach conditions, preserving the dune system, protecting special status species, and providing for safe recreational opportunities, would continue. Preservation of the primary dune system and restriction of visitor access only to designated dune crossover trails



- Visitor contact station
- Ranger station
- Self-guiding trail
- Boat launch
- National Seashore Boundary
- Merritt Island National Wildlife Refuge Pole/Troll
- USFWS/NPS Joint Management Area
- Intracoastal Waterway
- Unpaved road
- Trail



Back of Alt A Map

would continue. NPS staff would maintain an active resource monitoring and dune restoration program to repair areas of the dune system that have been denuded by unlawful visitor-created (social) trails.

Playalinda Beach Access. The access road, 13 beach parking areas that accommodate 1,032 cars and 18 recreational vehicles, chemical toilets, and access to the beach via boardwalk dune crossovers would be retained.

Temporary closures of the Playalinda Beach area to visitor use before scheduled NASA activities may continue.

Entrance Station. Visitor contact by NPS personnel would continue to be provided at the existing entrance station and fee booth.

Administrative Complex. The complex, including ranger station, curatorial storage facility, and garage, would continue to serve their current functions.

Lifeguard Operations Area. Structures supporting beach operations (garage, lifeguard building, and petroleum/oil/lubrication building) would be retained just south of the intersection of the Playalinda Beach access road and State Route 402.

Beach access for all terrain vehicles (ATVs) for national seashore operations, such as responding to beach emergencies and supporting the resource management program, would continue over the administrative boardwalk dune crossover.

Lands/Waters South of State Route 402. To comply with NASA security concerns, public access to this area would continue to be restricted.

NASA Tracking Facilities. Public access would continue to be restricted in and around NASA tracking facilities.

Klondike Beach Area

Current management trends that emphasize preserving pristine beach conditions and protecting special status species would continue. Public access to Klondike Beach would continue to be by permit only and would be limited to 25 persons per day on the south end of the beach and 25 persons per day on the north end of the beach. Limits on and registration of visitor use are intended to provide opportunities for solitude, maintain pristine beach conditions, protect special status species, and ensure public safety. NPS staff would maintain an active resource monitoring and dune restoration program to repair areas of the dune system that become denuded by unlawful visitor-created (social) trails.

Apollo Beach Area

Apollo Beach. Current management trends, such as maintaining relatively pristine beach conditions, preserving the dune system, protecting special status species, and providing for safe recreational opportunities, would continue. Preservation of the primary dune system and restriction of visitor access only to designated dune crossover trails would continue. NPS staff would continue to maintain an active resource monitoring and dune restoration program to repair areas of the dune system that have been denuded by unlawful visitor-created (social) trails.

Apollo Beach Access. The access road, five beach parking areas accommodating a total of 194 cars, exterior shower facility at beach parking area # 1, and chemical toilet facilities at all beach parking areas would be retained. Provision for convenient visitor access to beach areas via designated dune crossovers would continue.

Temporary closures of beach parking area #5 and half of #4 may continue before scheduled NASA launches.

When parking areas reach capacity, temporary restrictions on additional vehicular access into

the Apollo Beach area would continue to be managed at the entrance station.

Public use of the unpaved parking area near the administrative boardwalk would continue to be allowed for trailer parking and beach access for seasonal horseback riding along the shoreline areas between beach parking areas #1 and #2 for a distance of about 1 mile.

The overhead power and telephone lines paralleling the roadway would remain in place.

Entrance Station. Visitor contact by NPS personnel would continue to be provided at the entrance station and fee booth. The current configuration of the entrance station and gate would continue to allow for unrestricted access to the boat ramp area.

Apollo Beach Visitor Information Center. The new Apollo Beach Visitor Center and pavilion, scheduled for completion in 2011, continues to serve as the main hub of visitor activities, including space for showcasing interpretive exhibits and an orientation film. The small Eastern National sales outlet would continue to operate at the site. Canoe rental for campers only would continue. The range of functions for this site would continue to include interpretation, information, permitting, and administrative ranger activities. The current level of interpretive and educational opportunities would be maintained, including school programs hosted at the new education pavilion, Turtle Mound, and public pontoon boat tours. These tours originate at the visitor center and showcase Mosquito Lagoon, the Eldora State House, and Turtle Mound.

Turtle Mound. Current management trends, including provisions for mound protection, maintenance of the self-guided interpretive boardwalk trail, waysides, and parallel parking for 11 cars along Apollo Beach Road, would continue.

North District Maintenance Area. North District maintenance operations would continue to be based from the existing site opposite the visitor information center. The

maintenance shop, equipment repair shop, pole shed, petroleum/oil/lubrication building, and storage building would be retained.

Beach Operations Area. The garages would continue to provide storage space for life-guard operations, interpretation and resource management, law enforcement, and maintenance. The fire cache would remain.

Beach access for all terrain vehicles (ATVs) to respond to beach emergencies as well as to support the turtle management program would continue over the existing administrative boardwalk dune crossover.

Eldora Hammock Area

Eldora Hammock Access. NPS staff would continue to maintain the paved access road and four parking areas (accommodating a total of 53 cars) that provide visitor access to the Eldora historic area, interpretive trails, the canoe/kayak landing, and Mosquito Lagoon

The overhead power and telephone lines that parallel the roadway would remain in place.

Eldora Historic Area. The Eldora State House and dock would continue to be preserved. Staff office space and exhibits would be retained at the Eldora State House, and public access to the first floor would continue.

Eldora Hammock Interpretive Trail. The trail and its series of wayside exhibits would be retained. Interpretive opportunities, such as guided interpretive tours, would be continued.

Castle Windy Interpretive Trail. Current management trends, with provision for mound protection, use of beach parking lot #3 (accommodating 25 cars) as trailhead parking, and maintenance of the self-guided interpretive hammock trail to the east shoreline of Mosquito Lagoon would continue.

Marine Science Educational Station. The national seashore would continue to pursue

supporting research operations at these facilities.

Former Hebner Property. The garage would continue to provide for national seashore operations. Existing utilities would continue to be maintained.

Former Feller Property. The house and dock would continue as a research station. Agreements and partnerships for resource inventory and monitoring would be continued. The trailer pad would remain.

Former Schultz Property. The Schultz house would be preserved and would continue to be used for administrative purposes such as for staging special events or housing mainly for researchers, and may accommodate other hires such as Student Conservation Association interns, other interns, and volunteers. The garage would be removed because of its poor condition. If needed for storage or restrooms, it could be replaced with a compatible structure.

Lands South of Eldora Hammock. The southern portion of the Eldora Hammock (Schultz house to the Gomez grant line) would continue to be protected and preserved. The area would continue to be undeveloped and inaccessible by foot and would remain closed to visitors except for shoreline areas accessed by boat and the Castle Windy Interpretive Trail. The site of the French shipwreck survivors' camp would continue to be protected and preserved.

Northern Mosquito Lagoon (Gomez Grant line to NPS north boundary)

Boat Access Areas. A boat launch ramp, paved 22-space boat trailer parking area, and restroom facility across from Apollo Beach parking area #1 would be maintained. Public access to the launch ramp would remain available 24 hours per day.

The paved boat access ramp and kayak launching area across from Apollo Beach

parking area #5, as well as the undelineated gravel parking area, would be retained. The canoe and kayak landing area accessing Mosquito Lagoon from the Eldora Hammock area would continue to be maintained.

Lagoon Waters. Diverse, low-impact, water-based recreational opportunities would continue to be provided in lagoon waters while maintaining the quality of resource conditions. Commercial guiding and harvesting activities would continue to be permitted. NPS staff would continue to enhance resource stewardship partnerships with the U.S. Fish and Wildlife Service, the National Aeronautics and Space Administration, and other partners for Mosquito Lagoon.

Lagoon Islands. The National Park Service would continue to provide for diverse, low-impact, backcountry opportunities on lagoon islands while maintaining the quality of resource conditions. Fourteen designated backcountry campsites with picnic tables and grills would continue to be maintained and made available for public use by permit only.

Oak Hill Area

Seminole Rest. Management of the area would continue to focus on protection and preservation of the archeological resources and the rehabilitated historic main house and caretaker's house. A small Eastern National sales outlet would continue to operate. A visitor contact station has been established on the first floor of the main house and provides space for a visitor orientation film and exhibits pursuant to completion of a permanent exhibit plan. The upper floor of the main house would continue to be used for NPS administrative purposes. The caretaker's house would continue to be used intermittently as a ranger station and maintenance field office. The maintenance shed would remain.

The interpretive trail would remain, and the area would continue to be staffed by volunteers.

The concrete parking area that accommodates 2 handicapped parking spaces, 11 regular and 6 parallel vehicle pull-ins, 1 bus drop-off, and the satellite gravel overflow parking area accommodating 10 vehicles would continue to be maintained.

Stuckey Property. As legislatively mandated, the Stuckey property would be purchased on a willing seller basis.

Bill's Hill Area. Current management and protection of resources would continue, and access during daylight hours would continue.

Staff monitoring is currently very limited, and no services, sales, or supplies are available at the site. The area would remain undeveloped in character.

USFWS/NPS Joint Management Area

Resources management within the Joint Management Area would be governed by National Park Service laws and policies and by the USFWS Comprehensive Conservation Plan.

Access. Temporary closures of portions of the Joint Management Area to visitor use before scheduled NASA launches and landings may continue.

Central/Southern Mosquito Lagoon. The National Park Service would continue to support USFWS-led management direction and recreational activities (boating, fishing, and waterfowl hunting) for the lagoon area south of the Gomez Grant line. Existing designated pole/troll areas would continue to be monitored by USFWS staff to assess their effectiveness in providing protection of sensitive seagrass bed habitat. Additional pole/troll areas may be designated by USFWS staff if resource conditions indicate a need for additional protective measures. The National Park Service, U.S. Fish and Wildlife Service, and the National Aeronautics and Space Administration would continue to enhance resource management and protection of

lagoon resources. The National Park Service would support potential USFWS canoe trails at Beacon 42, Max Hoeck Creek, and Bull Camp.

Boat Access Areas. The U.S. Fish and Wildlife Service would continue to provide public boat access to central Mosquito Lagoon via two boat launching facilities along Kennedy Parkway (State Route 3) and a third along Bio Lab Road. A nonmotorized launch area for canoes is proposed along the south end of Bio Lab Road by the U.S. Fish and Wildlife Service.

At the Eddy Creek boat launch area, at the south end of the lagoon, the management agreement with the U.S. Fish and Wildlife Service for NPS maintenance of the public boat launch ramp, dock, parking area (28 cars/10 boat trailers), pavilion, and waysides would remain.

The management agreement with the U.S. Fish and Wildlife Service for the National Park Service to provide on-site school group environmental education programs in the Eddy Creek area would also continue.

Lands North of Haulover Canal. The National Park Service would continue to support USFWS lead management direction and recreational activities for this area. Deer and feral hog hunting areas may be considered on Merritt Island National Wildlife Refuge lands north of Haulover Canal to control populations of these species.

Manatee Viewing Area. The National Park Service would continue to support USFWS lead management direction and self-guided interpretive opportunities for this area.

Scrub Ridge Interpretive Trail. The National Park Service would continue to support USFWS and NASA lead management direction and self-guided interpretive opportunities for this area.

Sand Road/Trail. The National Park Service would continue to support USFWS lead management direction for this resource and

assist that agency in preserving the trail and its associated World War II observation towers.

Historic Properties. NPS staff would continue to assist USFWS staff and NASA staff with its primary responsibility in the management of cultural resources in the Joint Management Area (such as Target Rock, Ross Hammock, “Confederate salt works,” Old Haulover Canal, Clifton Schoolhouse site, and Dummit Cove). The current level of opportunities for information, interpretation, and education would continue. (With the exception of the Clifton Schoolhouse site, these features are not currently interpreted or marked.)

Bio Lab Road. USFWS staff would continue to maintain public access along Bio Lab Road for wildlife viewing, fishing, waterfowl hunting, and boat access to Mosquito Lagoon.

NASA Tracking Facilities. Public access would continue to be restricted in and around the NASA tracking facilities.

Merritt Island National Wildlife Refuge

USFWS Visitor Information Center. The U.S. Fish and Wildlife Service would remain the lead agency for visitor information in the South District. Visitor orientation to the

features available at the national seashore and the Merritt Island National Wildlife Refuge would continue to be provided at the USFWS visitor information center, just west of the national seashore boundary. Limited national seashore orientation (e.g., brochures and maps) would continue.

NPS South District Maintenance Area. The USFWS Wilson’s Corner site would continue to be used for the NPS South District maintenance operations, including the maintenance shop; east and west pole sheds; Bally building; and petroleum, oil, and lubrication building. Because a water source is not available on site, non-potable water would continue to be trucked in and stored. Drinking water would continue to be provided separately.

Titusville Area

National Seashore Headquarters. The lease arrangement for national seashore headquarters in downtown Titusville would be extended. As provided in the national seashore legislation, acquisition of the Stuckey property would be appropriate on a willing seller basis only. A determination of this site’s appropriateness for a future park headquarters would be made sometime following acquisition.

ALTERNATIVE B: THE NPS PREFERRED ALTERNATIVE

OVERALL CONCEPT

Under alternative B, Canaveral National Seashore would be managed to preserve and enhance the natural and historic landscape features associated with the national seashore's eastern Florida coastal barrier island system. Emphasis would be placed on retaining the seashore's relatively undeveloped character and providing uncrowded experiences by dispersing visitors via a shuttle service or canoe, kayak, hiking and walking trails, and bicycle trails. Coordination with land-managing partners would be increased to provide additional educational opportunities and programs for visitors and enhanced monitoring of Mosquito Lagoon resources.

VISITOR EXPERIENCE

Visitors entering the national seashore would experience the relatively pristine natural setting of the national seashore and lagoon that are mostly free of unnecessary distractions. Opportunities for experiencing an uncrowded natural environment would be easily found throughout the national seashore. High visitor use levels might be encountered at visitor contact centers or at portals to the beach and lagoon, but emphasis would be placed on encouraging visitors to experience areas of the seashore that are relatively undeveloped.

RESOURCE PROTECTION

Natural resource management efforts would focus on protection, preservation, and rehabilitation of species and ecosystem features, inventorying and monitoring of resources, and applied research efforts as well as the preservation of the national seashore's soundscape and water quality. Coordination with land-managing partners would be increased to provide a comprehensive approach to ecosystem and cultural resource

management as well as additional educational opportunities and programs for visitors.

Agreements and partnership with educational institutions could be developed for research and inventory and monitoring of national seashore resources.

Beaches. Beaches would remain relatively pristine and undeveloped, with emphasis on preserving a healthy dune system, using boardwalks for public access across the dunes, and restoring impacted areas.

Restoration of disturbed areas to natural conditions would be a principal focus of resource management efforts. Travel in shallow water areas in the national seashore could be limited to pole/troll or nonmotorized methods to protect fragile seagrass and fish spawning areas and oyster beds.

Cultural Resources. Cultural resource management efforts would continue to focus on protection, preservation, and interpretation of more than 180 archeological sites and historic structures such as the Eldora State House, and main house and caretaker's house at Seminole Rest. In selected areas, such as Seminole Rest and the Eldora Hammock area, key cultural landscape features would be rehabilitated to reflect historic conditions associated with their periods of significance.

In addition, resource management personnel would work with interpretive staff to highlight appropriate themes for the educational program.

Fisheries. Under this alternative, the National Park Service would develop a separate fisheries management plan to address commercial and recreational fishing in the lagoon and offshore waters of the national seashore. This fisheries management plan would include a public involvement and environmental compliance process to determine sustainable harvest levels for

shellfish, red drum, spotted sea trout, and other game fish. The National Park Service would also develop a research and monitoring program to collect baseline data in order to make informed decisions in the fisheries management plan.

Until the fisheries management plan is approved, the National Park Service would continue to voluntarily adopt the Florida Fish and Wildlife Conservation Commission's fishing regulations and actively monitor and patrol fishing activities in Mosquito Lagoon to ensure state regulations are met. Commercial fishing within the lagoon waters of the national seashore would also continue to be authorized by the National Park Service through a permit system.

The Fish and Wildlife Service has decided to phase out commercial fishing by 2018 within the Merritt Island National Wildlife Refuge, which includes the NPS/USFWS joint management area of the national seashore (where the Fish and Wildlife Service has primary jurisdiction over natural resources and the National Park Service has primary jurisdiction over cultural resources). Until this time, the Fish and Wildlife Service would continue to manage fishing according to state regulations, and commercial fishing would continue to be authorized through a joint NPS/USFWS permit system. A USFWS permit would also continue to be required for recreational fishing.

NATIONAL SEASHORE OPERATIONS AND FACILITIES

Readily identifiable visitor contact facilities for orientation and educational purposes and ranger stations would be conveniently located and provide quick access to beach and lagoon areas. Other support facilities for national seashore operations, such as administration, resource management, and maintenance, would be visually screened from visitor use areas, but would be conveniently located to critical beach and lagoon resource areas to promote efficient operations. Efforts would be undertaken to separate public and

administrative/ maintenance traffic to provide for enhanced visitor experiences and safety.

Access to areas within the national seashore would be accommodated with low-key structures that blend with their natural surroundings to avoid impacts on fragile resources such as dune vegetation and shoreline edges, scenic views, and cultural sites and landscapes.

AREA-SPECIFIC MANAGEMENT ACTIONS

Playalinda Beach Area

Playalinda Beach. Current management trends would continue, such as maintaining relatively pristine beach conditions, preserving the dune system, protecting special status species, and providing for safe recreational opportunities. Preservation of the primary dune system and restriction of visitor access only to designated dune crossover trails would continue. NPS staff would maintain an active resource monitoring and dune restoration program to repair areas of the dune system that have been denuded by unlawful visitor-created (social) trails.

The high-maintenance chemical toilet facilities at all beach parking areas would be replaced with a more efficient and sustainable system.

Playalinda Beach Access. The access road, 13 beach parking areas that accommodate 1,032 cars and 18 recreational vehicles, and access to the beach via boardwalk dune crossovers would be retained.

Temporary closures of the Playalinda Beach area to visitor use before scheduled NASA launches and landings may continue.

A bicycle path connecting with the proposed USFWS bike path along State Route 402 into Playalinda Beach would be developed.

Entrance Station. Visitor contact by NPS personnel would continue to be provided at the entrance station and fee booth.

Administrative Complex. The complex, including ranger station, curatorial storage facility, and garage, would continue to serve their current functions, although a small visitor contact station would be accommodated in the ranger station.

Lifeguard Operations Area. The desirability of moving lifeguard operations to Eddy Creek would be evaluated. Structures might be removed or used for storage. The administrative boardwalk dune crossover would also be reconfigured in that area to accommodate ATV emergency access.

Lands/Waters South of State Route 402. To comply with NASA security concerns, public access to this area would continue to be restricted.

NASA Tracking Facilities. Public access would continue to be restricted in and around NASA tracking facilities.

Klondike Beach Area

Current management trends that emphasize preserving pristine beach conditions and protecting special status species would continue. Public access to Klondike Beach would continue to be by permit only and limited to 25 persons per day on the south end of the beach and 25 persons per day on the north end of the beach. Limits on and registration of visitor use are intended to provide opportunities for solitude, maintain pristine beach conditions, protect special status species, and ensure public safety. NPS staff would maintain an active resource monitoring and dune restoration program to repair areas of the dune system that may become denuded by unlawful visitor-created (social) trails.

Apollo Beach Area

Apollo Beach. Current management trends, such as maintaining relatively pristine beach conditions, protecting special status species, and providing for safe recreational opportunities, would continue. Preservation of the primary dune system and restriction of visitor access only to designated dune crossover trails would continue. NPS staff would maintain an active resource monitoring and dune restoration program to repair areas of the dune system that have been denuded by unlawful visitor-created (social) trails.

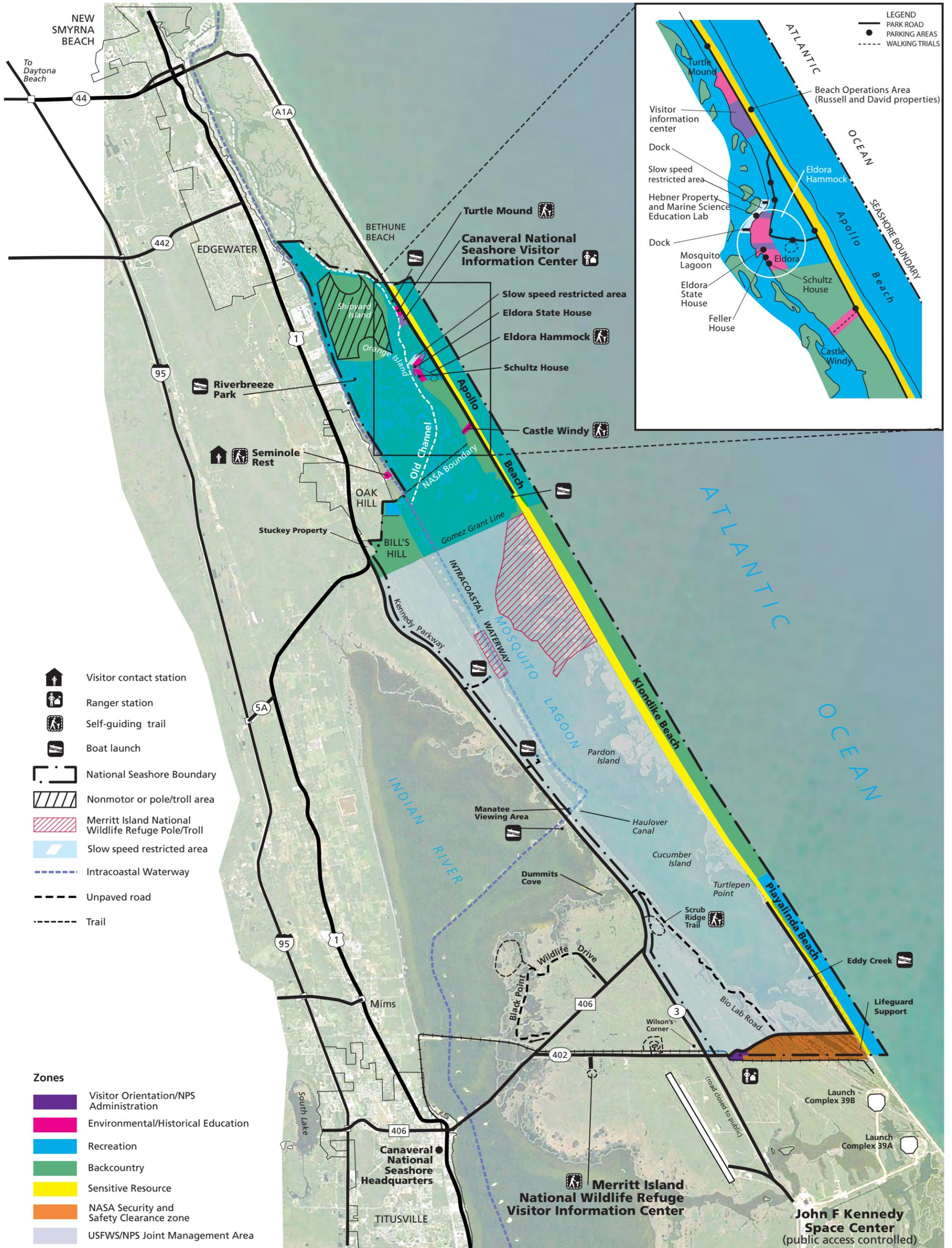
Apollo Beach Access. The access road, five beach parking areas accommodating a total of 194 cars, and exterior shower facility at beach parking area #1 would remain. Provision for convenient visitor access to beach areas via designated dune crossovers would continue.

Temporary closures of beach parking area #5 and half of #4 would continue before scheduled NASA launches per NASA requirements.

When parking areas reach capacity, temporary restrictions on additional vehicular access into the Apollo Beach area would go into effect at the entrance station. However, opportunities to provide alternative transportation into the area would be pursued, such as establishing bike trails along national seashore roads that extend and connect with existing county bike trail systems and coordinating with the Volusia County Public Transit System to extend shuttle bus service into the national seashore. A commercial service arrangement could also be developed to provide for limited peak-season, weekend shuttle service into the area.

Public use of the unpaved parking area near the administrative boardwalk would continue to be allowed for trailer parking and beach access for seasonal horseback riding along the shoreline areas between beach parking areas #1 and #2.

The high-maintenance chemical toilet facilities at all beach access parking areas



NOTE: To show visually, the size of zone colors have been enlarged in certain areas.

Alternative B Canaveral National Seashore

United States Department of the Interior / National Park Service

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Back of Alt B map

would be replaced with a more efficient and sustainable system.

To remove man-made visual intrusions and enhance scenic views, existing overhead power and telephone lines would be removed, and lines would be placed underground. Removal of these above-ground lines could also enhance visitor safety during storms, and prevent service disruptions.

Entrance Station. Visitor contact by NPS personnel would continue to be provided at the entrance station and fee booth; however, the structure and entrance gate would be relocated towards the north boundary to enhance security and safety, allow for controlled entry into the launch ramp area, and provide a safe turnaround area for visitors when parking areas have reached capacity.

Apollo Beach Visitor Information Center. The Apollo Beach Visitor Center and pavilion (scheduled for completion in 2011) would continue to serve as the primary hub for visitor activities. The current level of school programs hosted at the visitor information center pavilion and Turtle Mound and public pontoon boat tours—which originate at the visitor information center and showcase Mosquito Lagoon, the Eldora State House, and Turtle Mound—would be expanded.

Turtle Mound. Current management provisions for mound protection, maintenance of the self-guided interpretive boardwalk trail, waysides, and parallel parking configuration for 11 cars along the beach access road would continue.

North District Maintenance Area. North District maintenance operations would continue to be based from the site opposite the visitor information center. However, the maintenance complex would be reconfigured or redesigned to improve efficiency and eliminate internal circulation problems, provide adequate turnaround, and separate visitor traffic from maintenance traffic. Facilities would be screened from the view of visitors.

Beach Operations Area. The garages would continue to provide storage space for lifeguard operations, interpretation and resource management, law enforcement, and maintenance. The fire cache would remain.

Beach access for all terrain vehicles (ATVs) to respond to beach emergencies as well as support the turtle management program would continue over the existing administrative boardwalk dune crossover.

Eldora Hammock Area

Eldora Hammock Access. NPS staff would continue to maintain the existing access road and four parking areas (accommodating a total of 53 cars) that provide visitor access to the Eldora historic area, interpretive trails, canoe/kayak landing, and Mosquito Lagoon. To remove man-made visual intrusions and enhance scenic views, overhead power and telephone lines would be removed, and lines would be placed underground.

Eldora Historic Area. The Eldora State House, Cisterns, and Dock would be preserved. Public access to the first floor would continue to be provided. Visitor understanding of this late 19th century Florida waterway community; the early 20th century Florida environmental movement; and the interconnectedness of the natural environment, hammock community, and lagoon setting with these cultural conditions would be expanded/improved. Interpretation of the Eldora historic area would continue with permanent exhibits and administrative office space in the Eldora State House. The area would be studied as a cultural landscape, and key features would be rehabilitated to reflect historic conditions associated with their period of significance.

An exhibit area would be maintained in the state house pursuant to the permanent exhibit and historic furnishings plans.

Eldora Hammock Interpretive Trail. The trail and its series of wayside exhibits would remain. Interpretive opportunities, such as

guided interpretive tours, would be continued.

Castle Windy Interpretive Trail. Current management trends, with provision for mound protection, use of beach parking lot #3 (accommodating 25 cars) as trailhead parking, and maintenance of the self-guided interpretive hammock trail to the east shoreline of Mosquito Lagoon, would continue. In addition, the trail would be extended along the shoreline to provide a looped segment to enhance interpretive and environmental education opportunities.

Marine Science Educational Station. The national seashore would continue to pursue supporting research operations at these facilities.

Former Hebner Property. The garage would continue to be used for national seashore operations.

Former Feller Property. Use of the property would be offered to a broad range of universities and institutions for research and inventorying and monitoring activities. The trailer pad would remain.

Former Schultz Property. The Schultz house would be preserved and would continue to be used for administrative purposes such as intermittent housing for new hires, researchers, and interns, or for staging special events. The garage would be removed because of its poor condition; repair would require virtual replacement of the entire structure. If needed for storage or restrooms, it could be replaced with a compatible structure.

Lands South of Eldora Hammock. The southern portion of the Eldora Hammock (Schultz house to Gomez Grant line) would continue to be protected and preserved. The area would continue to be undeveloped and inaccessible by foot and would remain closed to visitors except for shoreline areas accessed by boat and the Castle Windy interpretive trail. The site of the French shipwreck

survivors' camp would be protected and preserved.

Northern Mosquito Lagoon
(Gomez Grant line to NPS north boundary)

Boat Access Areas. The boat launch area across from Apollo Beach parking area #1 would continue to be maintained; however, 24-hour public access would be phased out over time and transitioned into controlled entry to enhance security. The entrance area (gate/fee booth) would be relocated north to the national seashore boundary to control public access to the launch area. Use of the boat ramp area would be included in the national seashore entrance fee.

The paved boat access ramp and kayak launching area across from Apollo Beach parking area #5, as well as the undelineated gravel parking area, would remain.

The canoe and kayak landing area accessing Mosquito Lagoon from the Eldora Hammock area would continue to be maintained.

Lagoon Waters. Diverse, low-impact, water-based recreational opportunities would be provided in lagoon waters while maintaining the quality of resource conditions.

NPS staff would continue to enhance its resource stewardship partnership with the U.S. Fish and Wildlife Service and the National Aeronautic and Space Administration for Mosquito Lagoon, as well as increase its monitoring efforts to better assess changes or trends in resource conditions related to the effects of public boating activities, commercial guiding and/or commercial harvesting activities in the lagoon. Public and commercial activities would continue to be permitted unless documented trends in resource conditions require changes to visitor use management.

Complementing recent USFWS efforts for providing proactive resource protection measures for areas containing oyster beds, fish spawning, and seagrass beds in other areas of

Mosquito Lagoon, the National Park Service would establish a nonmotorized or pole/troll zone to protect resources in the Shipyard Island area of the lagoon. Other such zones might also be established if monitoring indicates that resources are being impacted by overuse.

To provide for wildlife viewing and shoreline protection, a slow-speed zone would be established for boats between the Eldora State House, parking lot #7, and the first island to the west.

Lagoon Islands. The National Park Service would continue to provide for diverse, low-impact, recreational opportunities on lagoon islands while maintaining the quality of resource conditions. Fourteen designated backcountry campsites with picnic tables and grills would continue to be maintained and made available for public use by permit only.

Oak Hill Area

Seminole Rest. Management of the area would continue to focus on protection and preservation of the archeological resources and the rehabilitated historic main house and caretaker's house. A small Eastern National sales outlet would continue to operate. A visitor contact station has been established on the first floor of the main house and provides space for a visitor orientation film and exhibits. The upper floor of the Seminole Rest main house is used for NPS administrative purposes. The caretaker's house is used as a maintenance field office. The maintenance shed would remain. The interpretive trail would remain.

Interpretive and educational programs would be expanded. The area would be studied as a cultural landscape, and key features would be rehabilitated to reflect historic conditions associated with their period of significance.

The concrete parking area that accommodates 2 handicapped parking spaces, 11 regular and 6 parallel vehicle pull-ins, and 1 bus drop-off,

and the satellite gravel overflow parking area accommodating 10 vehicles would remain.

Stuckey Property. As legislatively mandated, the Stuckey property would be purchased on a willing seller basis. Once acquired, a decision as to whether it should be developed as a new visitor facility or restored to natural conditions would be made. Since the legislation was signed, a visitor facility has been developed at Seminole Rest.

Bill's Hill Area. Opportunities for dispersed backcountry hiking would be provided. Expanded interpretive opportunities via marked trails and wayside exhibits would be developed.

A canoe/kayak landing and water trail connection with the proposed USFWS canoe/kayak trail along the west side of the Intracoastal Waterway south of the Gomez Grant line would be established. Additional routes would be developed through the mangrove islands and connect to the canoe/kayak launch area at parking lot #7 in the Eldora Hammock area.

Access and parking for designated trailheads for hiking would be provided.

Cultural and natural resources monitoring efforts would be increased in response to providing limited access for visitor backcountry experience. An archeological survey would be implemented to document sites. Resource monitoring would be provided by staff stationed nearby at Seminole Rest.

USFWS/NPS Joint Management Area

Access. Temporary closures of portions of the Joint Management Area to visitor use before scheduled NASA launches and landings may continue.

Central/Southern Mosquito Lagoon. The National Park Service would continue to support U.S. Fish and Wildlife Service lead management direction and recreational activities (boating, fishing, and waterfowl

hunting) for the lagoon area south of the Gomez Grant line. Existing designated pole/troll areas would be monitored by USFWS staff to assess their effectiveness in providing protection of sensitive seagrass bed habitat. Additional pole/troll areas may be designated by USFWS staff if resource conditions indicate a need for additional protective measures. The National Park Service, U.S. Fish and Wildlife Service, and the National Aeronautics and Space Administration would continue to enhance resource management and protection of lagoon resources. The National Park Service would support potential USFWS canoe trails at Beacon 42, Max Hoeck Creek, and Bull Camp.

Boat Access Areas. The U.S. Fish and Wildlife Service would continue to provide public boat access to central Mosquito Lagoon via two boat launching facilities along Kennedy Parkway (State Route 3) and a third along Bio Lab Road. A nonmotorized launch area for canoes is proposed along the south end of Bio Lab Road by the U.S. Fish and Wildlife Service.

At the Eddy Creek boat launch area, at the south end of the lagoon, the management agreement with the U.S. Fish and Wildlife Service for NPS maintenance of the public boat launch ramp and parking area would continue.

The existing management agreement with the U.S. Fish and Wildlife Service for the National Park Service to provide on-site school group environmental education programs in the Eddy Creek area would continue.

Lands North of Haulover Canal. The National Park Service would continue to support USFWS lead management direction and recreational activities for this area. Deer and feral hog hunting areas may be considered on Merritt Island National Wildlife Refuge lands north of Haulover Canal to control populations of these species.

Manatee Viewing Area. The National Park Service would continue to support USFWS

lead management direction and self-guided interpretive opportunities for this area.

Scrub Ridge Interpretive Trail. The National Park Service would continue to support USFWS lead management direction and self-guided interpretive opportunities for this area.

Sand Road/Trail. The National Park Service would continue to support USFWS lead management direction for this resource and assist that agency in preserving the trail and its associated World War II observation towers.

Historic Properties. NPS staff would continue to assist USFWS staff and NASA staff with its primary responsibility in the management of cultural resources in the Joint Management Area (such as Target Rock, Ross Hammock, “Confederate salt works,” Old Haulover Canal, Clifton Schoolhouse site, and Dummit Cove). The current level of opportunities for information, interpretation, and education would continue.

Bio Lab Road. USFWS staff would continue to maintain public access along Bio Lab Road for wildlife viewing, fishing, waterfowl hunting, and boat access to Mosquito Lagoon.

NASA Tracking Facilities. Public access would continue to be restricted in and around NASA tracking facilities.

Merritt Island National Wildlife Refuge

USFWS Visitor Information Center. The U.S. Fish and Wildlife Service would remain the lead agency for visitor information in the South District. Visitor orientation to the features available at the national seashore and the Merritt Island National Wildlife Refuge would continue to be provided at the USFWS visitor information center, just west of the national seashore boundary. Limited national seashore orientation (e.g., brochures and maps) would be available.

NPS would work with the USFWS to explore whether combined administrative

headquarters functions in the South District would be the best strategy for administration of the national seashore. If it is determined that such a combined facility is not an appropriate option for administration of the national seashore, NPS staff would look elsewhere in the South District for such a facility location.

NPS South District Maintenance Area. The USFWS Wilson's Corner site would continue to be used for the NPS South District maintenance operations, including the maintenance shop; east and west pole sheds; Bally building; and petroleum, oil, and lubrication building. Because a water source is not available on site, non-potable water would contin-

ue to be trucked in and stored. Drinking water would continue to be provided separately.

Titusville Area

National Seashore Headquarters. The lease arrangement for national seashore headquarters in downtown Titusville would be extended. As provided in the national seashore legislation, acquisition of the Stuckey property would be appropriate on a willing seller basis only. A determination of this site's appropriateness for a future park headquarters would be made sometime following acquisition.

ALTERNATIVE C

OVERALL CONCEPT

Under alternative C, Canaveral National Seashore would be managed as a place where visitors would explore and experience a wide range of opportunities designed to provide an in-depth understanding of the natural and cultural history of eastern coastal Florida. When visitors enter the national seashore, they would be presented with a menu of choices for alternative modes of access to land- and water-based natural and cultural features, recreational opportunities, and educational pursuits.

VISITOR EXPERIENCE

Visitors entering the national seashore would be provided with a full range of educational opportunities, including knowledge about the natural and cultural resources of the area, recreational pursuits, resource sensitivity issues, and public safety messages. Information regarding educational opportunities would be made available in a centralized location as well as at a number of specific areas in the national seashore. The central visitor orientation facility would be in the Bill's Hill area, and there would be a second information center at Apollo Beach; smaller satellite visitor contact areas using historic structures, new facilities, or wayside exhibits would be in various locations in the national seashore. For the unprepared visitor, recreational rental equipment would be available near significant areas of interest, thus making it more convenient to leave automobiles behind and access the unique natural and cultural areas of the national seashore through various nonmotorized methods. Land- and water-based trails would be expanded; interpretation of cultural sites would be increased; and on-site environmental education activities, emphasizing safety and resource sensitivity, would be routinely scheduled.

RESOURCE PROTECTION

Natural resource management efforts would focus on protection, preservation, and rehabilitation of species and ecosystems, inventorying and monitoring resources, and applied research efforts, as well as preservation of the national seashore's soundscapes and water quality. Coordination with land-managing partners would be increased to provide a comprehensive approach to ecosystem and cultural resource management as well as additional educational opportunities and programs for visitors.

Beaches. Beaches would remain relatively pristine and undeveloped, with emphasis on preserving a healthy dune system, using boardwalks for public access across the dunes, and restoring impacted areas.

In addition, resource management personnel would work with interpretive staff to highlight appropriate themes for the educational program.

Agreements and partnership with educational institutions could be developed for research and inventory and monitoring of national seashore resources.

Cultural Resources. Cultural resource management would continue to emphasize protection, preservation, rehabilitation, appropriate adaptive use, and interpretation of more than 180 archeological sites and historic structures, such as the Eldora State House, Schultz House, and main house and caretaker's house at Seminole Rest, within the context of the national seashore's natural terrestrial and cultural landscapes and scenic views.

Fisheries. Under this alternative, the National Park Service would develop a separate fisheries management plan to address commercial and recreational fishing in the lagoon and offshore waters of the national

seashore. This fisheries management plan would include a public involvement and environmental compliance process to determine sustainable harvest levels for shellfish, red drum, spotted sea trout, and other game fish. The National Park Service would also develop a research and monitoring program to collect baseline data in order to make informed decisions in the fisheries management plan.

Until the fisheries management plan is approved, the National Park Service would continue to voluntarily adopt the Florida Fish and Wildlife Conservation Commission's fishing regulations and actively monitor and patrol fishing activities in Mosquito Lagoon to ensure state regulations are met. Commercial fishing within the lagoon waters of the national seashore would also continue to be authorized by the National Park Service through a permit system.

The Fish and Wildlife Service has decided to phase out commercial fishing by 2018 within the Merritt Island National Wildlife Refuge, which includes the NPS/USFWS joint management area of the national seashore (where the Fish and Wildlife Service has primary jurisdiction over natural resources and the National Park Service has primary jurisdiction over cultural resources). Until this time, the Fish and Wildlife Service would continue to manage fishing according to state regulations, and commercial fishing would continue to be authorized through a joint NPS/USFWS permit system. A USFWS permit would also continue to be required for recreational fishing.

NATIONAL SEASHORE OPERATIONS AND FACILITIES

Visitor contact facilities would be located at specific areas throughout the national seashore to orient visitors and provide them with information regarding educational and recreational opportunities. NPS administrative functions would be relocated from the leased structure in Titusville to a new facility in the Bill's Hill area.

AREA-SPECIFIC MANAGEMENT ACTIONS

Playalinda Beach Area

Playalinda Beach. Current management trends, such as maintaining relatively pristine beach conditions, preserving the dune system, protecting special status species, and providing for safe recreational opportunities, would continue. Preservation of the primary dune system and restriction of visitor access only to designated dune crossover trails would continue. NPS staff would maintain an active resource monitoring and dune restoration program to repair areas of the dune system that have been denuded by unlawful visitor-created (social) trails. Temporary closures of the Playalinda Beach area to visitor use before scheduled NASA launches and landings may continue.

The high-maintenance chemical toilet facilities at all beach access parking areas would be replaced with a more efficient and sustainable system.

Playalinda Beach Access. The access road, 13 beach parking areas that accommodate 1,032 cars and 18 recreational vehicles, and access to the beach via boardwalk dune crossovers would be retained.

A bicycle path connecting with the proposed USFWS bike path along State Route 402 into Playalinda Beach would be developed.

Entrance Station. Visitor contact by NPS personnel would continue to be provided at the existing entrance station and fee booth.

Administrative Complex. The complex, including ranger station, curatorial storage facility, and garage, would continue to serve their current functions.

Lifeguard Operations Area. The operations would be relocated closer to the beach. Structures would be converted to a small satellite maintenance staging area.

Lands/Waters South of State Route 402. To comply with NASA security concerns, public access to this area would continue to be restricted.

NASA Tracking Facilities. Public access would continue to be restricted in and around NASA tracking facilities.

Klondike Beach Area

Current management trends that emphasize preserving pristine beach conditions and protecting special status species would continue. Public access to Klondike Beach would continue to be by permit only and limited to 25 persons per day on the south end of the beach and 25 persons per day on the north end of the beach. Limits on and registration of visitor use are intended to provide opportunities for solitude, maintain pristine beach conditions, protect special status species, and ensure public safety. NPS staff would maintain an active resource monitoring and dune restoration program to repair areas of the dune system that may become denuded by unlawful visitor-created (social) trails.

Apollo Beach Area

Apollo Beach. Current management trends, such as maintaining relatively pristine beach conditions, preserving the dune system, protecting special status species, and providing for safe recreational opportunities, would continue. Preservation of the primary dune system and restriction of visitor access only to designated dune crossover trails would continue. NPS staff would maintain an active resource monitoring and dune restoration program to repair areas of the dune system that have been denuded by unlawful visitor-created (social) trails.

Apollo Beach Access. The access road, five beach parking areas accommodating a total of 194 cars, and exterior shower facility at beach parking area #1 would be retained. Provision

for convenient visitor access to beach areas via designated dune crossovers would continue.

Parking area #1 would be redesigned to accommodate oversized vehicles.

Unpaved parking for horse trailers and a primitive trail to administrative boardwalk access for horses would be provided.

Temporary closures of beach parking area #5 and half of #4 may continue before scheduled NASA launches.

When parking areas reach capacity, temporary restrictions on additional vehicular access into the Apollo Beach area would go into effect at the entrance station. However, a bicycle path would be established along national seashore roads (that extends and connects with the existing county bike trail systems) to provide an alternative mode of access.

Chemical toilet facilities would be replaced by a more sustainable system, showers would be added, and water and sewer lines would be connected to all comfort stations.

Apollo Beach Entrance Station. Visitor contact by NPS personnel would continue to be provided at the entrance station and fee booth. The entrance area would be reconfigured for safety and to provide a turnaround when parking lots are full.

Apollo Beach Visitor Information Center. The Apollo Beach Visitor Center and pavilion (scheduled for completion in 2011) would continue to serve as the primary hub for visitor activities.

The public pontoon boat tours, which originate at the visitor center and showcase Mosquito Lagoon, the Eldora State House, and Turtle Mound, would be expanded to include other areas, including Seminole Rest. The feasibility of providing a water-based commercial shuttle service using navigable channels to access other features would be explored.

Back of Alt C MAP

Turtle Mound. Current provisions for mound protection, maintenance of the self-guided interpretive boardwalk trail, waysides, and parallel parking configuration for 11 cars along the beach access road would continue. Interpretive and environmental education opportunities at Turtle Mound would be expanded, and a pavilion providing shade/rain protection for environmental education activities would be constructed. Parking space for larger vehicles, such as school buses, would be provided.

North District Maintenance Area. Most maintenance functions would be relocated from Apollo Beach and consolidated in a centralized maintenance facility at Bill's Hill area or the Stuckey property. The existing buildings at the North District Maintenance Area would be used for satellite maintenance activities.

Beach Operations Area. The garages would continue to provide storage space for life-guard operations, interpretation and resource management, law enforcement, and maintenance. The fire cache would remain.

Beach access for all terrain vehicles (ATVs) to respond to beach emergencies as well as support the turtle management program would continue over the existing administrative boardwalk dune crossover.

Eldora Hammock Area

Eldora Hammock Access. NPS staff would continue to maintain the existing access road and four parking areas (accommodating 53 cars) that provide visitor access to the Eldora historic area, interpretive trails, canoe/kayak landing, and Mosquito Lagoon. The overhead powerlines would remain.

Eldora Historic Area. The Eldora State House and dock would be preserved. Public access to the first floor would continue to be provided. Options for making the facility accessible to visitors with disabilities would be explored. Visitor understanding of this late 19th century Florida waterway community;

the early 20th century Florida environmental movement; and the interconnectedness of the natural environment, hammock community, and lagoon setting with these cultural conditions would be expanded/improved. Interpretation of the Eldora historic area would continue by providing permanent exhibits and administrative office space in the Eldora State House. The area would be studied as a cultural landscape, and key elements of the cultural landscape, including the cisterns, would be preserved.

Records relating to the Eldora historic area would be archived and catalogued in a repository in the state house. A historic museum would be established in the state house pursuant to completion of exhibit and historic furnishings plans.

Interpretive/access trails throughout the cultural landscape would be incorporated and improved. Foot trails would be extended to connect the Eldora State House with other features of the Eldora Hammock area. The dock would be expanded for administrative use and as an interpretive boat tour stop.

Sewer and water service would be extended to this area to provide potable water and replace existing septic fields.

Eldora Hammock Interpretive Trail. The trail and its wayside exhibits would remain. Interpretive opportunities, such as guided interpretive tours, would be continued.

Castle Windy Interpretive Trail. Current management trends, with provision for mound protection, use of beach parking lot #3 (accommodating 25 cars) as trailhead parking, and maintenance of the existing self-guided interpretive hammock trail to the east shoreline of Mosquito Lagoon, would continue. Additionally, a small parking area on the west side of the beach access road would be constructed, and interpretation programs would be expanded. The trail would be extended to include areas along the lagoon.

Marine Science Educational Station. The national seashore would continue to pursue

supporting research operations at these facilities.

Former Hebner Property. The garage would be removed and replaced with facilities for expanded research activities or dormitory facilities for interns. These facilities would be tied into existing research and educational operations of the university research site.

Former Feller Property. The house and dock would be offered through the National Park Service or commercial services to provide water-based recreational opportunities. The trailer pad would remain.

Former Schultz Property. The Schultz house would be preserved and would continue to be used for administrative purposes such as intermittent housing for new hires, researchers, and interns, or for staging special events. The garage would be removed because of its poor condition. If needed for storage or restrooms, it could be replaced with a compatible structure.

Lands South of Eldora Hammock. The southern portion of the Eldora Hammock (Schultz House to Gomez Grant line) would be protected and preserved. Limited access to the area via designated foot trails would be allowed to connect to sites of interpretive interest in the Joint Management Area. NPS staff would coordinate with U.S. Fish and Wildlife Service to conduct limited tours in the area. The site of the French shipwreck survivors' camp would be protected and preserved.

Northern Mosquito Lagoon (Gomez Grant line to NPS north boundary)

Boat Access Areas. The boat launch facilities, parking for 22 boat trailers, and restroom facilities, would be continued. Public access to the launch ramp would remain available 24 hours/day.

The paved boat access ramp and kayak launching area across from Apollo Beach parking area #5, as well as the parking area,

would remain. The parking area would be paved and minimally increased in capacity.

The canoe and kayak landing area accessing Mosquito Lagoon from the Eldora Hammock area would remain.

Lagoon Waters. Diverse, low impact, water-based recreational opportunities would be provided in lagoon waters while maintaining the quality of resource conditions.

NPS staff would continue to enhance its resource stewardship partnership with the U.S. Fish and Wildlife Service and the National Aeronautic and Space Administration for Mosquito Lagoon, as well as increase its monitoring efforts to better assess changes or trends in resource conditions related to the effects of public use and commercial guiding and/or harvesting activities in the lagoon. Public and commercial activities would continue to be permitted unless documented trends in resource conditions require adjusted limits on take or levels of use.

To provide for wildlife viewing and shoreline protection, a slow-speed zone would be established for boats between the Eldora State House, parking lot #7, and the first island to the west.

Lagoon Islands. The National Park Service would continue to provide for diverse, low-impact recreational opportunities on lagoon islands while maintaining the quality of resource conditions. Fourteen designated backcountry campsites with picnic tables and grills would continue to be maintained and made available for public use by permit only.

Oak Hill Area

Seminole Rest. Management of the area would continue to focus on protection and preservation of the archeological resources and the rehabilitated historic main house and caretaker's house. A small Eastern National sales outlet would continue to operate. A visitor contact station has been established on the first floor of the main house to provide

space for a visitor orientation film and exhibits pursuant to completion of a permanent exhibit plan. The upper floor of the Seminole Rest main house is used for NPS administrative purposes. The caretaker's house serves as a maintenance field office. The maintenance shed would remain.

The interpretive trail would remain. A marsh trail would be added to the site, and educational programs would be initiated.

Sundries and services (camping permits, boating tours, etc.) would be provided.

The concrete parking area that accommodates 2 handicapped parking spaces, 11 regular and 6 parallel vehicle pull-ins, 1 bus drop-off, and the satellite gravel overflow parking area accommodating 10 vehicles might be expanded.

Stuckey Property. As legislatively mandated, the Stuckey property would be purchased on a willing seller basis. A centralized visitor center/administrative headquarters and maintenance facility would be constructed on this site. Visitors could obtain orientation and interpretive information on national seashore resources. This facility would support management and maintenance needs for the entire national seashore, and it would include equipment rental (canoes, kayaks, etc.) and sundries sales. The number and type of functions in this facility could increase and be phased in as visitation increases in future years.

If funding is not available to purchase the Stuckey site, new facilities/buildings for the NPS visitor center and headquarters would be constructed in another previously disturbed location in the Bill's Hill area as provided in the NASA/NPS agreement deeding Bill's Hill to the National Park Service.

Bill's Hill Area. Enhanced recreational opportunities, such as hiking trails, camping, canoe/kayak launching, and equestrian use, would be provided in the area. Access and parking at designated trailheads would be provided for hiking and horseback riding.

Expanded interpretive opportunities via marked trails and wayside exhibits would be developed.

The area would be connected with the USFWS canoe/kayak trail along the west side of the Intracoastal Waterway, past the Gomez Grant line, and through the mangrove islands to parking lot #7 in the canoe/kayak launch area at Eldora Hammock.

Cultural and natural resources monitoring efforts would be increased in response to increased visitor use, including horseback riding. Resource staff at the new visitor center/headquarters would provide a presence and management.

An active restoration effort would be programmed to restore sites such as abandoned citrus groves to interpret the history of citrus horticulture in Florida.

USFWS/NPS Joint Management Area

Access. Temporary closures of portions of the Joint Management Area to visitor use before scheduled NASA launches and landings may continue.

Central/Southern Mosquito Lagoon. The National Park Service would continue to support USFWS lead management direction and recreational activities (boating, fishing, and waterfowl hunting) for the lagoon area south of the Gomez Grant line. Existing designated pole/troll areas would be monitored by USFWS staff to assess their effectiveness in providing protection of sensitive seagrass bed habitat. Additional pole/troll areas may be designated by USFWS staff if resource conditions indicate a need for additional protective measures. The National Park Service, U.S. Fish and Wildlife Service, and the National Aeronautics and Space Administration would continue to enhance resource management and protection of lagoon resources. The National Park Service would support potential USFWS canoe trails at Beacon 42, Max Hoeck Creek, and Bull Camp.

Boat Access Areas. The U.S. Fish and Wildlife Service would continue to provide public boat access to central Mosquito Lagoon via the two boat launching facilities along Kennedy Parkway (State Route 3) and a third along Bio Lab Road. A nonmotorized launch area for canoes is proposed along the south end of Bio Lab Road by the U.S. Fish and Wildlife Service.

The existing management agreement with the U.S. Fish and Wildlife Service for NPS maintenance of the Eddy Creek boat launch ramp and parking area would continue. Consideration would be given to a concession equipment (canoes, kayaks, etc.) rental at the boat ramp.

As per the agreement with the U.S. Fish and Wildlife Service, NPS staff would continue to provide on-site school group environmental education programs in the Eddy Creek area. The National Park Service would seek to expand these environmental education and public programs with the help of other partners.

Lands North of Haulover Canal. The National Park Service would continue to support USFWS lead management direction and recreational activities for this area. Deer and feral hog hunting areas may be considered on Merritt Island National Wildlife Refuge lands north of Haulover Canal to control populations of these species.

Manatee Viewing Area. The National Park Service would continue to support USFWS management direction and activities for this area and would coordinate with the U.S. Fish and Wildlife Service to expand the site's interpretive and educational programs.

Scrub Ridge Interpretive Trail. The National Park Service would continue to support USFWS and NASA lead management direction and self-guided interpretive opportunities for this area.

Sand Road/Trail. The National Park Service would continue to support USFWS lead management direction for this resource and

assist that agency in preserving the trail and its associated World War II observation towers.

Historic Properties. The National Park Service would continue to assist the U.S. Fish and Wildlife Service and the National Aeronautics and Space Administration with cultural resource management support for historic properties found throughout the Joint Management Area (such as Ross Hammock, "Confederate salt works," Old Haulover Canal, Clifton Schoolhouse site, and Dummit Cove). The National Park Service would coordinate with the U. S. Fish and Wildlife Service and other partners to establish historic context for these sites and to provide educational programs (on-site, off-site, and/or virtual).

Target Rock. The National Park Service would continue to assist the U.S. Fish and Wildlife Service with cultural resource preservation. Limited access to the site could include interpretive tours. Related multimedia educational materials would be provided off-site.

Bio Lab Road. USFWS staff would continue to maintain the gravel public access along Bio Lab Road for wildlife viewing, fishing, waterfowl hunting, and boat access to Mosquito Lagoon.

NASA Tracking Facilities. Public access would continue to be restricted in and around NASA tracking facilities.

Merritt Island National Wildlife Refuge

USFWS Visitor Information Center. The U.S. Fish and Wildlife Service would remain the lead agency for visitor information in the South District. Visitor orientation to the features available at the national seashore and the Merritt Island National Wildlife Refuge would continue to be provided at the USFWS visitor information center, just west of the national seashore boundary. Limited national seashore orientation (e.g., brochures and maps) would continue to be available.

NPS South District Maintenance Area.

Most maintenance functions would be relocated from the Wilson's Corner site and consolidated into a new facility in the Bill's Hill area or on the Stuckey property, if acquired. Use of the Wilson's Corner area would be returned to the U.S. Fish and Wildlife Service.

Titusville Area

National Seashore Headquarters. The National Park Service would discontinue leasing the privately owned structure in Titusville for use as the administrative headquarters. Administrative headquarters functions would be relocated into a new facility in the Bill's Hill area or on the Stuckey property, if acquired.

ALTERNATIVE D

OVERALL CONCEPT

Under alternative D, Canaveral National Seashore would be managed to focus on enhancing the existing investment in lands, resources, and facilities. The national seashore would be managed to promote outdoor recreational and interpretive educational opportunities that are consistent with preservation of the natural and cultural resources. A limited level of facility development would improve efficiencies in NPS administration and operations and enhance visitor amenities. Coordination with land-managing partners would be increased to provide additional educational opportunities and programs for visitors and enhanced monitoring of the Mosquito Lagoon resources.

VISITOR EXPERIENCE

National seashore visitors would have a relatively unstructured discovery-type experience highlighted by dispersed, low-density use levels. Expanded interpretive activities and programs and enhanced opportunities for some recreational activities, such as canoeing, kayaking, and hiking, would be provided throughout the national seashore.

Visitor contact and orientation services would occur in both the North and South districts of the national seashore. A new and enlarged visitor information center with additional restrooms would be established at Apollo Beach to accommodate school and other large groups. The facility would enable visitors to interact with NPS staff and receive educational information through various media—such as films, interactive exhibits, displays, and educational merchandise.

The visitor information center would provide shelter from the weather and access to water-based recreational equipment rental. A small equipment rental operation for bikes, canoes, and kayaks would encourage nonmotorized

access to a variety of national seashore features.

Visitor contact functions would be added within the ranger station at Playalinda Beach to provide information and perhaps include the sales of educational materials.

RESOURCE PROTECTION

Natural resource management would emphasize protection, preservation, and rehabilitation of species and ecosystem features, inventory and monitoring of resources, and applied research efforts, as well as the preservation of the national seashore's soundscape and water quality. Coordination with land-managing partners would be increased to provide a comprehensive approach to ecosystem and cultural resource management, as well as additional educational opportunities and programs for visitors.

Restoration of disturbed areas to reflect natural conditions would be a main focus of resource management efforts. Shallow water areas in the national seashore might be limited to nonmotorized travel to protect fragile seagrass areas and oyster beds.

Beaches. Beaches would remain relatively pristine and undeveloped, with emphasis on preserving a healthy dune system, using boardwalks for public access across the dunes, and restoring impacted areas.

Agreements and partnership with educational institutions could be developed for research and inventory and monitoring of national seashore resources.

Cultural Resources. Cultural resource management would continue to emphasize protection, preservation, rehabilitation, appropriate adaptive use, and interpretation of more than 180 archeological sites and historic structures—such as the Eldora State

House, Schultz House, and main house and caretaker's house at Seminole Rest—within the context of the national seashore's natural terrestrial and cultural landscapes and scenic views.

Fisheries. Under this alternative, the National Park Service would develop a separate fisheries management plan to address commercial and recreational fishing in the lagoon and offshore waters of the national seashore. This fisheries management plan would include a public involvement and environmental compliance process to determine sustainable harvest levels for shellfish, red drum, spotted sea trout, and other game fish. The National Park Service would also develop a research and monitoring program to collect baseline data in order to make informed decisions in the fisheries management plan.

Until the fisheries management plan is approved, the National Park Service would continue to voluntarily adopt the Florida Fish and Wildlife Conservation Commission's fishing regulations actively monitor and patrol fishing activities in Mosquito Lagoon to ensure state regulations are met. Commercial fishing within the lagoon waters of the national seashore would also continue to be authorized by the National Park Service through a permit system.

The U.S. Fish and Wildlife Service has decided to phase out commercial fishing by 2018 within the Merritt Island National Wildlife Refuge, which includes the NPS/USFWS joint management area of the national seashore (where the Fish and Wildlife Service has primary jurisdiction over natural resources and the National Park Service has primary jurisdiction over cultural resources). Until this time, the Fish and Wildlife Service would continue to manage fishing according to state regulations, and commercial fishing would continue to be authorized through a joint NPS/USFWS permit system. A USFWS permit would also continue to be required for recreational fishing.

NATIONAL SEASHORE OPERATIONS AND FACILITIES

A limited level of facility development would be provided to safely accommodate visitor access and services while protecting fragile resources. Facilities currently unused or used by other organizations and entities would be used by the national seashore wherever possible. A limited number of new water and sewer connections would be installed. Some new trails would extend into areas that have potential for expanding visitor understanding of national seashore resources with minimal impact.

Future arrangements to house NPS administrative functions might be provided outside Titusville if the arrangement provided a more operationally efficient and economical location. For cost efficiency, Playalinda Beach maintenance functions would be combined with the USFWS maintenance area.

AREA-SPECIFIC MANAGEMENT ACTIONS

Playalinda Beach Area

Playalinda Beach. Current management trends, such as maintaining relatively pristine beach conditions, preserving the dune system, protecting special status species, and providing for safe recreational opportunities, would continue. Preservation of the primary dune system and restriction of visitor access only to designated dune crossover trails would continue. NPS staff would maintain an active resource monitoring and dune restoration program to repair areas of the dune system that have been denuded by unlawful visitor-created (social) trails.

The high-maintenance chemical toilet facilities would be replaced with a more efficient and sustainable system.

Playalinda Beach Access. The access road, 13 beach parking areas that accommodate

1,032 cars and 18 RVs, and access to the beach via boardwalk dune crossovers would remain.

Temporary closures of the Playalinda Beach area to visitor use before scheduled NASA launches and landings may continue.

Entrance Station. Visitor contact by NPS personnel would continue to be provided at the entrance station and fee booth.

Administrative Complex. The complex, including ranger station, curatorial storage facility, and garage, would continue to serve their current functions, although a small visitor contact station would be accommodated in the ranger station.

Lifeguard Operations Area. The existing lifeguard operations functions would be relocated to an area near Eddy Creek in the interpretive storage building. Existing structures would be removed or used for storage. The administrative boardwalk dune crossover would also be reconfigured in that area to accommodate ATV emergency access.

Lands/Waters South of State Route 402. To comply with NASA security concerns, public access to this area would continue to be restricted.

NASA Tracking Facilities. Public access would continue to be restricted in and around existing NASA tracking facilities.

Klondike Beach Area

Current management trends that emphasize preserving pristine beach conditions and protecting special status species would continue.

Public access to Klondike Beach would continue to be by permit only and limited to 25 persons per day on the south end of the beach and 25 persons per day on the north end of the beach. Limits on and registration of visitor use are intended to provide opportunities for solitude, maintain pristine beach conditions, protect special status species, and ensure public safety. NPS staff would maintain

an active resource monitoring and dune restoration program to repair areas of the dune system that may become denuded by unlawful visitor-created (social) trails.

Apollo Beach Area

Apollo Beach. Current management trends, such as maintaining relatively pristine beach conditions, preserving the dune system, protecting special status species, and providing for safe recreational opportunities would continue. Preservation of the primary dune system and restriction of visitor access only to designated dune crossover trails would continue. NPS staff would maintain an active resource monitoring and dune restoration program to repair areas of the dune system that have been denuded by unlawful visitor-created (social) trails.

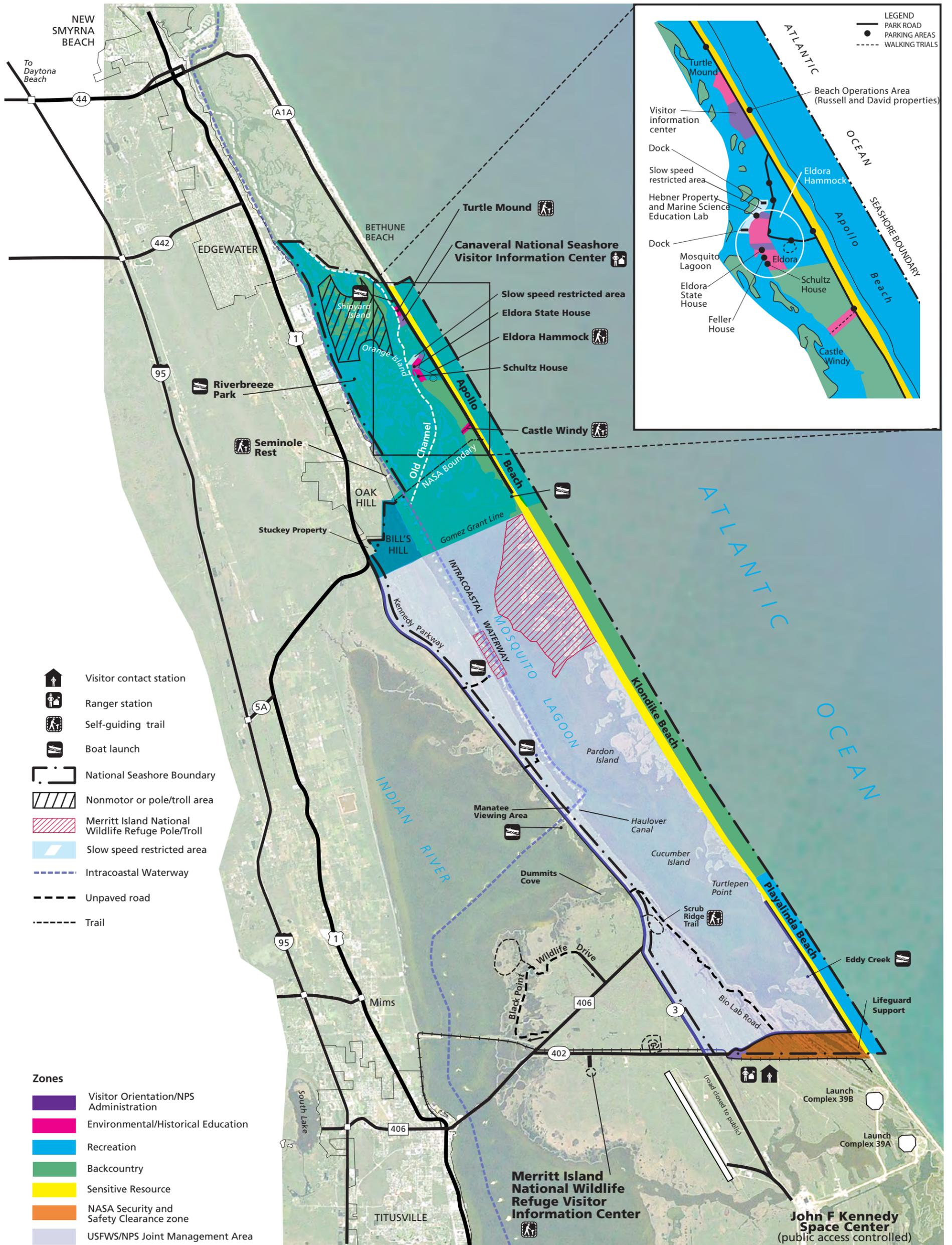
Apollo Beach Access. The access road, five beach parking areas accommodating a total of 194 cars, and exterior shower facility at beach parking area #1 would remain. Provision for convenient visitor access to beach areas via designated dune crossovers would continue.

Temporary closures of beach parking area #5 and half of #4 may continue before scheduled NASA launches.

When parking areas reach capacity, temporary restrictions on additional vehicular access into the Apollo Beach Area would continue to be managed at the entrance station.

An unpaved parking area for horse trailers and a primitive trail connection to the administrative boardwalk would be provided. Seasonal horseback riding along the shoreline areas between beach parking areas #1 and #2 would continue to be allowed.

The high-maintenance chemical toilet facilities at all beach access parking areas would be replaced with a more efficient and sustainable system. Limited water and sewer connections might be extended to some locations (beach parking areas #1 and #2).



Alternative D Canaveral National Seashore

United States Department of the Interior / National Park Service

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NOTE: To show visually, the size of zone colors have been enlarged in certain areas.

Back of ALT D Map

An exterior shower would be added at beach parking area #2.

The overhead power and telephone lines would remain in place.

Entrance Station. Visitor contact by NPS personnel would continue to be provided at the entrance station and fee booth.

Apollo Beach Visitor Information Center. The Apollo Beach Visitor Center and pavilion (scheduled for completion in 2011) would continue to serve as the primary hub for visitor activities. The current level of school programs hosted at the visitor information center pavilion and Turtle Mound, and the public pontoon boat tours—which originate at the visitor center and showcase Mosquito Lagoon, the Eldora State House, and Turtle Mound—would remain.

Turtle Mound. Current provisions for mound protection, maintenance of the self-guided interpretive boardwalk trail, waysides, and parallel parking configuration for 11 cars along the beach access road would continue.

North District Maintenance Area. North District maintenance operations would continue to be based from the existing site opposite the visitor information center. The maintenance complex would be reconfigured or redesigned to improve efficiency and eliminate internal circulation problems, provide adequate turnaround, and separate visitor traffic from maintenance traffic. The facilities would be screened from the view of visitors.

Beach Operations Area. The garages would continue to provide storage space for lifeguard operations, interpretation and resource management, law enforcement, and maintenance. The fire cache would remain.

Beach access for all terrain vehicles (ATVs) to respond to beach emergencies as well as support the turtle management program would continue over the existing administrative boardwalk dune crossover.

Eldora Hammock Area

Eldora Hammock Access. NPS staff would continue to maintain the existing access road and four parking areas (accommodating 53 cars) that provide visitor access to the Eldora historic area, interpretive trails, and Mosquito Lagoon.

The overhead power and telephone lines would remain.

Eldora Historic Area. The Eldora State House and dock would be preserved. Public access to the first floor would continue to be provided. Options for making the facility accessible to visitors with disabilities would be explored. Visitor understanding of this late 19th century Florida waterway community; the early 20th century Florida environmental movement; and the interconnectedness of the natural environment, hammock community, and lagoon setting would be expanded/improved. Interpretation of the Eldora historic area would continue by providing permanent exhibits and administrative office space in the Eldora State House. The area would be studied as a cultural landscape, and key elements of the cultural landscape, including the cisterns, would be protected and preserved.

Records relating to the Eldora historic area would be archived and catalogued in a repository in the state house. A historic museum would be established in the state house pursuant to completion of exhibit and historic furnishings plans.

Sewer and water service might be extended to this area to provide potable water and replace the existing septic field.

Eldora Hammock Interpretive Trail. The trail and its wayside exhibits would remain. Interpretive opportunities, such as guided interpretive tours, would be continued.

Castle Windy Interpretive Trail. Current management trends, with provision for mound protection, use of beach parking lot #3

(accommodating 25 cars) as trailhead parking, and maintenance of the self-guided interpretive hammock trail to the east shoreline of Mosquito Lagoon, would continue.

Marine Science Educational Station. The national seashore would continue to pursue supporting research operations at these facilities.

Former Hebner Property. The garage would continue to provide for resource management storage. Additional trailer pads would be constructed to provide for administrative functions, such as office and housing space. Utility lines would be extended.

Former Feller Property. The use agreement and partnerships would be phased out and the house would be used for NPS resource management, biological-technical, and intern research functions. The trailer pad would remain.

Former Schultz Property. The Schultz house would be preserved and continue to be used for administrative purposes such as intermittent housing for new hires, researchers, and interns, or for staging special events. The garage would be removed because of its poor condition. If needed for storage or restrooms, it could be replaced with a compatible structure.

Lands South of Eldora Hammock. The southern portion of the Eldora Hammock (Schultz House to Gomez Grant line) would be protected and preserved. The area would continue to be undeveloped and inaccessible by foot and would remain closed to visitors except for shoreline areas accessed by boat and the Castle Windy Interpretive Trail. The site of the French shipwreck survivors' camp would be protected and preserved.

Northern Mosquito Lagoon
(Gomez Grant line to NPS north boundary)

Boat Access Areas. The boat launch area across from Apollo Beach parking area #1 would continue to be maintained; however,

24-hour public access would be phased out over time to provide for controlled access at night and to enhance security. Use of the boat ramp area would be included in the national seashore entrance fee. The entrance area (gate/fee booth) would be relocated north to the national seashore boundary to control public access to the launch area.

The paved boat access ramp and kayak launching area across from beach parking area #5, as well as the undelineated gravel parking area, would remain.

The canoe and kayak landing area accessing Mosquito Lagoon from the Eldora Hammock area would continue to be maintained.

Lagoon Waters. Diverse, low-impact, water-based recreational opportunities would continue to be provided in lagoon waters while maintaining the quality of resource conditions.

NPS staff would continue to enhance its resource stewardship partnership with the U.S. Fish and Wildlife Service and the National Aeronautics and Space Administration for Mosquito Lagoon, as well as increase its monitoring efforts to better assess changes or trends in resource conditions related to the effects of public use and commercial guiding and/or harvesting activities in the lagoon. Public and commercial activities would continue to be permitted unless documented trends in resource conditions require changes to visitor use management.

Complementing recent USFWS efforts for providing proactive resource protection measures for areas containing oyster beds, fish spawning, and seagrass beds in the Shipyard Island area, the National Park Service would establish a nonmotorized or pole/troll zone to protect resources in the Shipyard Island area of the lagoon. Other such zones might also be established if monitoring indicates that resources are being impacted by overuse.

To provide for wildlife viewing and shoreline protection, a slow-speed zone would be

established for boats between the Eldora State House, parking lot #7, and the first island to the west.

There would be increased opportunities for canoeing and kayaking activities within the lagoon.

Lagoon Islands. The National Park Service would continue to provide for diverse, low-impact, recreational opportunities on lagoon islands while maintaining the quality of resource conditions. Fourteen designated backcountry campsites with picnic tables and grills would continue to be maintained and made available for public use by permit only.

Oak Hill Area

Seminole Rest. Management of the area would continue to focus on protection and preservation of the archeological resources and the rehabilitated historic main house and caretaker's house. A small Eastern National sales outlet would continue to operate. A visitor contact station has been established on the first floor of the main house to provide space for a visitor orientation film and exhibits pursuant to completion of an exhibit plan. The upper floor of the Seminole Rest main house is used for NPS administrative purposes. The caretaker's house serves as a maintenance field office. The maintenance shed would remain. The interpretive trail would remain.

Interpretive opportunities at the site would be expanded. A self-guided interpretive trail would be developed through an adjacent marsh area, and educational programs would be initiated.

The concrete parking area accommodating 2 handicapped parking spaces, 11 regular and 6 parallel vehicle pull-ins, 1 bus drop-off, and the satellite gravel overflow parking area for 10 vehicles would remain.

Stuckey Property. As legislatively mandated, the Stuckey property would be purchased on a

willing seller basis. Once acquired, a trailhead and parking area would be constructed.

Bill's Hill Area. Opportunities for dispersed recreation (including canoe/kayak, hiking, and horseback riding trails) would be enhanced; interpretation would be enhanced through marked trails and wayside exhibits. A canoe/kayak landing and water trail connection would be established with the proposed USFWS canoe/kayak trail along the west side of the Intracoastal Waterway south of the Gomez Grant line. Additional routes through the mangrove islands would connect to the existing canoe/kayak launch area at parking area #7 in the Eldora Hammock area. Access and parking for designated trailheads would be provided.

Cultural and natural resources monitoring efforts would be increased to provide limited access for visitor backcountry experience. An archeological survey would be implemented to document sites. Resource monitoring would be provided by staff at nearby Seminole Rest.

An active restoration effort would be programmed to restore sites such as abandoned citrus groves to interpret the history of citrus horticulture in Florida.

USFWS/NPS Joint Management Area

Access. Temporary closures of portions of the Joint Management Area to visitor use before scheduled NASA launches and landings may continue.

Central/Southern Mosquito Lagoon. The National Park Service would continue to support USFWS lead management direction and recreational activities (boating, fishing, and waterfowl hunting) for the lagoon area south of the Gomez Grant line. Existing designated pole/troll areas would be monitored by USFWS staff to assess their effectiveness in providing protection of sensitive seagrass bed habitat. Additional pole/troll areas may be designated by USFWS staff if resource conditions indicate a need for

additional protective measures. The National Park Service, U.S. Fish and Wildlife Service, and the National Aeronautics and Space Administration would continue to enhance resource management and protection of lagoon resources. The National Park Service would support potential USFWS canoe trails at Beacon 42, Max Hoeck Creek, and Bull Camp.

Boat Access Areas. The U.S. Fish and Wildlife Service would continue to provide public boat access to central Mosquito Lagoon via two boat launching facilities along Kennedy Parkway (State Route 3) and a third along Bio Lab Road. A nonmotorized launch area for canoes is proposed along the south end of Bio Lab Road by the U.S. Fish and Wildlife Service.

At the Eddy Creek boat launch area, at the south end of the lagoon, the management agreement with the U.S. Fish and Wildlife Service for NPS maintenance of the public boat launch ramp and parking area would continue.

As per the agreement with the U.S. Fish and Wildlife Service, NPS staff would continue to provide on-site school group environmental education programs in the Eddy Creek area. The National Park Service would seek to expand these environmental education and public programs with the help of other partners.

Lands North of Haulover Canal. The National Park Service would continue to support USFWS lead management direction and recreational activities for this area. Deer and feral hog hunting areas may be considered on Merritt Island National Wildlife Refuge lands north of Haulover Canal to control populations of these species.

Manatee Viewing Area. The National Park Service would continue to support USFWS lead management direction and self-guided interpretive opportunities for this area. The National Park Service would assist USFWS efforts to expand the site's interpretive and educational programs.

Scrub Ridge Interpretive Trail. The National Park Service would continue to support USFWS and NASA lead management direction and self-guided interpretive opportunities for this area.

Sand Road/Trail. The National Park Service would continue to support USFWS lead management direction for this resource and assist that agency in preserving the trail and its associated World War II observation towers.

Historic Properties. The National Park Service would continue to assist the U.S. Fish and Wildlife Service and the National Aeronautics and Space Administration with cultural resource management support for historic properties found throughout the Joint Management Area (such as Target Rock, Ross Hammock, "Confederate salt works," Old Haulover Canal, Clifton Schoolhouse site, and Dummit Cove). The National Park Service would coordinate with the U. S. Fish and Wildlife Service and other partners to establish historic context for these sites and to provide educational programs (on-site, off-site, or virtual).

Bio Lab Road. USFWS staff would continue to maintain public access along Bio Lab Road for wildlife viewing, fishing, waterfowl hunting, and boat access to Mosquito Lagoon.

NASA Tracking Facilities. Public access would continue to be restricted in and around NASA tracking facilities.

Merritt Island National Wildlife Refuge

USFWS Visitor Information Center. The U.S. Fish and Wildlife Service would remain the lead agency for visitor information in the South District. Visitor orientation to the features available at the national seashore and the Merritt Island National Wildlife Refuge would continue to be provided at the USFWS visitor information center, just west of the national seashore boundary. Limited national seashore orientation (e.g., brochures and maps) would remain.

NPS South District Maintenance Area. To improve operational efficiency, the NPS South District maintenance operations at Wilson's Corner would be relocated and consolidated into a new multiagency facility in USFWS maintenance area adjacent to their visitor center.

Titusville Area

NPS Headquarters. When the lease arrangement for the national seashore headquarters in Titusville expires, future lease negotiations or in-house development might occur in another area (including Volusia County) if the arrangement provided a more operationally efficient and economical location.

COST ESTIMATES

To make wise planning and management decisions for the national seashore, NPS decision makers and the public must consider an overall picture of the advantages, disadvantages, and general costs of the no-action and action alternatives. By including the no-action alternative, a comparison can be made between the action alternatives and the current national seashore management practice.

It is important that the cost estimates contain the same elements and that they be developed with the same general assumptions so that there can be consistency and comparability among alternatives. In table 4, the costs are presented as applied to the types and general intensities of development; they are presented by alternative and in a comparative format. (Definitions of terms in the table are explained in the text in this section.) The following caveats apply.

- The costs are presented as estimates and allow for flexibility in application of components.
- These costs are not appropriate for budgeting purposes.
- The costs presented have been developed using industry standards to the extent available.
- Actual costs would be determined at a later date, considering the design of facilities, identification of detailed resource protection needs, and changing visitor expectations.
- The approval of a general management plan does not guarantee that funding and staffing needed to implement the plan would be forthcoming. Funding for capital construction improvements is not currently shown in NPS construction programs. It is not likely that all capital improvements would be totally implemented during the life of the plan. Larger capital improvements may be phased over several years. Actions directed by general management plans or

in subsequent implementation plans are accomplished over time. Budget restrictions, requirements for additional data or regulatory compliance, and competing national park system priorities could prevent immediate implementation of many actions. Major or especially costly actions could be implemented 10 or more years into the future.

- Full implementation of the general management plan may be years in the future.

The estimates provided in table 4 include annual operating costs, staffing levels, one-time facility costs, and one-time nonfacility. A definition of each of these types of costs follows:

- **Annual Operating Costs** are the total costs per year for maintenance and operations associated with each alternative, including utilities, supplies, staff salaries and benefits, leasing and other materials. Cost and staffing estimates assume that the alternative is fully implemented as described.
- **Staffing** is the total number of person-years of staff required to maintain the assets of the park at an acceptable level, provide visitor services, protect resources, and generally support the park's operations. The full-time equivalency (FTE) number indicates NPS-funded staff, not volunteer positions or positions funded by partners. Full-time equivalency salaries and benefits are included in the annual operating costs.
- **One-time Facility Costs** include those for the design, construction, rehabilitation, or adaptive reuse of visitor centers, roads, parking areas, administrative facilities, comfort stations, educational facilities, fire stations, maintenance facilities,

- museum collection facilities, and other visitor facilities.
- **One-time Nonfacility Costs** include actions for the preservation of cultural or natural resources not related to facilities, the development of visitor use or management tools, and other park management activities that would require substantial funding above annual operating costs.

Staffing and annual operating cost estimates for the action alternatives are calculated by taking the staffing and annual operating costs under the no-action alternative and adding additional staffing and annual operating costs associated with their implementation.

There are no “other costs” associated with implementation of the alternatives. Other costs are for projects that are wholly or partially funded from other sources.

TABLE 4: COST COMPARISONS FOR EACH ALTERNATIVE (IN 2010 DOLLARS)

	NO ACTION	ALTERNATIVE B (NPS PREFERRED)	ALTERNATIVE C	ALTERNATIVE D
Annual Operating Costs	\$3.2 million	\$3.9 million	\$4.2 million	\$4.1 million
Staffing (FTEs)	53	63.5	68.5	65.5
Additional Interpretive Rangers	0	5	6.5	5
Additional Law Enforcement Rangers	0	2	2	2
Additional Resource Management Staff	0	1	2	1
Additional Maintenance Staff	0	2.5	4	4
Additional Administrative Staff	0	0	1	.5
Total One-time Facility Costs	\$10.1 million	\$19.3 million	\$35.8 million	\$17.5 million
Attend to Deferred Maintenance Backlog	\$9.5 million	\$9.5 million	\$9.5 million	\$9.5 million
Rehab Existing Infrastructure	\$0	\$0.1 million	\$0.3 million	\$0.1 million
Enhance Visitor Understanding of and Orientation to Seashore Resources	\$0.1	\$0.5 million	\$5.8 million	\$0.9 million
Improve Visitor Access to Seashore Resources	\$0	\$5.3 million	\$5.9 million	\$1.6 million

	NO ACTION	ALTERNATIVE B (NPS PREFERRED)	ALTERNATIVE C	ALTERNATIVE D
Extend or Provide New Utility Service for Enhanced Visitor Services	\$0.5 million	\$0.5 million	\$5.8 million	\$2.1 million
Complete Miscellaneous Site Work to Enhance Visitor Experience	\$0	\$1.5 million	\$0	\$0
Expand Existing and/or Construct Contemporary Structures to Enhance Operational Efficiency	\$0	\$1.9 million	\$8.5 million	\$3.3 million
Total One-time Nonfacility Costs	\$0	\$2.1 million	\$2.1 million	\$2.1 million
Restore Areas to Natural Conditions	\$0	\$0.1 million	\$0.1 million	\$0.1 million
Conduct other resource management initiatives (plans, studies, and assessments)	\$0	\$2.0 million	\$2.0 million	\$2.0 million

NOTE: All costs have been rounded to the nearest \$100,000. Cost and staffing estimates assume that the alternative is fully implemented as described in the narrative.

ALTERNATIVE A (NO ACTION)

The NPS staffing level under the no-action alternative would continue to be 53 FTEs. This includes the 2 employees in the superintendent’s office, 3 in administration, 19 in maintenance, 13 in interpretation/visitor use, 4 in resource management, and 12 in law enforcement. Volunteers and partners would continue to be key contributors to NPS operations of the national seashore.

One-time facility costs under the no-action alternative consists primarily of deferred maintenance projects on roads, parking areas, trails/boardwalks, maintained landscapes, buildings, utilities, marina/waterfront systems, and swim beaches. These projects total \$9.5 million. The other one-time facility cost

include new utility services at Oat Hill (\$0.5 million).

ALTERNATIVE B (NPS PREFERRED)

NPS staffing level to implement alternative B would be the equivalent of 63.5 full-time staff members—10.5 additional FTEs compared to the no-action alternative. This increase in staffing is primarily needed to expand visitor services and resource protection efforts. It includes five additional interpretive rangers, two additional law enforcement rangers, one additional resource management staff, and two and a half additional maintenance staff.

Justification for these staffing increases follows:

5.0 FTE – Division of Interpretation and Education

The addition of five interpretive rangers would allow the park to meet its optimal level of services over the next 15-20 years by enhancing interpretive and educational programs at Seminole Rest, Eldora State House, Playalinda, and Apollo districts. The additional staffing would allow us to improve the 50,000 annual interpretive contacts made by a staff of three permanent employees and to more effectively interact with an annual visitation of over 1 million visitors. Contacts include boat and canoe programs, turtle watch programs, environmental education programs, public programs, outreach, and media contacts.

2.0 FTE – Division of Visitor and Resource Protection

A key component of the preferred alternative is the implementation of an additional poll/troll area in the northern portion of the lagoon. Sufficient law enforcement is necessary to regulate boating activities in this area. The additional two law enforcement rangers would better position the seashore to be able to provide sufficient levels of visitor and resource protection.

1.0 FTE – Division of Resource Management

The current staffing level for this division is two permanent FTEs. The seashore's complexity includes a coastal barrier island system, a dune vegetation system, Mosquito Lagoon, historic landscapes, and over 180 archeological sites. The park is comprised of approximately 57,000 acres distributed among three districts, including 24 miles of pristine coast—the longest stretch of undeveloped coastline in the eastern United States. The addition of one employee to the resource management division would allow the seashore to focus on preserving and rehabilitating species and ecosystem features and to provide enhanced monitoring of

Mosquito Lagoon—key aspects of the preferred alternative.

2.5 FTE – Division of Facilities Management

The additional staffing would be needed to maintain current levels of facilities, grounds, roads, trails, boardwalks, boat access areas, restrooms, and parking lots. The seashore includes 13 parking areas in the Playalinda District that accommodate 1,032 cars and 18 recreational vehicles, and 5 parking areas in the Apollo District that accommodate 194 cars. Although the preferred alternative does not propose additional facilities, maintenance needs would be increased due to the enhancement of programs and the emphasis on preserving and enhancing the natural and historic features of the seashore.

One-time facility costs of alternative B total \$20.8 million. These costs include the same deferred maintenance projects listed under the no-action alternative (\$9.5 million). Other one-time facility costs include establishing bike paths along seashore roads (\$3.8 million); improving access and parking at designated trailheads (\$0.9 million); burying all overhead powerlines (\$1.4 million); and installing more sustainable restrooms at the Apollo Beach and Playalinda Beach access areas (\$1.7 million).

One-time nonfacility costs are needed to conduct resource management initiatives, such as restoring dune areas impacted from social trailing, conducting habitat assessments and cultural resource inventories, and completing implementation-level plans, such as fisheries management and commercial services plans (\$2.1 million).

ALTERNATIVE C

The NPS staffing level to implement alternative C would be the equivalent of 68.5 full-time staff members—15.5 additional FTEs compared to the no-action alternative. This increase in staffing is primarily needed to expand visitor services and resource protection efforts. It includes six and a half

additional interpretive rangers, two additional law enforcement rangers, two additional resource management staff, four additional maintenance staff, and one additional administrative staff.

One-time facility costs of alternative C total \$35.8 million. These costs include the same deferred maintenance projects listed under the no-action alternative (\$9.5 million). Other one-time facility costs include constructing a new visitor center/headquarters facility in the Bill's Hill area (\$4.8 million); establishing bike paths along seashore roads (\$3.8 million); improving access and parking at designated trailheads (\$0.9 million); extending utility services at Apollo Beach, Bill's Hill, and Seminole Rest (\$5.8 million); installing more sustainable restrooms at Playalinda Beach access area (\$1.2 million); and centralizing seashore maintenance facilities (\$4.9 million).

One-time nonfacility costs are needed to conduct resource management initiatives, such as restoring dune areas impacted from social trailing, conducting habitat assessments and cultural resource inventories, and completing implementation-level planning, such as fisheries management and commercial services plans (\$2.1 million).

ALTERNATIVE D

The NPS staffing level to implement alternative D would be the equivalent of 65.5 full-time staff members—12.5 additional FTEs compared to the no-action alternative. This increase in staffing is primarily needed to expand visitor services and resource protection efforts. It includes five additional interpretive rangers, two additional law enforcement rangers, one additional resource management staff, four additional maintenance staff, and one additional part-time administrative staff.

One-time facility costs of alternative D total \$17.5 million. These costs include the same deferred maintenance projects listed under the no-action alternative (\$9.5 million). Other one-time facility costs include new access and

parking areas at designated trailheads (\$0.9 million); extending utility services at Apollo Beach (\$1.6 million); installing more sustainable restrooms at Playalinda Beach access area (\$1.2 million); and reconfiguring maintenance functions (\$1.1 million).

One-time nonfacility costs are needed to conduct resource management initiatives, such as restoring dune areas impacted from social trailing, conducting habitat assessments and cultural resource inventories, and completing implementation-level planning, such as fisheries management and commercial services plans (\$2.1 million).

LAND ACQUISITION

This plan does not propose acquisition of any lands outside the already authorized boundary. The only property in the authorized boundary that is not currently in fee ownership is the Stuckey property south of Oak Hill. The National Park Service would continue to work toward the acquisition of this property through donation or purchase from a willing seller only. In either case, merely adding this property to the national seashore does not immediately make funds available for site maintenance, restoration, construction, or operation. Costs to acquire the Stuckey property are not included as part of this plan.

MITIGATIVE MEASURES COMMON TO ALL ACTION ALTERNATIVES

In the legislation that created the National Park Service, Congress charged the agency with managing lands under its stewardship “in such manner and by such means as would leave them unimpaired for the enjoyment of future generations” (National Park Service Organic Act). As a result, the National Park Service routinely considers and implements mitigative measures whenever activities that could adversely affect the resources or systems are anticipated. Mitigation means to take action to avoid, reduce, or compensate for the effects of environmental damage.

A common set of mitigative measures would be applied to the action alternatives in this *General Management Plan*. The National Park Service would avoid, minimize, and mitigate adverse impacts whenever practicable.

New facilities would be sited to minimize impacts on resources, including avoiding wetlands and sensitive areas and placing new facilities as close to existing disturbances as feasible.

NATURAL RESOURCES

Geology and Soils

Measures to control impacts on soils and geologic resources would include incorporating structures such as sand ladders, boardwalks, and sidewalks to reduce impacts on the substrate; erosion and sediment controls such as silt fences and hay bales; and storm water management practices such as infiltration and detention basins. Steep slopes and inundated areas would be avoided. Activities with the potential to disturb natural resources would be monitored for use-related impacts.

Construction permits would be obtained and complied with to minimize potential for adverse effects. If construction projects would disturb more than 1 acre combined, a National Pollutant Discharge Elimination

System (NPDES) General Permit for Storm Water Discharge from Large Construction Activities would be required. The state of Florida requires an environmental resource permit before any construction project is initiated that would affect wetlands, alter surface water flows, or contribute to water pollution. Storm water discharges must meet state water quality standards, as outlined in *Florida Administrative Code 62-302*.

Site-specific soil surveys would be conducted to determine if any engineering limitations are present. This information would be incorporated into design and construction of facilities.

Disturbed areas would be revegetated with native plants in a timely period, and disturbed areas would be monitored for invasive species.

Floodplains

Surveys for floodplains would be carried out prior to facility development, and the information would be used to avoid or minimize any impacts to floodplains. To prevent water pollution during construction, erosion control measures and storm water management techniques would be used to minimize discharge to floodplains. The use of heavy equipment adjacent to and in waterways would be minimized. If parking areas are paved, an oil/water separator system would be installed.

New facilities and construction would be sited outside floodplains to the extent practicable, or if that is not possible, to otherwise comply with Executive Order 11988 “Floodplain Management.”

The preparation of a “Floodplain Statement of Findings” would be required for any action that would result in adverse impacts on floodplains, in compliance with NPS Director’s Order 77-2: *Floodplain Management*.

Wetlands

Wetlands potentially affected by new facilities would be delineated by qualified NPS staff or certified wetland specialists and clearly marked before construction work. Wetlands would be avoided or impacts would be minimized to the degree practicable. Facilities would be sited to avoid wetlands, or if that is not practicable, to otherwise comply with Executive Order 11900, "Protection of Wetlands" and regulations of the Clean Water Act (CWA). Permits would need to be acquired under Section 404 of the act before conducting any activities that could cause adverse impacts on wetland habitats, such as the discharge of dredge and fill material. Mitigation would likely be required to compensate for unavoidable impacts.

The preparation of a "Wetland Statement of Findings" would be required for any action that would result in adverse impacts on wetlands, in compliance with the NPS "no net loss of wetlands" goal and other stipulations of Director's Order #77-1.

Boardwalks would be constructed in certain areas to avoid direct impacts on wetlands. If the parking areas are paved, pollutants in runoff would be mitigated by the use of best management practices for treatment of storm water in paved areas.

Water Resources

Impacts on water resources would be mitigated during and after construction activities. These would include incorporating structures to limit impacts and nonstructural (procedural) techniques. Construction activities would include standard soil erosion, spill prevention, and storm water runoff prevention methods. Specific measures may include oil/water separators, silt fencing, boardwalks, and sand ladders, to avoid erosion and runoff into flowing water environments or during storms. Activities with the potential to disturb natural water resources would be monitored for use-related impacts.

Structural mitigation measures could include soil erosion control devices, use of permeable surfaces, and vegetated or natural filters to trap or filter stormwater runoff. Construction activities in or near waterways would be minimized to the extent practicable.

In some areas, reducing permissible speed limits for motorized watercraft may alleviate sediment resuspension (turbidity), water pollution, shoreline erosion, and disturbance of aquatic life.

Vegetation and Wildlife

Surveys for sensitive wildlife and vegetation species would be carried out before construction activities to allow for facility design that would avoid sensitive plant species and sensitive habitat. Construction activities would be timed to result in the least impact on wildlife species, especially during nesting periods.

Soundscapes

Under all four alternatives, standard noise abatement measures would be implemented, as appropriate, during national seashore operations and construction activities. Examples include scheduling activities so that impacts are minimized, use of the best available noise control techniques, use of hydraulically or electrically powered tools, and situating noise-producing machinery as far as possible from sensitive uses or resources.

Efforts would be made to separate public and administrative/maintenance traffic, which could reduce adverse impacts from vehicle noise in certain areas. Construction activities would be scheduled for hours that would minimize the impact on the natural soundscape. The idling of motors during construction would be minimized. Facilities would be located and designed to minimize objectionable noise.

Air Quality

Measures to control dust and erosion during construction would be implemented and could include the following: water or otherwise stabilize soils, minimize vegetation clearing, revegetate with native species, cover haul trucks, and employ speed limits on unpaved roads.

NPS vehicle emissions would be minimized by using the best available technology whenever possible.

Night Sky

Outdoor lighting for new or rehabilitated facilities would be the minimum amount required to provide for personal safety. Lights would also be shielded and/or directed downward to minimize impact on the night sky and disorientation of sea turtles.

Threatened and Endangered Species

Surveys would be conducted, as appropriate, for threatened and endangered species and species of concern before ground-disturbing activities are undertaken. The information would be used to mitigate for or avoid impacts on listed species.

Conservation measures would be implemented in consultation with the U.S. Fish and Wildlife Service and would be required if

- activities expected to have impacts on listed species or their designated critical habitat beyond those addressed in this document were initiated
- additional species occurrences were identified within the national seashore

Should any of the above events occur, renewed discussion and consultation with the U.S. Fish and Wildlife Service would focus on development of specific conservation

measures to reduce potential impacts on these species and/or designated critical habitat.

CULTURAL RESOURCES

Archeological Resources

The Archeological Resources Protection Act of 1979 requires that all federal land managers develop plans for surveying lands under their control to determine the nature and extent of archeological resources on those lands. Funding for a comprehensive survey has been requested, and site-specific surveys continue to be conducted in the interim. The following procedures would be taken to ensure that archeological resources are not lost or damaged due to NPS activities:

As appropriate, archeological surveys and/or monitoring would precede any construction. Known archeological resources would be avoided to the greatest extent possible. If archeological resources listed in or eligible for listing in the National Register could not be avoided, an appropriate mitigation strategy would be developed in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes. If during construction previously undiscovered archeological resources were uncovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy could be developed in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes.

Archeological sites would continue to be managed to preserve their documented values in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties and Archeological Documentation*.

Human Remains

In the event that human remains, funerary objects, sacred objects, or objects of cultural patrimony were discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) and other applicable laws would be followed.

Ethnographic Resources

Ethnographic resources are defined by the National Park Service as any “site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (Director’s Order #28: *Cultural Resource Management Guideline*, 181).

Canaveral National Seashore staff would consult with associated American Indian tribes to develop and accomplish programs in a way that respects the beliefs, traditions, and other cultural values of the American Indian tribes who have ancestral ties to national seashore lands. NPS staff would maintain government-to-government relations with associated tribes to ensure a collaborative working relationship, and would consult regularly with them before taking actions that would affect natural and cultural resources that are of interest and concern to them. Access to, and ceremonial use of, American Indian sacred sites by American Indian religious practitioners would be accommodated in a manner that is consistent with national seashore purposes and applicable law, regulations, and policy.

Historic Structures

Historic structures and landscapes have been identified and evaluated in the 2008 historic resource study. However, not all have been fully documented or nominated to the National Register. Until that action has

occurred, however, all properties listed on or appearing to meet National Register criteria, including those identified in the 2008 historic resource study, would be treated as though they are listed. No action affecting any of these resources may proceed without appropriate consultation with the state historic preservation officer and documentation of the action under Section 106 of the National Historic Preservation Act of 1966, as amended, as promulgated under the Advisory Council on Historic Preservation’s “Regulations for the Protection of Historic and Cultural Properties” (36 CFR 800).

Cultural Landscapes

A cultural landscape is defined as “a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions (Director’s Order #28: *Cultural Resource Management Guideline*).

Four cultural landscapes have been identified in the national seashore: Eldora Historic District, Haulover Canal, Indian River Citrus Landscape, and Seminole Rest. Cultural landscapes would continue to be surveyed, inventoried, and evaluated under National Register of Historic Places criteria to determine eligibility for listing in the National Register. Listed, as well as determined eligible, cultural landscapes would be managed to preserve their natural resource values and culturally significant character defining patterns and features in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.

THE ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The National Park Service is required to identify the environmentally preferable alternative in its environmental impact analysis documents for public review and comment. The National Park Service, in accordance with the Department of the Interior policies contained in the *Department Manual* (516 DM 4.10) and the *Council on Environmental Quality's Forty Questions*, defines the environmentally preferable alternative (or alternatives) as the alternative that best promotes the national environmental policy expressed in the National Environmental Policy Act (Section 101(b)). Section 101 states that "it is the continuing responsibility of the federal government to

- (1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- (2) ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- (3) attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- (4) preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- (5) achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities; and
- (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources" (NPS DO-12 Handbook, Section 2.7D).

The alternatives do not differ much with respect to criteria 1 and 6; therefore the evaluation focuses on criteria 2, 3, 4, and 5.

Alternative A, the no-action alternative, represents "business as usual" and was included to provide a baseline against which to compare the effects of the other (action) alternatives. Alternative A partially meets criterion 2; the current imbalance between visitor amenities and facilities is not fully addressed. Alternative A partially realizes criterion 3 because it does not comprehensively address challenges in the areas of resource protection and visitor use that face the national seashore now and in the future. Alternative A also does not fully realize criterion 4 because it does not provide improved protections for and visitor access to historic, cultural, and natural resources. Alternative A only partially realizes criterion 5 because it does not address changes in visitation patterns at the national seashore.

Alternative B, the NPS preferred alternative, fully realizes criterion 2 by enhancing facilities and protecting resources in a safe and aesthetically pleasing manner, such as the enhancement proposed for the Apollo Beach entrance station. Alternative B fully realizes criterion 3 by providing the highest degree of protection for natural resources and reducing human intrusion into the environment. Alternative B fully meets criterion 4 by enhancing preservation of cultural and historic resources and improving related natural heritage resources, such as restoration of several historic features. Alternative B fully realizes criterion 5 because it emphasizes improvements in facilities that would enhance visitor experiences in a variety of settings.

Alternative C realizes criteria 2 and 3 to a lesser degree than alternative B because of a greater emphasis on visitor services and less emphasis on environmental protection. Alternative C only partially meets criterion 4 because the focus of this alternative is to provide more visitor opportunities and access to resources. Alternative C fully realizes criterion 5 because of the emphasis on a wide range of visitor experiences and educational

opportunities that would accommodate changing visitor use patterns. This includes new visitor amenities at Apollo Beach and Turtle Mound (including commercial services and increasing parking capacity in several areas).

Alternative D fully realizes criterion 2 by providing continued safe and pleasing surroundings. Alternative D only partially realizes criterion 3 by emphasizing restoration while still allowing for visitor use in many areas. Alternative D partially realizes criterion 4 with some emphasis on resource protection and enhancement of existing facilities. Alternative D realizes criterion 5 by greatly enhancing visitor education and substantially

improving visitor contact areas and interpretation opportunities. However, it does not provide the widest range of recreational opportunities as in alternative C.

After considering the environmental consequences of the four management alternatives, including consequences to the human environment, the National Park Service has concluded that alternative B, the NPS preferred alternative, is also the environmentally preferable alternative. This alternative best realizes the full range of national environmental policy goals as stated in section 101 of the National Environmental Policy Act.

KEY IMPLEMENTATION PLANS TO FOLLOW THIS GENERAL MANAGEMENT PLAN

A number of more topic-specific investigations, studies, and planning efforts are needed to more fully define the details of how best to achieve and maintain the desired future conditions of the resource and visitor experience defined under the approved general management plan. The list includes the following:

- **Resource Stewardship Strategy**
This document would identify national seashore resources, establish desired resource conditions, and provide guidance on how best to prioritize and sequence management actions to meet desired conditions.
- **Fisheries Management Plan**
The National Park Service would develop a plan for management of the fisheries in the lagoon and offshore waters of the national seashore in relation to the USFWS plans and other federal and state policies. The plan would include a public involvement and environmental compliance process to determine sustainable harvest levels for shellfish, red drum, spotted sea trout, and other game fish. The National Park Service would also develop a research and monitoring program to collect baseline data in order to make informed decisions.
- **Scrub-Jay Habitat Assessment (Bill's Hill Area)**
This plan may be completed as a part of the Resource Stewardship Strategy. It would look at the quality of the environment within the Bill's Hill area as a means to encourage scrub habitat for the threatened Florida scrub-jay.
- **Archeological Survey (national seashore-wide)**
NPS policy and section 110 of the National Historic Preservation Act of 1966, as amended, require complete archeological survey of all National Park Service Areas. Canaveral NS has not yet had such an evaluation. Lack of such a survey inhibits development, hampers management decisions, and may result in the loss or damage of significant archeological resources.
- **Cultural Landscape Inventory (Eldora Hammock area and Seminole Rest)**
A cultural landscape inventory would identify significant resources that should be protected as a part of the cultural significance of these important sites. The inventory would lead to a decision regarding the eligibility of these landscapes for inclusion on the National Register of Historic Places.
- **Visitor Use Management Plan**
This plan would identify the types and levels of visitor and other public use that can be accommodated while sustaining the desired resource conditions and visitor experiences that complement the purpose of the national seashore.
- **Comprehensive Interpretive Plan**
This plan addresses both interpretation and visitor information. It addresses the entire spectrum of services and duties performed by interpretive rangers. It identifies what is important to tell visitors and provides guidance for disseminating that information.
- **Commercial Services Plan (recreational equipment rental and transportation shuttle)**
A commercial services plan would provide guidance to the national seashore for provision of services most appropriately undertaken by the private sector.
- **Soundscape Management Plan**
A soundscape management plan provides guidance for restoration of natural sound

conditions that have become degraded over time.

- **National Seashore Administrative History**

This document is a comprehensive history of park management.

- **Historic Structure Reports**

Historic Structure Reports for Eldora State House and the Schultz-Leeper House should be completed to determine treatment and use of these resources.

- **Cultural Landscape Reports**

Cultural Landscape Reports should be completed for Seminole Rest, Eldora State House, Haulover Canal, and Indian River Citrus Landscape to determine treatment and use of these resources.

ALTERNATIVES OR ACTIONS CONSIDERED BUT DISMISSED

No fully developed alternatives or actions were considered and dismissed. The alternatives proposed in this plan include the range of actions and alternatives proposed by the public and staff during scoping and in later phases of the planning process.

TABLE 5: SUMMARY COMPARISON OF ALTERNATIVES

Alternative A		Alternative B		Alternative C		Alternative D	
CONCEPT							
Concept	There would be no change in the current management direction for the foreseeable future. The National Park Service would continue to manage Canaveral National Seashore under the overall operational direction provided in its enabling legislation and interagency/ cooperative agreements with the National Aeronautics and Space Administration and the U.S. Fish and Wildlife Service. The latter agreement defines the general boundaries of jointly managed areas in and around Mosquito Lagoon and delineates responsibilities of the two agencies for cooperative administration and management of the area.	Canaveral National Seashore would be managed to preserve and enhance the natural and historic landscape features associated with the national seashore’s eastern Florida coastal barrier island system. Emphasis would be placed on retaining the national seashore’s relatively undeveloped character and providing uncrowded experiences by dispersing visitors through a shuttle service or canoe, kayak, hiking and walking trails, and bicycle trails.	Canaveral National Seashore would be managed as a place where visitors would explore and experience a wide range of opportunities that would be designed to provide an in-depth understanding of the natural and cultural history of eastern coastal Florida. When visitors enter the national seashore, they would be presented with choices for alternative modes of access to land- and water-based natural and cultural features, appropriate recreational opportunities, and educational pursuits.	Canaveral National Seashore would be managed to focus on enhancing the existing lands, resources, and facilities. The national seashore would be managed to promote outdoor recreational and educational opportunities that are consistent with preservation of the national seashore’s natural and cultural resources. Limited facility development would provide more efficient NPS administration and operations and enhanced visitor amenities. Coordination with land-managing partners would be increased to provide additional educational opportunities and programs for visitors and enhanced monitoring of Mosquito Lagoon resources.			
PLAYALINDA BEACH AREA							
Playalinda Beach	Restrooms would be maintained. No new facilities would be developed	Restrooms would be replaced; new bicycle trail would be developed along roadway.	Restrooms would be replaced; new bicycle trail would be developed along roadway.	Restrooms would be replaced.			
Entrance Station	Entrance station would be maintained.						
Administrative Complex	The ranger station would be maintained.	Visitor contact station would be accommodated in the ranger station.	No change.	Visitor contact station would be accommodated in the ranger station.			
Lifeguard Operations Area	The current level of lifeguard operations would continue.	The desirability of moving lifeguard operations to Eddy Creek would be evaluated. Structures might be removed or repurposed, and the administrative boardwalk dune crossover would be reconfigured.	Lifeguard operations would be moved closer to beach; existing structures would be repurposed.	Lifeguard operations would be moved to Eddy Creek, structures would be removed or repurposed, and the administrative dune cross-over boardwalk would be reconfigured.			

Table 5: Summary Comparison of Alternatives

	Alternative A	Alternative B	Alternative C	Alternative D
Lands/Waters S. of S.R. 402	This area would continue to be managed for its natural resources. Public access would continue to be restricted in accordance with NASA security concerns			
NASA Tracking Facilities	Public access would continue to be restricted in and around NASA tracking facilities.			
KLONDIKE BEACH				
	Managed for protection of endangered species and preservation of pristine beach conditions. Public access limited.			
APOLLO BEACH				
Apollo Beach Access	Managed for beach/dune preservation and visitor use. Chemical toilets remain. Access to beach restricted when parking lots are full. Use of unpaved parking for horse trailer parking continues	Bicycle trails and new bus access might be developed, toilets would be replaced, and powerlines would be placed underground.	Some parking would be redesigned, horse use would be accommodated, a bike path would be developed, showers would be installed, toilets would be replaced, and water and sewer lines would be connected.	Horse use would be accommodated, toilets would be replaced (some connected to water and sewer), and a shower would be installed at parking area #2.
Entrance Station	The current entrance station would remain.	Station and gate would be relocated towards northern boundary.	Station area would be redesigned.	The current entrance station would remain.
Visitor Information Center	The new visitor center, pavilion, and ranger station at Apollo Beach (scheduled for completion in 2011) would continue to serve as the hub of visitor activities and programs for the North District.	The visitor center, pavilion, and ranger station at Apollo Beach would continue to serve as the hub of visitor activities and programs for the North District.	The visitor center, pavilion, and ranger station at Apollo Beach would continue to serve as the hub of visitor activities and programs for the North District. The feasibility of commercial shuttle service would be explored.	The visitor center, pavilion, and ranger station at Apollo Beach would continue to serve as the hub of visitor activities and programs for the North District.
Turtle Mound	The mound would continue to be preserved. Trail, waysides, and parking would remain.	The mound would continue to be preserved. Trail, waysides, and parking would remain.	A shade/rain pavilion would be constructed and parking area would be enlarged.	The mound would continue to be preserved. Trail, waysides, and parking would remain.
North District Maintenance Area	Facility would remain unchanged in its current location.	Facility would be reconfigured/ redesigned and screened from view.	Maintenance function would be moved to centralized facility at Stuckey property or Bill's Hill area and existing buildings would be repurposed.	Facility would be reconfigured/ redesigned and screened from view.
Beach Operations Area	Administrative dune crossover boardwalk would remain for beach emergencies.			

CHAPTER 2: ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

	Alternative A	Alternative B	Alternative C	Alternative D
ELDORA HAMMOCK AREA				
Eldora Hammock	Access and parking would be maintained. Power and telephone lines would continue overhead.	Powerlines would be placed underground.	Access and parking would be maintained. Power and telephone lines would continue overhead.	Access and parking would be maintained. Power and telephone lines would continue overhead.
Eldora Historic Area	The State House and dock would be preserved. Access to the first floor of the state house would continue. Exhibits and staff office space would be retained at the Eldora State House.	Exhibits and staff office space would be retained at the Eldora State House, visitor understanding would be expanded, and landscape would be restored.	Exhibits and staff office space would be retained at the Eldora State House, visitor understanding would be expanded, and landscape would be restored. A museum would be established in the state house. There would be new trails and a new dock. Septic fields would be replaced with new connection to sewer and water.	Exhibits and staff office space would be retained at the Eldora State House, visitor understanding would be expanded, and the landscape would be preserved. A museum would be established in the state house. Septic fields might be replaced with new connection to sewer and water.
Eldora Hammock Interpretive Trail	The trail and waysides would be maintained. The level of interpretive opportunities would be unchanged.			
Castle Windy Interpretive Trail	Mound protection and maintenance of current parking and trails would continue.	The mound would continue to be protected, and the trail would be extended.	Trail would be extended, new parking area would be added, and interpretive programs would be expanded.	Mound protection and maintenance of current parking and trails would continue.
Marine Science Educational Station	The national seashore would continue to pursue supporting research operations at these facilities.	The national seashore would continue to pursue supporting research operations at these facilities.	The national seashore would continue to pursue supporting research operations at these facilities.	The national seashore would continue to pursue supporting research operations at these facilities.
Former Hebner Property	The garage would continue to be used for park operations. Existing utilities would remain.	The garage would continue to be used for park operations. Existing utilities would remain.	Garage would be replaced with a research/dormitory facility.	Additional trailer pads would be added for administrative functions; utility lines would be extended.
Former Feller Property	The house and dock would continue as a research station. Agreements and partnerships for resource inventory and monitoring would continue. The trailer pad would remain.	Property would be offered for research, inventorying, and monitoring activities.	Property would be offered for possible commercial services.	Property would be used for NPS resource management.

Table 5: Summary Comparison of Alternatives

	Alternative A	Alternative B	Alternative C	Alternative D
Former Schultz Property	Use of house would continue for administrative purposes. Garage would be removed and replaced if needed.			
Lands South of Eldora Hammock	Managed for resource protection and closed to visitors except along Castle Windy Interpretive Trail and the shoreline accessed by boat.	Managed for resource protection and closed to visitors except along Castle Windy Interpretive Trail and the shoreline accessed by boat.	Managed for resource protection. Limited access via foot trails would be allowed.	Managed for resource protection and closed to visitors except along Castle Windy Interpretive Trail and the shoreline accessed by boat.
NORTHERN MOSQUITO LAGOON				
Boat Access Areas	24-hour access for boat launch. Facilities maintained.	Entrance area would be relocated, and 24-hour access would be phased out.	Parking would be paved and slightly increased. 24 hour access for boat launch.	Entrance area would be relocated, and 24-hour access would be phased out.
Lagoon Waters	Enhanced resource management. Continued low-impact water-based recreational opportunities. Commercial guiding and harvesting activities would continue to be permitted.	Nonmotorized or pole/troll zone would be developed; slow-speed zone would be developed between Eldora State House, parking lot #7, and the first island to the west. Commercial guiding and harvesting activities would continue to be permitted.	Slow-speed zone would be developed between Eldora State House, parking lot #7, and the first island to the west. Commercial guiding and harvesting activities would continue to be permitted.	Nonmotorized or pole/troll zones would be developed for resource protection; Slow-speed zone would also be developed between Eldora State House, parking lot #7, and the first island to the west. There would be more opportunities for canoeing and kayaking in the lagoon. Commercial guiding and harvesting activities would continue to be permitted.
Lagoon Islands	Diverse, low-impact backcountry opportunities. Campsites and picnic tables/grills made available by permit only.			
OAK HILL AREA				
Seminole Rest	Management of the area would continue to focus on archaeological resources and operations.	Interpretive and educational programs would be expanded. Cultural landscape would be studied and key features rehabilitated.	A marsh trail would be developed.	A marsh trail would be developed. Interpretive opportunities would be expanded, a self-guided interpretive trail would be developed, and educational programs would be initiated.
Stuckey/Bill's Hill	NPS would continue to pursue acquisition of the Stuckey property on a willing seller basis.	NPS would continue to pursue acquisition of the Stuckey property on a willing seller basis. A future determination as to its appropriateness as a future park	NPS would continue to pursue acquisition of the Stuckey property on a willing seller basis. If acquired, a new full-service visitor center/ administrative facility and	NPS would continue to pursue acquisition of the Stuckey property on a willing seller basis. If acquired, trailhead and parking, trails and waysides, and canoe/kayak landing

CHAPTER 2: ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

	Alternative A	Alternative B	Alternative C	Alternative D
		headquarters use would be made sometime following acquisition. At Bill's Hill, parking, trails, waysides, canoe/kayak landing, and water trails would be developed. Landscape restoration program would be developed.	maintenance facility would be constructed. New trails, waysides, campsites, horse trails, and parking and site access would also be developed. Interpretive opportunities would be expanded. A connection to USFWS canoe/kayak trail would be developed and some of the natural landscape would be restored.	and water trails would be developed. Landscape restoration and a connection to USFWS canoe/kayak trail would also occur.
JOINT MANAGEMENT AREA				
Access	Temporary closures before scheduled launches/landings would continue.			
Central and Southern Lagoon	Managed for resource protection. Pole/troll areas designated by USFWS.			
Boat Access Areas	A new canoe launch would be developed on Bio Lab Road.	A new canoe launch would be developed on Bio Lab Road.	Possibly allow equipment rental concession. Expand environmental education and public programs with partner help.	Expand environmental education and public programs with partner help.
Lands North of Haulover Canal	NPS would support USFWS management direction and recreation activities.			
Manatee Viewing Area	NPS would support USFWS management and self-guided interpretive opportunities.	NPS would support USFWS management and self-guided interpretive opportunities.	Expand interpretation.	Expanded interpretation.
Sand Road Trail	NPS would support USFWS management and provide assistance in preservation of the trail and its associated WWII observation towers.			
Historic Properties	NPS would continue to support USFWS and NASA to preserve and interpret historic properties throughout the Joint Management Area.	NPS would continue to support USFWS and NASA to preserve and interpret historic properties throughout the Joint Management Area.	Coordinate with partners to establish historic context for these sites and to provide educational programs.	Coordinate with partners to establish historic context for these sites and to provide educational programs.
Target Rock	Preserve Target Rock site.	Preserve Target Rock site.	Develop tours to Target Rock.	Preserve Target Rock site.
Bio Lab Road	USFWS would continue to maintain Bio Lab Road.			
NASA Tracking Facilities	Public Access would continue to be restricted in and around the NASA tracking facilities.			

Table 5: Summary Comparison of Alternatives

	Alternative A	Alternative B	Alternative C	Alternative D
MERRITT ISLAND NATIONAL WILDLIFE REFUGE				
Visitor Information Center	Limited National Seashore orientation would be available.	NPS would work with the USFWS to explore whether combined administrative headquarters functions in the South District would be the best strategy for administration of the national seashore. Otherwise, the U.S. Fish and Wildlife Service would remain the lead agency for visitor information in the South District.	Limited National Seashore orientation would be available.	Limited National Seashore orientation would be available.
South District Maintenance Area	NPS would continue to use Wilson's Corner for South District maintenance facilities. Water would continue to be brought in.	NPS would continue to use Wilson's Corner for South District maintenance facilities. Water would continue to be brought in.	Maintenance functions would be relocated to new facility in Bill's Hill; area would be returned to the U. S. Fish and Wildlife Service.	Maintenance functions would be relocated to multiagency facility in USFWS maintenance area adjacent to the visitor center.
TITUSVILLE NPS HEADQUARTERS				
NPS Headquarters	The headquarters would continue to be in Titusville.	The headquarters would continue to be in Titusville.	NPS administrative headquarters would be moved from Titusville to Bill's Hill area.	New facilities near the national seashore would be sought for administrative headquarters.
STAFFING AND COSTS				
Staffing	53 full-time-equivalent employees	63.5 full-time-equivalent employees	68.5 full-time-equivalent employees	65.5 full-time-equivalent employees
One-time capital Costs	\$10.1 million	\$19.4 million	\$35.8 million	\$17.5 million
Annual Operating Costs	\$3.2 million	\$3.9 million	\$4.2 million	\$4.1 million

TABLE 6: COMPARISON OF IMPACTS

Note: There would be no impairment of resources under any alternative.

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Impacts on Natural Resources				
Geologic Resources and Soils	Under the no-action alternative, no changes to current conditions would occur within the national seashore. Conditions for geologic resources and soils would remain as described in the “Affected Environment” chapter. Maintenance activities on roads and parking areas would continue to result in long-term, negligible to minor, adverse impacts on soils associated with any necessary removal of vegetation or disturbance of soils, which could result in potential erosion and transport of suspended sediments during storms. Long-term beneficial impacts would be expected to continue from restricted public access to Turtle Mound and the lands south of the Eldora Hammock area.	Activities associated with implementing alternative B would result in short- and long-term, minor, adverse impacts on geologic resources and soils, primarily due to construction efforts that would increase impervious surfaces and result in erosion and sedimentation. In addition, long-term beneficial impacts would be anticipated because vegetative cover would be increased at certain locations.	Activities associated with implementing alternative C would result in short- and long-term, minor to moderate, adverse impacts on geologic resources and soils primarily from construction efforts that would increase impervious surfaces, resulting in erosion and sedimentation. Long-term beneficial impacts would be anticipated because vegetative cover would be increased at certain locations.	Activities associated with implementing alternative D would result in short- and long-term, minor, adverse impacts on geologic resources and soils primarily due to construction efforts that would increase impervious surfaces, potentially resulting in erosion and sedimentation. In addition, long-term beneficial impacts would be anticipated as vegetative cover would be increased at certain locations, partially offsetting the increase in impervious surfaces.

Table 6: Comparison of Impacts

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Floodplains	Long-term, negligible, adverse impacts on floodplains would be expected to continue from alternative A because of the presence of impervious surfaces (e.g., buildings, parking areas, and roads) within or adjacent to the 100-year floodplain. Impacts from the existing conditions at the national seashore would continue to be negligible.	Small improvements, such as trailheads and parking areas, would create additional short- and long-term, negligible to minor, adverse impacts on floodplains.	The greatest potential short- and long-term adverse impacts on floodplains would be from the construction of the visitor center/administrative headquarters and maintenance facilities at the Stuckey property (if acquired) or Bill's Hill. Additional short- and long-term, negligible to minor, adverse impacts would also be expected from construction of parking areas, trails, and smaller structures.	Short- and long-term, negligible to moderate, adverse impacts on floodplains would be expected as a result of alternative D. The greatest potential short- and long-term adverse impacts would be from construction activities in the Oak Hill area.
Wetlands	<p>Long-term, negligible to minor, adverse impacts would continue from the implementation of alternative A because of continued maintenance activities and impervious surfaces (e.g., buildings, parking areas, roads) in areas near wetlands.</p> <p>Long-term, negligible to moderate, adverse impacts on wetlands would continue, particularly in the Bill's Hill area, because of continued uncontrolled visitor access, exotic vegetation, and dumping (due to lack of management presence).</p>	<p>Short- and long-term, negligible to minor, adverse impacts on wetlands would be expected from implementing alternative B. Smaller improvements, such as trailheads, a bike path, and parking areas, would create additional short- and long-term, negligible to minor, adverse impacts, depending on whether these improvements are placed within wetlands.</p> <p>Long-term negligible adverse impacts would continue because of existing impervious surfaces in areas near wetlands. Long-term, minor, beneficial impacts on wetlands would be expected from increased security, controlled access, and the establishment of a slow-speed zone for boats and a pole/troll or nonmotorized zone in Mosquito Lagoon.</p>	<p>Short- and long-term, negligible to minor, adverse impacts on wetlands would be expected from implementing alternative C. The greatest potential short- and long-term adverse impacts would be from the construction of the visitor center/administrative headquarters and maintenance facilities at the Stuckey property (if acquired) or Bill's Hill area.</p> <p>Additional short- and long-term, negligible to minor, adverse impacts would also be expected from construction of parking areas, trails, and smaller structures. Negligible adverse impacts would also continue because of existing impervious surfaces within or adjacent to wetland areas.</p>	<p>Short- and long-term, negligible to minor, adverse impacts on wetlands would be expected as a result of alternative D. The greatest potential short- and long-term adverse impacts would be from construction activities in the Oak Hill area.</p> <p>Improvements such as parking areas, trailheads, and access, particularly if paved, could introduce a relatively large amount of new impervious surfaces and permanent loss of vegetation to an area. Negligible adverse impacts would also continue from existing impervious surfaces near wetlands.</p>

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Water Resources	<p>Under the no-action alternative, no changes to current conditions on water resources would occur in Canaveral National Seashore. Water resources would remain as described in “Chapter 3: Affected Environment.” Maintenance activities on roads and parking areas would continue to result in long-term, negligible to minor, adverse impacts on water resources from erosion and sedimentation (i.e., soil transport to water sources and possible fuel leaks) associated with maintenance activities.</p> <p>Long-term, minor, adverse impacts on lagoon water quality could also continue from oil or other fluids from improperly maintained watercraft being introduced into lagoon waters. Short-term, minor, adverse impacts associated with increased turbidity could occur as a result of the operation of watercraft in shallow waters. Long-term, beneficial impacts would be expected to continue from restricted public access to Turtle Mound and the lands south of the Eldora Hammock area.</p>	<p>Implementation of alternative B could result in short- and long-term, negligible to moderate, adverse impacts on water resources. Beneficial impacts would also be realized through revegetation and by the restoration of property to its natural condition.</p>	<p>Implementation of alternative C could result in short-term, negligible to moderate, adverse, and long-term, minor, adverse impacts. Beneficial impacts would also be realized by the restoration of property to its natural condition and through revegetation efforts.</p>	<p>Implementation of alternative D could result in short-term, negligible to minor, adverse, and long-term, negligible to moderate, adverse impacts. Beneficial impacts would also be realized by the restoration of property to its natural condition and through revegetation efforts.</p>

Table 6: Comparison of Impacts

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Vegetation and Wildlife	Alternative A would have short- and long-term, negligible to moderate adverse impacts, and short- and long-term, negligible to moderate beneficial impacts.	Alternative B would have short- and long-term, negligible to moderate adverse impacts, and short- and long-term beneficial impacts.	The actions proposed in alternative C would have short- and long-term, negligible to moderate adverse impacts, and long-term beneficial impacts on vegetation and wildlife.	Alternative D would have short- and long-term, negligible to moderate adverse impacts, and short- and long-term, negligible to moderate beneficial impacts.
Soundscapes and Noise	Long-term, minor, adverse impacts on the soundscape from recreational activities, increasing visitation, and maintenance activities (such as paving and grading) would be expected to continue under alternative A.	Implementation of alternative B could have short-term, minor to moderate, adverse impacts, and long-term, minor, adverse impacts on the soundscape. Long-term, minor, beneficial impacts on the soundscape would also be expected from establishing a slow-speed zone for boats in Northern Mosquito Lagoon.	Implementation of alternative C could result in short-term, minor to moderate, adverse impacts and long-term, minor, adverse impacts on the soundscape.	Implementation of alternative D could result in short-term, minor to moderate, adverse impacts and long-term, minor, adverse impacts on the soundscape. Long-term, minor, beneficial impacts would be expected from phasing out of 24-hour public access to provide for controlled access at night and establishing a slow-speed zone for boats in northern Mosquito Lagoon.
Air Quality	Long-term, minor, adverse impacts on the air quality from recreational activities, increasing visitation, and maintenance activities would be expected to continue under alternative A.	Implementation of alternative B could result in an increase in short- and long-term adverse impacts on air quality, due to construction activities, vehicle emissions, and emissions related to recreational activities. Some localized beneficial impacts are also expected because of the availability of alternative transportation, such as shuttle buses and bicycles.	Implementation of alternative C would result in short-term, minor to moderate, adverse impacts and long-term, minor, adverse impacts on air quality. Some localized beneficial impacts are also expected because of the availability of alternative transportation, such as shuttle buses and bicycles.	Implementation of alternative D would result in short- and long-term, minor, adverse impacts on the air quality at the national seashore.

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Impacts on Cultural Resources				
Impacts on Archeological Resources	Long-term, negligible to minor, adverse impacts on archeological resources under alternative A.	Long-term, minor, and adverse, and long term, negligible to minor, and beneficial impacts on archeological resources. The impacts of alternative B would be no adverse effect for Section 106.	Same as alternative B.	Same as alternative B.
Impacts on Historic Structures	Long-term, negligible to minor, adverse impacts on historic structures under alternative A.	Impacts on historic structures under alternative B would be beneficial or adverse, negligible to minor, and long term. The impacts of alternative B would be no adverse effect for Section 106.	Same as alternative B.	Same as alternative B.
Impacts on Cultural Landscapes	Long-term negligible to minor adverse impacts on cultural landscapes.	Beneficial or adverse, negligible to minor, and long term. The impacts of alternative B would be no adverse effect for Section 106.	Same as alternative B.	Same as alternative B.
Impacts on Ethnographic Resources	Long-term, beneficial, negligible to minor impacts on ethnographic resources.	Long-term, minor, beneficial impacts on ethnographic resources. The impacts of alternative B would be no adverse effect for Section 106.	Beneficial, negligible to minor, and long-term impacts on ethnographic resources.	Same as alternative C.
Impacts on Visitor Experience				
	Visitors seem satisfied overall with most current opportunities in the national seashore. Maintaining the current level of access and range of visitor opportunities would have no effect on the existing visitor experience. For visitors who would prefer	The impacts of alternative B would be long term and moderately beneficial for visitors looking for additional recreational opportunities in Canaveral National Seashore. However, there would be some long-term, minor, adverse impacts related to	The impacts of alternative C would be long term, major, and beneficial for visitors looking for additional recreational opportunities in Canaveral National Seashore. However, there would be some long-term, minor, adverse impacts related to	Same as alternative B.

Table 6: Comparison of Impacts

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
	additional improvements in recreation-oriented facilities and boundary markers, or greater access to the Apollo Beach area, continuing the current range of visitor opportunities would result in a long-term, minor adverse impact. Projected increases in visitor use levels would result in a long-term, minor, adverse effect on the visitor experience resulting from inconvenience and crowding.	crowding and noise as a result of increased visitation. Depending on future adaptive management direction, additional short-term minor to moderate adverse impacts could be expected.	crowding and noise as a result of increased visitation. Depending on future adaptive management direction, additional short-term minor to moderate adverse impacts could be expected.	
Impacts on National Seashore Operations				
	Alternative A would likely continue to have a long-term, minor to moderate, adverse impact on national seashore operations. There would continue to be a long-term, minor, adverse cumulative impact on operations resulting from increased demands on national seashore resources and the need for NPS managers to focus on local and regional issues. The contribution of alternative A to these cumulative impacts would be negligible.	Under alternative B impacts on national seashore operations would be long term, moderate, and both adverse and beneficial. Adverse impacts would result from an increasing management and operational responsibilities and increases in capital and operating costs. Beneficial impacts would result from operational efficiencies and resulting enhanced visitor services and programs. An increase of staff would ensure smooth and effective programs and services for visitors, which would be beneficial. Cumulative impacts on national seashore operations under alternative B would be long term, minor and adverse. Alternative B's contribution to these cumulative effects would be a noticeable beneficial offset.	Under alternative C impacts on national seashore operations would be long term, moderate, and both adverse and beneficial. Adverse impacts would result from an increasing management and operational responsibilities and increases in capital and operating costs. Beneficial impacts would result from operational efficiencies and resulting enhanced visitor services and programs. An increase of staff would ensure smooth and effective programs and services for visitors, which would be beneficial. Cumulative impacts on national seashore operations under alternative C would be long term, minor and adverse. Alternative C's contribution to these cumulative effects would be a noticeable beneficial offset.	Under alternative D impacts on national seashore operations would be long term, moderate, and both adverse and beneficial. Adverse impacts would result from an increasing management and operational responsibilities and increases in capital and operating costs. Beneficial impacts would result from operational efficiencies and resulting enhanced visitor services and programs. An increase of staff would ensure smooth and effective programs and services for visitors, which would be beneficial. Cumulative impacts on national seashore operations under alternative D would be long term, minor and adverse. Alternative D's contribution to these cumulative effects would be a noticeable beneficial offset.

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Impacts on Regional Socioeconomics				
	<p>Over time, expenditures by visitors traveling to the national seashore would continue to have beneficial effects on the local and regional economies. These impacts would be short and long term for most visitor-related businesses and their employees. The annual NPS operational expenditures would have a long-term and negligible to minor beneficial impact on the regional economy.</p> <p>The deferred maintenance, rehabilitation, and other new work proposed under this alternative would provide one-time, short-term, minor, beneficial impacts on the regional economy. The impacts of other actions, together with the impacts of alternative A, would result in short- and long-term minor beneficial cumulative effects. The contribution of this alternative to these cumulative impacts would be very small.</p>	<p>Expenditures by visitors traveling to the national seashore would continue to have minor beneficial effects on the local and regional economy. These impacts would be long term on a local and regional basis for most visitor-related businesses and their employees. The deferred maintenance, rehabilitation, and additional new miscellaneous work proposed under this alternative would provide one-time, short-term, minor, beneficial impacts on the regional economy. The national seashore’s annual expenditures and employee expenditures in the local and two-county regional economy would provide long-term, minor, beneficial impacts.</p> <p>The impacts of NASA-related construction activity, together with the impacts of actions proposed in alternative B, would result in short-term, moderate, beneficial cumulative effects,—mostly for the construction industry. Changes in the NASA workforce would have unknown long-term impacts on regional socioeconomics. The contribution of alternative B to these cumulative impacts would be beneficial but very small.</p>	Same as alternative B.	Same as alternative B.

Chapter **3**

The Affected Environment



INTRODUCTION

This chapter describes the existing environment of Canaveral National Seashore. The focus is on those elements that would be affected by the actions proposed in the alternatives should they be implemented. These topics were selected on the basis of federal law, regulations, executive orders, NPS expertise, and concerns expressed by other agencies or members of the public during project scoping.

The first section in this chapter discusses impact topics that are analyzed in detail in this *General Management Plan / Environmental*

Impact Statement. The issues discussed in chapter 1 were one of the factors considered in identifying the impact topics. The next section discusses impact topics considered but dismissed from further analysis and explains the rationale for these decisions. Although these resources or topics are important, the alternatives in this plan either do not have an effect on these resources or the alternatives would have only positive impacts on them, and/or any adverse impacts would be negligible to minor.

TABLE 7: TOPICS ANALYZED AND DISMISSED

Impact Topics Analyzed in Detail	Impact Topics Considered but Dismissed
Natural Resources	Natural Resources
<ul style="list-style-type: none"> • <i>Geologic Resources and Soils</i> • <i>Floodplains</i> • <i>Wetlands</i> • <i>Water Resources</i> • <i>Vegetation</i> • <i>Wildlife</i> • <i>Fishes and Essential Fish Habitat</i> • <i>Special Status Species (Federal and State)</i> • <i>Soundscape and Noise</i> • <i>Air Quality</i> 	<ul style="list-style-type: none"> • <i>Natural or Depletable Resource Conservation Potential</i> • <i>Energy Efficiency and Conservation Potential</i> • <i>Prime or Unique Farmlands</i> • <i>Ecologically Critical Areas, Wild and Scenic Rivers, other Unique Natural Areas</i> • <i>Carbon Footprint</i> • <i>Night Sky</i>
Cultural Resources	Cultural Resources
<ul style="list-style-type: none"> • <i>Archeological Resources</i> • <i>Prehistoric/Historic Structures and Buildings</i> • <i>Cultural Landscapes</i> • <i>Ethnographic Resources</i> 	<ul style="list-style-type: none"> • <i>Museum Collections</i> • <i>Traditional Cultural Properties</i> • <i>Indian Trust Resources</i>
Visitor Experience	
National Seashore Operations	
Regional Socioeconomics	
Other Impact Topics	Other Impact Topics
	<ul style="list-style-type: none"> • <i>Environmental Justice</i> • <i>Urban Quality and Design of the Built Environment</i>

NATURAL RESOURCES

NATURAL RESOURCE IMPACT TOPICS CONSIDERED IN THIS ENVIRONMENTAL IMPACT STATEMENT

Canaveral National Seashore is along the Atlantic coast of Florida, approximately 38 miles northeast of Orlando, stretching from the city of New Smyrna Beach in the north to the town of Merritt Island in the south. The Cape Canaveral NASA shuttle landing facility and Merritt Island National Wildlife Refuge in the south abut the national seashore.

Canaveral National Seashore was created by an act of Congress on January 3, 1975, to

“preserve and protect the outstanding natural, scenic, scientific, ecologic, and historic values of certain lands, shorelines, and waters of the state of Florida and to provide for public outdoor recreation use and enjoyment of the same”

The national seashore contains 58,000 acres of barrier island, open lagoon, coastal hammock, pine flatwoods, and offshore waters along the east-central coast of Florida. Water comprises over two-thirds of the national seashore’s 58,000 acres. The eastern boundary of the national seashore extends 0.5 miles into the Atlantic Ocean. One of the most dominant features is the barrier island, a fragile ecosystem that separates Mosquito Lagoon from the Atlantic Ocean (NPS 2009b). The national seashore is an excellent example of a relatively stable barrier beach backed by a productive lagoon system. The national seashore’s 24 miles of undeveloped beach is the longest stretch of undeveloped beach on the east coast of Florida. Mosquito Lagoon, which composes more than two-thirds of the national seashore, is designated an Outstanding Florida Water and is a part of the 155-mile-long Indian River Lagoon, an Estuary of National Significance. The

Indian River Lagoon is considered the most diverse and productive estuary in North America.

The natural resources of Canaveral National Seashore include a diversity of wildlife and vegetative communities within the land/lagoon/sea interface of east-central Florida. In contrast with other barrier islands, Canaveral National Seashore has a single dune ridge, averaging 12 feet high, which is quite stable due to a dense growth of saw palmetto and several other species of hardy shrubs and grasses. Mosquito Lagoon, protected by the national seashore’s barrier island, is the northernmost part of the Indian River Lagoon system, which contains the most diverse collection of aquatic species along the length of the eastern seaboard.

This chapter describes the existing environment of Canaveral National Seashore. The focus is on elements (e.g., water resources, vegetation, wildlife) that would be affected by the actions proposed in the alternatives should they be implemented. These topics were selected on the basis of federal law, regulations, executive orders, NPS expertise, and concerns expressed by other agencies or members of the public during project scoping.

This chapter discusses impact topics that are analyzed in detail in chapter 4 of this *General Management Plan/ Environmental Impact Statement*. The last section of this chapter (3) discusses impact topics that are not analyzed in detail and explains the rationale for these decisions.

Geologic Resources and Soils

NPS *Management Policies 2006* define how to manage national seashore resources. The National Park Service would protect geologic features from the unacceptable impacts of human activity while allowing

natural processes to continue. At Canaveral National Seashore, these features include soils, sand dunes, and paleontological resources such as fossilized plants or animals or their traces. In addition, the National Park Service would actively seek to understand and preserve the soil resources of parks and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil or its contamination of other resources.

Much of Canaveral National Seashore is composed of a barrier island ecosystem. The geologic structure of the national seashore is a product of Florida's complex geologic history. As sea levels rose and fell in response to the advance and retreat of the North American glaciers, the exposed portion of the Florida peninsula increased or diminished, resulting in a series of former shorelines. These historic shorelines are represented by the alternating ridge (former dune lines) and swale topography observable in the southern area of the national seashore. At the point of maximum glaciation (16,000 years before present), sea level was about 100 meters below the present level. With the retreat of the last glaciers and corresponding sea level rise about 7,000 years ago, Canaveral National Seashore's barrier island and Mosquito Lagoon were formed.

The national seashore's narrow barrier island, which is 24 miles long, separates the Atlantic Ocean from Mosquito Lagoon. The east (ocean) side of the island is a sandy beach. The beach is backed by a single dune ridge, averaging 12 feet in height above mean sea level. The back (west) side of this dune slopes toward Mosquito Lagoon and is anchored by dense vegetation. The barrier island protects the geological and biological systems to the west by reducing the impacts of storm surge. Barrier islands are dynamic systems that change in response to storms and tides that shift the sediment supply from or to the islands. Generally, sediments are deposited on the beach during the calm summer months, and during the tumultuous winter months beach sand is carried offshore. Sand also migrates southward

along the coast, although some areas with northward movement do occur in the national seashore. Currently, the islands are slowly migrating towards the mainland.

Erosion and shoreline retreat are critical issues at the national seashore. As such, Canaveral National Seashore is being examined under the National Assessment of Coastal Change Hazards project conducted by the U.S. Geological Survey (USGS 2008). This project is an ongoing, multiyear undertaking to identify and quantify the vulnerability of U.S. shorelines to coastal changes such as the effects of severe storms, sea level rise, and shoreline erosion and retreat.

Climate change may impact geological resources and soils in the national seashore as a result of increased storm intensity and duration. These predicted changes are expected to result in shoreline erosion, flooding, and inundation (Loehman and Anderson 2009).

As a result of its geologic history, most soils found in the national seashore are unconsolidated marine-deposited sediments from the Holocene epoch (the past 12,000 years). The dominant soil material is almost pure quartz sand, the grains of which are highly resistant to weathering. Sandy loams, clays, and organic soils of the tidal marshes are the other soil types found in the national seashore (USGS 2004). Sediments in the mainland of the national seashore are undifferentiated siliciclastics and organics that exceed 20 feet in thickness and form beach ridges and sand dunes.

Numerous soil associations have been mapped at the national seashore, primarily consisting of sands or a mixture of clays and sands (including the Canaveral Sand, Palm Beach Sand, and the Astutula Sand). Sands compose approximately 35% of the soils mapped at the national seashore (NRCS 2008).

Floodplains

Floodplains are areas of low-level ground present along rivers, stream channels, or coastal waters. The living and nonliving parts of natural floodplains interact with each other to create dynamic systems in which each component helps to maintain the characteristics of the environment that supports it. Floodplain ecosystem functions include natural moderation of floods, flood water storage and conveyance, groundwater recharge, nutrient cycling, water quality maintenance, and in support of a diversity of plants and animals. Floodplains provide a broad area to spread out and temporarily store floodwaters. This reduces flood peaks and velocities and the potential for erosion. Canaveral National Seashore is classified by the Federal Emergency Management Agency as within the 100-year floodplain. (The 100-year floodplain is the area that has a 1% chance of inundation by a flood in a given year.)

Climate change is expected to increase the extent and frequency of coastal flooding (Loehman and Anderson 2009). These floods may alter the natural floodplain distribution in the national seashore, leading to changes in vegetation, wildlife habitat, and sand regimes on the islands and on the mainland.

Floodplains are subject to periodic or infrequent inundation due to heavy rains or from hurricanes. Risk of flooding typically hinges on local topography, the frequency of precipitation, and the size of the watershed above the floodplain. NPS policy provides for recognition of and management for the preservation of floodplain values, minimization of hazardous conditions associated with flooding, and compliance with Executive Order 11988, “Floodplain Management,” and other executive orders and federal laws related to managing activities in flood-prone areas and coastal zones.

Wetlands

Wetlands have been defined by agencies responsible for their management. In this document, the term “wetland” is defined using U.S. Army Corps of Engineers conventions. The Corps of Engineers has jurisdiction to protect wetlands as a subset of “the waters of the United States” under Section 404 of the Clean Water Act using the following definition:

. . . areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support . . . a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3[b]). . . include(s) swamps, marshes, bogs, and similar areas.

Executive Order 11990, “Protection of Wetlands,” requires federal agencies to minimize or avoid, where possible, adversely impacting wetlands. NPS Director’s Order 77-1: “Wetland Protection” (NPS 2002) also directs the National Park Service to avoid or minimize adverse impacts on wetlands from new development or facilities, or to compensate for unavoidable impacts via restoration of degraded wetlands. Wetlands (marshes) are described in the “Vegetation” section of this chapter.

Canaveral National Seashore has two types of wetlands—salt marshes and mangrove swamps. Wetlands of the Mosquito Lagoon basin cover about 42% of the terrestrial area of the national seashore (Kroening 2008). The national seashore is a transition zone where the marshes and mangrove swamps overlap. The transition zone lies between Sebastian Inlet (near the Indian River/Brevard County line) and extends north to New Smyrna Beach.

The salt marshes are both low- and high-tide marshes and support numerous ecological communities, as discussed later under “Vegetation.” The mangrove swamps are supported by less-saline water than the salt marshes. Red mangroves occur naturally and

have been planted to reduce shoreline erosion along Mosquito Lagoon. Mangroves are protected by Florida law, and mangrove communities cannot be altered.

Mangroves are especially threatened by the sea level rise and storm surges that are expected because of climate change. Declines in coastal water quality, habitat quality, and biodiversity are the most likely effects of these changes. Salt marshes may have better resilience to sea level rise, especially if new sedimentation rates are roughly equal to the rate of sea level rise. However, localized impacts on salt marshes could occur, depending on the rate and type of changes.

Water Resources

Water resources of Canaveral National Seashore include the Atlantic waters along its eastern shore out to 0.5 mile offshore, the surface waters in the national seashore's jurisdiction, and the subsurface aquifers. Most of the area composing Canaveral National Seashore is covered or underlain by such bodies of water. The national seashore does not use subsurface aquifers as a source for drinking water, irrigation, or other beneficial uses. Therefore, subsurface water resources would not be discussed in this document. Though the national seashore boundary extends out to 0.5 mile offshore, the bottomlands of the ocean remain the jurisdiction of the state, while the waters are in the jurisdiction of the National Park Service.

Surface waters are abundant and comprise some two-thirds of the total national seashore. Besides the nearshore waters of the Atlantic Ocean, surface waters include Mosquito Lagoon, numerous sloughs and marshes, and brackish water impoundments. The 2001 "Water Resources Management Plan" contains detailed information regarding national seashore water resources. A hydrologic model is being developed for Mosquito Lagoon, which is scheduled for completion in 2011. This model is based on

surface/groundwater flow and water quality. It would allow managers to track and quantify pollutants and to provide information on the effect of septic tanks on nutrient and bacterial sources in Mosquito Lagoon.

The climate of the national seashore is classified as humid subtropical, and the national seashore receives 48–56 inches of rainfall per year (Kroening 2008).

Mosquito Lagoon has an average depth of only 4 feet and is connected to the Atlantic Ocean by the Ponce de Leon Inlet in the north. Mosquito Lagoon is connected to the Indian River Lagoon by the Haulover Canal, which was constructed in 1887 to improve navigation through the Indian River Lagoon system. Freshwater recharge of the lagoon occurs from surface water runoff and groundwater inflow.

Surface water resources generally consist of wetlands, lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale.

The Coastal Zone Management Act (CZMA) of 1972 (16 *United States Code* [USC] 1451 et seq.) declares a national policy to preserve, protect, develop, and, where possible, restore or enhance the resources of the nation's coastal zones. To achieve federal consistency with CZMA requirements, federal activities that have reasonably foreseeable effects on any land, water, or natural resources of the coastal zone must be consistent to the maximum extent practicable with the enforceable policies of a state's federally approved coastal zone management program. The Florida Coastal Management Program, which is administered through the Florida State Clearinghouse and overseen by the Florida Department of Environmental Protection (FDEP), is a federally approved program that ensures the compatible use of Florida's coastal resources (FDEP 2008d).

In addition to CZMA requirements, the Florida Beach and Shore Preservation Act

was enacted to protect, preserve, and manage Florida's valuable sandy beaches and adjacent and coastal system. This act provides three interrelated programs administered by the Department of Environmental Protection that work in concert to accomplish the task—the Coastal Construction Control Line Program, the Beach Erosion Control Program, and the Coastal Construction Program (FDEP 2008e). Data for these programs are collected by surveying the shoreline, modeling, and determining rates and locations of erosion.

Canaveral National Seashore is within the watershed area administered by the St. Johns River Water Management District (SJRWMD). A "Surface Water Improvement and Management Plan" (Steward 2003) has been developed for Indian River Lagoon by this management district and other cooperating agencies. Under the SWIM plan, NPS staff are working closely with district staff to monitor seagrass in Mosquito Lagoon, collect weather data, and restore impounded areas to functioning wetlands. In 2001 the Canaveral National Seashore developed its own "Water Resources Management Plan" (NPS 2001c). A watershed assessment of the national seashore was initiated by the Florida Institute of Technology in October 2008 and is scheduled for completion in spring 2010. This project would provide NPS managers with an integrated, overall evaluation of current water resource conditions, identify anthropogenic and natural threats or stressors, and provide recommendations for actions or further studies to protect water-related resources.

The Atlantic Ocean. The eastern boundary of Canaveral National Seashore extends approximately 0.5 mile from the outer beach of the barrier island into the Atlantic Ocean. The clear, blue-green waters of the Atlantic Ocean are a primary focus for visitors. The water temperature varies seasonally between 60 degrees Fahrenheit (°F) and 83 °F, permitting year-round, water-oriented recreational activities (NPS 1982).

Mosquito Lagoon. Mosquito Lagoon, the northernmost body of water in the Indian River Lagoon system, composes about two-thirds of the area within the boundaries of Canaveral National Seashore. Due in part to its location in the transition zone between tropical and temperate climates, Mosquito Lagoon is one of the most species-rich and diverse estuaries in North America. Species composition varies greatly on a seasonal basis, with tropical and subtropical species dominating the waters during the summer months, and temperate species dominating during winter months (NPS 2001c). With an average depth of about 4 feet, the lagoon is dominated by shallow flats that support dense submerged aquatic vegetation, primarily seagrasses.

The Mosquito Lagoon watershed is entirely within Volusia and Brevard counties and consists of at least two, and possibly five, sub-basins. The largest is the Mosquito Lagoon sub-basin (38,183 acres). It includes the lagoon itself and the area draining to it by overland flow, subsurface flow, and drainage ditches. The smaller basin is a well-defined area called the Florida Shores sub-basin (3,386 acres), located in the city of Edgewater. A large human-made canal drains water from the city of Oak Hill, and could cause concern because it empties untreated water into two impoundments, which spill over into Mosquito Lagoon (NPS 2001c).

Mosquito Lagoon proper is a marine barrier island estuary, with its open water portion extending from just north of Cape Canaveral to Oak Hill. Ponce de Leon Inlet is at the northern end of the lagoon and allows some input of saline water from the ocean. At the southern end, Mosquito Lagoon has been linked to the Indian River by the Haulover Canal since the first canal was built in 1854, but little exchange of water occurs here (Belanger et al. 1997). North of Oak Hill, the lagoon is dominated by low hammocks and salt marsh islands, forming a very different habitat than the open water areas of the southern part of the lagoon. The national seashore extends approximately 8.25 miles

(13.3 kilometers) north from the point where the open water in Mosquito Lagoon ends.

Tides along the east coast of central Florida are classified as semi-diurnal (occurring twice daily). While numerous inlets to Mosquito Lagoon have formed and filled in the past, the only present-day connection between the lagoon and the Atlantic Ocean is the Ponce de Leon Inlet near the northern end of the national seashore boundaries. The spring tide range at this inlet is about 2.7 feet (NOAA 1993).

Because of the narrow width and shallow depth of Mosquito Lagoon, ocean water passing through the Ponce de Leon Inlet does not travel far into the lagoon, resulting in daily tide fluctuations of only 6 to 8 inches. This makes the lagoon subject to very poor circulation and flushing with ocean waters and particularly sensitive to sudden influxes of pollutants or other materials from increasing urbanization, industrialization, and agricultural activity in the Mosquito Lagoon drainage basin. This basin covers 42,000 acres of land and includes all or part of the cities of New Smyrna Beach, Oak Hill, Edgewater, and the unincorporated community of Bethune Beach (NPS 2001c; Woodward-Clyde Consultants 1994a, 1994b).

The rise and fall of the ocean tide is the predominant driving force of water and pollutants flushing into and out of Mosquito Lagoon. Marked differences exist between offshore and estuary tidal ranges, with offshore tidal ranges averaging about 4 feet. Moving into the estuary, the tidal range diminishes. At Edgewater, approximately 9 miles south of Ponce de Leon Inlet, the range is 2.1 feet. At the south Volusia County line, 13 miles farther south, the range drops to 0.5 feet (NPS 2001c).

The ecological diversity and importance of Mosquito Lagoon has been recognized at both the federal and state levels. The U.S. Environmental Protection Agency designated Mosquito Lagoon, along with the rest of the Indian River Lagoon system, as an

Estuary of National Significance in 1990. Mosquito Lagoon and the upper Indian River proper are designated by the state of Florida as Outstanding Florida Waters.

Most of Mosquito Lagoon is considered pristine habitat, except for occasional turbidity (cloudiness) resulting from storms and wind-suspended bottom sediments. High turbidity or lack of water clarity limits light and has a negative impact on seagrass because it restricts photosynthesis (which is essential for healthy seagrass).

Mosquito Lagoon's shallow depth makes it susceptible to turbidity, more so than other Indian River Lagoon system segments. Turbidity results from a combination of suspended organic solids (living and detrital, algal and nonalgal) and suspended inorganic (mineral) solids in the water, especially those that are easily resuspended by wind and storms. Mosquito Lagoon's 10-year average turbidity (greater than 6 nephelometric turbidity units) is higher than most other areas in the Indian River Lagoon system. Clarity is greatest in the winter and early spring and decreases significantly in the summer and fall (NPS 2001c). Clarity also decreases with increased distance from Ponce de Leon Inlet (Sigua et al. 1999). Since 1995, total suspended solids levels have generally increased, along with turbidity. In 1999 the average total suspended solids levels in Mosquito Lagoon increased to more than 50 milligrams per liter, (mg/L), about three times the pre-1996 levels (NPS 2001c).

Increases in nutrient delivery (i.e., nitrogen and phosphorus) to an aquatic system can promote photosynthesis. However, excess nutrient delivery can cause ecological problems. Rapid algal growth can cause increases in turbidity, which can lead to the lethal shading of submerged aquatic vegetation. Additionally, if excess nutrient delivery occurs in short pulses, algal populations can rapidly exhaust nutrient concentrations and mature all at once. During this mass maturation, bacterial decomposers would use large amounts of

dissolved oxygen, often making the aquatic system deficient in dissolved oxygen. Waters with low levels of dissolved oxygen exhibit poor species diversity because many species require high concentrations of dissolved oxygen.

The average dissolved oxygen value over the monitoring period from 1988 to 1994 for Mosquito Lagoon was 6.47 mg/L (Sigua et al. 2000). The state standard is 4.0 mg/L or greater in estuarine waters, so these values for national seashore waters are well within the acceptable range for most of the lagoon. A potential trouble spot is the northern district boat dock area, where dissolved oxygen values were highly variable (NPS 2001c). In this area, dissolved oxygen values ranged from a low of 0.04 mg/L to a high of 15.3 mg/L (Hall et al. 2001). Ratings below the state standard were observed for extended periods during the spring and fall, suggesting high system respiration and oxygen demand (NPS 2001c).

Total nitrogen concentrations have increased in Mosquito Lagoon waters during the past 20 years, especially in the southern segment. From 1999 through 2001, mean annual total nitrogen concentrations in certain segments of Mosquito Lagoon exceeded the provisional Indian River Lagoon system threshold of 1.1 mg/L. However, these levels have not promoted phytoplankton (chlorophyll *a*) blooms.

Chlorophyll *a* concentrations have remained relatively low and stable during the past 10 years, with mean annual concentrations of approximately 5 to 6 micrograms per liter ($\mu\text{g/L}$). Chlorophyll *a* levels might have remained low despite elevations in total nitrogen because there were no corresponding increased phosphorus inputs to the system. Total phosphorus input is a product of surface runoff, wind resuspension, and increased wastewater volumes. Low phosphorus levels are still generally the rule in Mosquito Lagoon, with an average value of 0.1 mg/L throughout the system (Sigua et al. 1999). Seasonally, total phosphorus concentrations are greater from April through

December than from January through March; these seasonal variations may be attributable to runoff from the land surface or die-off of drift algae that contribute recycled nutrients to the water. (USGS 2008)

The pH (acidity) for 22 test sites in Mosquito Lagoon averaged 7.9 and ranged from 6.5 to 8.5 (Sigua et al. 2000), within state standards. A slightly higher pH level appears to occur in wet summer months and be positively correlated with distance from the Ponce de Leon Inlet (Sigua et al. 2000).

Overall, Mosquito Lagoon exhibits good water quality, which can be attributed to low urbanization and negligible amounts of agricultural discharges (Sigua et al. 1996, 1999). Enrichment of nutrients is a special concern in the southern reaches of the lagoon where the residence time (the duration that the water molecules stay in one area) can be about two to three months, whereas the northern section could have a residence time of less than one month. Evidence of water quality decline in the past five years is demonstrated by increases of total nitrogen, total suspended solids, and color. It is difficult to discern whether or not this is beginning to have an important impact on seagrass (NPS 2001c). It is assumed that the increased loadings are nearing the threshold of impact (SFWMD 2002).

Impoundments. Impoundments were historically constructed as a nonchemical method of mosquito control. Impoundments inhibited mosquito reproduction by continuously flooding mosquito breeding areas, preventing mosquitoes from laying their eggs. Most impoundments along Mosquito Lagoon were constructed between 1962 and 1970 (Rey and Kain 1993, NPS 2001c). Although many of these impoundments have been reconnected to Mosquito Lagoon, there are still several that are slated for restoration. In addition, some of the remaining impoundments are being used as wildlife aquatic management areas, with seasonally controlled water levels.

Because the southern portion of Mosquito Lagoon is minimally populated due to federal ownership, the northern third of the lagoon is bordered by the aforementioned cities on the east and west shores, and trailer parks in the unincorporated areas of the western shore. Because of the proximity of these communities to the national seashore, the state specified in the deed transferring the lands to the National Park Service that the national seashore would cooperate with local mosquito-control districts. A cooperative agreement between the national seashore and the East Volusia Mosquito Control District allows the application of larvicides, when necessary, and maintenance of existing mosquito control ditches. The national seashore, in cooperation with East Volusia Mosquito Control District and the St. Johns River Water Management District, works to use nonchemical methods of mosquito control and to restore wetlands (NPS 2001c).

In addition to expected increases in flooding, saltwater intrusion, and storm frequency and intensity, there may be effects on water resources due to climate change. Expected changes in air and water temperatures in Florida would likely alter the nutrient cycling in Mosquito Lagoon because temperature has a marked effect on the biogeochemical processes there. Additionally, shifts in water temperature may have dramatic impacts on the pH or acidity of seashore waters, which causes a cascade of effects in oxygen content, nutrient cycling, and associated vegetation and wildlife. Water temperature changes in estuaries and protected areas like Mosquito Lagoon are especially vulnerable to these types of changes (Loehman and Anderson 2009).

Vegetation

Canaveral National Seashore's latitude and coastal position provide for geographic convergence of temperate and subtropical vegetation. Canaveral is the northernmost area in the continental United States

supporting plant communities composed largely of subtropical plant species. It also supports the southernmost populations of a number of plant species typical of northern, temperate climates. Two outstanding examples of this convergence are the (1) hammocks, which contain an overstory dominated by temperate species and an understory composed of subtropical plants, and (2) the shift in vegetation along the edge of the lagoon from salt marsh cordgrass (*Spartina alterniflora*), which dominates in estuarine areas in the northern part of the national seashore, to mangrove species that dominate lagoon-edge vegetation to the south end.

Vegetation in the national seashore is at risk from various threats, including invasive nonnative plant species, degradation of wetlands by feral hogs (*Sus scrofa*), and the suppression of the natural fire regime. Feral hogs destroy vegetation and alter species diversity because of foraging and eating habits. Also, they cause widespread soil disturbance and may alter soil nutrient dynamics in the areas where they forage. Brazilian pepper (*Schinus terebinthifolius*) is the most abundant nonnative species and it invades coastal scrub and strand communities. Recent efforts by the National Park Service to eliminate these two noxious plants have been only partially successful. Brazilian pepper and Australian pine have spread to all disturbed areas of the national seashore, and control would largely depend on timely follow-up treatments. Recently, cogon grass (*Imperata cylindrica*), a nonnative species from Southeast Asia, has been observed at a few locations in the national seashore's upland ecosystems.

The area of central Florida where the national seashore lies is one of the most active lightning strike areas in the country. Lightning strikes from sudden thunderstorms ignite numerous fires every summer. Several plant communities, including the coastal strand and scrub, freshwater marshes, and the slash pine flatwood communities, require frequent fires to maintain their integrity. Under the past

policy of fire suppression, there has been a transition to less natural plant communities. This has resulted in a loss of habitat for several rare and endangered species including the bald eagle and the Florida scrub-jay (NPS 2007). The “Fire Management Plan” for Canaveral National Seashore proposes thinning and prescribed fire to return the national seashore to a more natural condition.

The national seashore supports a diverse collection of natural communities as defined by the Florida Natural Areas Inventory (FNAI) (Florida DNR 1990). A natural community is defined as a distinct and reoccurring assemblage of populations of plants, animals, fungi, and microorganisms naturally associated with each other and their physical environment. The FNAI’s *Guide to the Natural Communities of Florida* (Florida DNR 1990) describes 81 natural communities that collectively make up the original, natural biological associations of Florida. The following descriptions of plant communities at Canaveral are based on the FNAI classification and supplemented with information from a floristic survey of the national seashore (Schmalzer and Foster 2005).

Climate change will likely impact the vegetation composition in the national seashore, especially in the mangrove and salt marsh areas, and in other areas where changes in sea level may alter the water table or soil characteristics. Air temperature in Florida will continue to increase, with average low temperatures in winter increasing by 1.7 °C to 5.6 °C and average high temperatures increasing by 1.7 °C to 3.9 °C by 2100. These changes will likely alter species composition in the national seashore because species requiring cooler temperatures move northward. Components of the unique plant assemblage that represents the interface between the subtropical and temperate zone may shift northward. Plant-animal interactions such as pollination, seed dispersal, and insect control may be disrupted. Invasive species are also expected to expand their ranges due to altered precipitation and

temperature regimes (Loehman and Anderson 2009).

Beach Dune Plant Community. Working from the coast inward, the first plant community is the beach dune community. It is characterized as wave-deposited upper beach and wind-deposited foredune, with sparse to dense vegetation composed of pioneer species, especially sea oats (*Uniola paniculata*). Other typical pioneer species include beach grass (*Panicum amarum*), railroad vine (*Ipomea pes-caprae*), and other herbs. Schmalzer and Foster (2005) reported the presence of these plant species at the national seashore — slender cordgrass (*Spartina patens*); small shrubs such as beachberry (*Scaevola plumieri*), beach elder (*Iva imbricata*), and Gulf croton (*Croton punctatus*); and herbs including dune sunflower (*Helianthus debilis*) and camphorweed (*Heterotheca subaxillaris*).

The beach dune community provides important foraging habitat for the threatened southeastern beach mouse (*Peromyscus polionotus niveiventris*) and nesting habitat for numerous shorebirds and marine turtles, many of which are rare and protected. Beach dunes are very dynamic communities and mobile environments. The wind continually moves the sand inland from the beach until it is trapped by vegetation. Beach dunes are subject to drastic topographic changes during storms and hurricanes. Taking the brunt of a storm surge, the intact beach dune community of the national seashore’s barrier island is essential for protection of inland biological communities.

In spite of their ability to withstand the harsh maritime environment, plants of the beach dune community are extremely vulnerable to human impacts. Footpaths or vehicle trails over the beach dunes can damage the vegetation, initiating erosion. If the erosion spreads, it can destabilize the dunes and impact adjacent plant communities. Destabilized dunes cannot block storm surge as effectively, allowing further impacts on inland communities. For these reasons, beach dune communities should be

protected from physical impacts such as trampling. Activities such as coastal developments, which could alter the availability of sand through longshore movement for beach dune replenishment, should be carefully evaluated. Dune fencing is used in severely impacted areas to help stabilize the dunes.

The national seashore protects this sensitive habitat with boardwalks for public access to the beach. Public use of motorized vehicles is prohibited in this area to avoid impacts on dune stability.

Coastal Strand Plant Community.

Proceeding landward, the beach dune community is bordered by the coastal strand plant community that lies behind the dune. The coastal strand plant community is characterized as stabilized, wind-deposited coastal dunes vegetated with a dense thicket of salt-tolerant shrubs, especially saw palmetto (*Serenoa repens*). Sea grape (*Coccoloba uvifera*), myrsine (*Myrsine guianensis*), wax myrtle (*Myrica cerifera*), nakedwood (*Myrsianthes fragrans*), and tough buckthorn (*Sideroxylon tenax*) are also found in this plant community (Schmalzer and Foster 2005). Coastal strand and coastal scrub (described below) communities provide habitat for several rare plants, including coastal mock vervain (*Glandularia (Verbena) maritima*), Florida shrub verbena (*Lantana depressa* var. *floridana*), erect pricklypear (*Opuntia stricta*), beachberry or inkberry (*Scaevola plumieri*), and Curtiss' hoarypea (*Tephrosia angustissima* var. *curtissii*) (Schmalzer and Foster 2005).

The coastal strand community provides important habitat for the beach mouse, gopher tortoise, diamondback rattlesnake, and other animals. Coastal strand also plays a critical role in stabilizing the dune and maintaining the functional integrity of the barrier island. Because this plant community is next to the coast and somewhat elevated, making it a prime location for resort or residential property development, it is probably the most rapidly disappearing plant community in Florida.

The national seashore protects 24 miles of shoreline, the largest undisturbed stretch along the east coast of Florida. Public vehicle access to the coastal strand is prohibited, and boardwalks allow public access to the beach without impacting this critical habitat. Coastal strand communities in the national seashore are also at risk from the invasive Brazilian pepper.

Coastal Scrub Plant Community. The coastal scrub plant community found in more interior and upland portions of the national seashore includes several smaller live oak species, known collectively as scrub live oaks. These scrub oaks reach heights of only 12 to 15 feet if fire is suppressed for a number of years, and include myrtle (*Quercus myrtifolia*), Chapman's (*Q. chapmanii*) and sand (*Q. geminata*) live oaks. Other shrubs include saw palmetto, wax myrtle, tough buckthorn, myrsine, and Florida privet (*Forestiera segregata*) (Schmalzer and Foster 2005). Ground cover in this community is usually very sparse and dominated by ground lichens or, rarely, herbs. This type of ground cover makes the scrub plant community sensitive to off-road vehicle and foot traffic because the lichen crust, which stabilizes the underlying sand, is easily damaged and can take more than 50 years to recover.

The coastal scrub habitat supports a number of rare and protected animal species, such as the Florida scrub-jay (*Aphelocoma coerulescens*), Eastern indigo snake (*Drymarchon corais couperi*), gopher frog (*Rana capito*), and gopher tortoise (*Gopherus polyphemus*). Acorns are a critical source of food for the scrub-jay, which buries them in bare patches of sand. This contributes to regeneration of the scrub oak community because not all acorns are retrieved. Infrequent fires are also important in maintaining this community type; without periodic fires, this community might undergo succession to xeric hammock. Also, the threatened species Curtiss' hoarypea requires openings in the shrub canopy that are brought about by fire (Schmalzer and Foster 2005). The national seashore's *Fire Management Plan* proposes

several thinning and prescribed burn projects for a large portion of the coastal strand and scrub communities (NPS 2007). Public vehicle access is restricted in this community.

Slash Pine Flatwood Community. The overstory of the slash pine flatwood community, a variant of Florida Natural Areas Inventory's mesic flatwood community type, is dominated by slash pine (*Pinus elliottii*), although live oak, saw palmetto, and fetterbush (*Lyonia lucida*) are the main understory species. Good examples of the pine flatwood community can be seen along the western side of State Route 3, just south of Oak Hill. A number of the pines in this area contain bald eagle nests, which are occupied year after year. As it is with many other plant species, the national seashore is at the range limit for slash pine, in this case, involving two subspecies. The northern subspecies (*P. elliotti* var. *elliotti*) reaches its southern limit in central Florida, and southern Florida or Dade County slash pine (*P. elliotti* var. *densa*) reaches its northern limit in the vicinity of the national seashore.

The southern Florida variety has several adaptations to survive fire that are lacking in the other subspecies. The bark is thicker, and the tree has an extended "grass stage" during which seedlings look like a small clump of grass. During this stage, which can last up to seven years, the plant is relatively safe from low-intensity fires while it develops a large underground trunk and energy reservoir. Once fully established below ground, the seedling undergoes a rapid growth period, pushing the vulnerable top of the plant above the height of potential flames in a very short period of time. During this period, growth rates can exceed 2 feet per year.

These combined characteristics demonstrate the historical importance of fire in the central and southern Florida ecosystems. Without relatively frequent fires, this community will transition into a hardwood-dominated forest. Prescribed fire could be instrumental in encouraging the regrowth of

this community type, which could, in turn, reverse the decline in the number of nesting eagles in the national seashore and increase habitat for the eastern indigo snake (NPS 2007). The slash pine communities of the national seashore also are areas of concern in the "Fire Management Plan" and are scheduled for several thinning and prescribed burn projects.

Hammocks. Hardwood and palm hammocks, also known as palm/oak or mixed hammocks, are characterized in the national seashore by an overstory that is dominated by live oak (*Quercus virginiana*) or cabbage palm (*Sabal palmetto*). Laurel oak (*Quercus laurifolia*), elm (*Ulmus americana*), and red mulberry (*Morus rubra*) also occur in the canopy. Other woody species, such as nakedwood (*Myrcianthes fragrans*), red bay (*Persea borbonia*), and hackberry (*Celtis laevigata*), are scattered throughout this community type. This community represents a transition zone where subtropical species and temperate species converge at their northern and southern boundaries. Temperate hardwoods (live oak and cabbage palm) dominate the canopy, while subtropical shrubs such as nakedwood, myrsine, lancewood (*Ocotea coriacea*), and wild coffee (*Psychotria sulzneri*) dominate the understory (Schmalzer and Foster 2005). The giant airplant (*Tillandsia fasciculata* var. *densispica*), spreading airplant (*Tillandsia utriculata*), and hand fern (*Ophioglossum palmatum*) are all epiphytes found in coastal or mesic hammocks. The hand fern occurs only on the cabbage palm, while giant and spreading airplants occur on various trees in the coastal and mesic hammocks, including cabbage palms and live oaks. The hand fern is also near the northern limits of its range and could be damaged by hard freezes.

Estuarine Communities. Along the banks of Mosquito Lagoon and its islands are two types of estuarine communities. Salt marsh border the lagoon in the northern part of the national seashore, and mangrove swamp borders the southern end. The transition between these two community types occurs in the area between Oak Hill and Sebastian

Inlet, an area approximately 50 miles south of the national seashore. In the shallow waters of Mosquito Lagoon are oyster reefs and seagrass beds, and mud flats are found along the fringes of the salt marshes, impoundments, and mangrove swamps.

Salt marsh, an estuarine community typical of temperate climates, can be divided into low marsh and high marsh. Low marsh is between mean high tide and low tides and is often dominated by dense stands of smooth cordgrass (*Spartina alterniflora*). Low marsh acts as a border between the water and high marsh. High marsh is flooded periodically by windblown tides, spring high tides, or seasonal rises in sea level. High marsh plants include cordgrass (*Spartina patens*), glasswort (*Salicornia* spp.), saltwort (*Batis maritima*), saltgrass (*Distichlis spicata*), and black needlerush (*Juncus roemerianus*). With one of the highest rates of primary productivity of any plant community in the world, tidal marshes are an important source of nutrients and habitat for many animals and play a vital role in fisheries production. The federally threatened Atlantic salt marsh snake (*Nerodia clarkii taeniata*) lives on the high marsh islands in the northern end of Mosquito Lagoon.

The dominant plants of the more tropical mangrove swamps are white (*Laguncularia racemosa*), black (*Avicennia germinans*), and red (*Rhizophora mangle*) mangroves; and buttonwood (*Conocarpus erecta*). These four species occasionally occur in areas defined by varying water levels. White mangrove and buttonwood occupy the highest water level areas, black mangrove the intermediate water level areas, and red mangrove typically occurs in the lowest water level areas. Mangrove swamp communities provide valuable habitat for a wide variety of animal life including fish, birds, amphibians, reptiles, invertebrates, and mammals. Many of these species are listed as endangered, threatened, or species of special concern. As such, mangroves are protected by Florida law. Mangrove communities cannot be altered without proper permits. Red mangroves are being planted in the national

seashore to reduce erosion along portions of the shoreline of Mosquito Lagoon.

Extensive seagrass beds are found in Mosquito Lagoon and are a key indicator to the overall health of the lagoon. Three seagrasses are common, including shoal grass (*Halodule wrightii*), widgeon grass (*Ruppia maritima*), and manatee grass (*Syringodium filiforme*) (Schmalzer and Foster 2005). These highly productive beds provide food and shelter to a host of animals including macroinvertebrates, manatees, sea turtles, and many fish species, including the highly sought red drum (*Sciaenops ocellatus*) and rare common snook (*Centropomus undecimalis*). The seagrass beds in the national seashore are highly vulnerable to human activity, including oil spills from the Intercoastal Waterway, increased turbidity, and large algal blooms (Florida DNR 1990).

Freshwater Marsh. Finally, there is a limited amount of freshwater marsh in upland areas in the southwestern corner of the national seashore. These communities occur in interdunal grassy swales between scrub and slash pine flatwoods areas of former dune ridges. Plant species include marsh pink (*Sebatia sellaris*); cordgrass (*Spartina bakeri*); and other species of grasses, sedges, and rushes. Prolonged absence of fire has allowed some of these marshes to be invaded by swamp willow (*Salix caroliniana*) and red maple (*Acer rubrum*). Alterations in the hydrology allow hardwood species to invade these wetlands areas. The freshwater marshes provide important habitat for many amphibians, including several species of frogs and sirens.

Invasive Plant Species. Invasive plant species have the potential to disrupt native plant communities in the national seashore. Because invasive species degrade, change, or displace native habitats and compete with native species, they pose a serious threat to the national seashore's plant resources. For example, if a proposed activity leads to habitat alteration, habitat loss, or habitat degradation of sensitive species, an opportunity is created for more tolerant, com-

petitive invasive species to colonize the disturbed area, thus reducing habitat and food availability for the native species.

Brazilian pepper is the most abundant nonnative species that invade coastal scrub and strand communities. The state lists the Brazilian pepper tree (*Schinus terebinthifolius*) as a noxious weed (NPS 2009d). This shrub or small tree can quickly colonize disturbed areas by suppressing and replacing native vegetation. Control of this species would depend upon timely follow-up treatments (NPS 2009d). The fast-growing Australian pine (*Casuarina equisetifolia*) was introduced into Florida in the late 1800s and had become an important invasive throughout the state. *Casuarina* spp. is now essentially controlled by uprooting seedlings, and larger trees are killed by cutting, girdling, and treatment with herbicides (Harris 2009). Cogon grass (*Imperata cylindrical*) was intentionally introduced in the United States in the early 20th century from Southeast Asia. Now classified at the state and federal levels, this noxious weed forms dense stands that crowd out native species and is considered one of the “Top 10 Worst Weeds in the World” (FDACS 2009). An invasive throughout the state, melaleuca (*Melaleuca quinquenervia*) invades wetland habitats and forms thickets, reduces biodiversity, and crowds out native vegetation, thus reducing suitable habitat for wildlife (NPS 2009d).

Wildlife

Canaveral National Seashore provides habitat to a wide variety of wildlife species because of its location. Coastal position, combined with the nexus between tropical, subtropical, and temperate vegetation, makes the national seashore an important habitat for resident and migrating species. Many of these species are special-status species, listed by the federal government or the state as threatened, endangered, or species of special concern. The extensive list of such species is addressed under the “Special Status Species” section later in this

section. Therefore, this wildlife discussion provides a brief overview of other wildlife in the national seashore.

Climate change is expected to have profound effects on wildlife because their biological cycles are so closely tied to temperature and their habitat. Birds, mammals, amphibians, and marine species are most likely to be affected in the national seashore. Bird migration patterns are already changing, with birds wintering in the southeast U.S. arriving on average 13 days earlier. Earlier breeding and egg laying dates and range expansion are already being seen in a variety of bird species. Because Canaveral National Seashore is home to both migratory and resident bird species, these effects are likely to be seen. Fish and other marine species are especially sensitive to changes in water temperature and chemistry. Disruptions in the life cycles of these species, especially breeding and egg-laying, are occurring. Disease outbreaks in ocean species, due in part to range expansion of marine parasites, are also occurring and are expected to increase as water temperatures rise. Other documented impacts to predator-prey relationships and wildlife habitat in marine and terrestrial environments are already occurring, such as changes in the male/female ratio of sea turtles and amphibians. Sensitive species such as the manatee, which already has a reduced habitat range, are especially vulnerable to the impacts of climate change (Loehman and Anderson 2009).

Birds. Canaveral National Seashore provides seasonal or year-round habitat for 310 species of birds, including many threatened or endangered bird species (discussed under “Special-Status Species” section), ducks, shorebirds, wading birds, and songbirds. Many of these species breed elsewhere during the summer, but find important winter habitat in the national seashore. Migrating and wintering shorebirds forage on mudflats in impoundments and along the edges of Mosquito Lagoon. Herons, egrets, ibises, and other wading

birds of all shapes and sizes are abundant in the national seashore.

Although the Arctic peregrine falcon (*Falco peregrinus tundrius*) does not breed in Florida, the Canaveral area is an important migration and wintering ground. Wintering falcons require areas that have a plentiful supply of prey birds for food and perches to roost on. The national seashore's coastal area provides optimum habitat in areas where the mangroves have been thinned out by recurrent freezes and dead shrubs and trunks remain standing by marshes and tidal flats (i.e., on the eastern side of Mosquito Lagoon). Once in their wintering grounds, peregrine falcons are relatively sedentary and remain within a few square miles all winter.

Mammals. In addition to the manatee and northern right whale, both of which are federally listed, the national seashore is home to at least 23 other mammal species. Round-tailed muskrats (*Neofiber alleniand*) and an isolated population of eastern woodrats (*Neotoma floridana smalli*) have only recently been discovered at the national seashore. One of the most common mid-sized mammals in the national seashore is the raccoon (*Procyon lotor*). Raccoons present management challenges because they prey on sea turtle and bird nests. Larger mammals that live in the national seashore include bottlenose dolphins, bobcats, and deer. As part of the NPS inventory and monitoring program, small mammal surveys were conducted in the national seashore during 2003 and 2004. These surveys documented the spotted skunk (*Spilogale putorius*) and six species of rodents, including the threatened southeast beach mouse, in the national seashore. A limited amount of pitfall trapping towards the end of the study resulted in one additional species, the southern short-tailed shrew (*Blarina carolinensis*).

Reptiles. Fifty reptilian species are documented for the national seashore. Gopher tortoises are keystone species for the national seashore. A keystone species is

defined as one whose impacts on its community or ecosystem are large and greater than would be expected from its relative abundance or total biomass (University of Washington 1996). These tortoises occupy a variety of upland habitats. Each tortoise digs numerous burrows in its home range (males generally average 17 burrows, while females average 9). These burrows provide important shelter for many other species, some of which are federally protected (e.g., Eastern indigo snake). Because of this species' important role in the ecosystem and current threats to its long-term survival—such as ongoing loss of habitat and upper respiratory disease—it might warrant increased protection.

Other reptile species at Canaveral National Seashore include four species of poisonous snakes: cottonmouth (*Agkistrodon piscivorus*), diamondback rattlesnake (*Crotalus adamanteus*), pygmy rattlesnake (*Sistrurus miliarius*), and coral snake (*Micrurus fulvius*). The five most commonly observed snakes in the national seashore are not poisonous: ribbon snake (*Thamnopsis sauritus*), banded water snake (*Nerodia fasciata*), garter snake (*Thamnopsis sirtalis*), corn snake (*Elaphe guttata*), and black racer (*Coluber constrictor*). All, including the venomous species, are important components of a healthy ecosystem, playing important roles in controlling populations of rodents and other potential pest species.

Fishery Management. Recreational and commercial fishing, which include oyster reefs, crabs, and fishes (described below) is an important activity in the national seashore. Commercial fishing includes guided and unguided fishing, crabbing, clamming, and oystering, and the National Park Service monitors commercial harvest of these species with a permit system.

The national seashore is not currently managing species in the Atlantic Ocean, but works with the state and other federal agencies to monitor fishery health. In the Joint Management Area, where the USFWS has primary jurisdiction over natural

resources and the NPS has primary jurisdiction over cultural resources, the Fish and Wildlife Service has decided to phase out commercial fishing by 2018. The National Park Service would develop a separate fisheries management plan to address commercial and recreational fishing in the waters it manages within Canaveral National Seashore.

Oyster Reefs. Oyster reefs occur in intertidal and subtidal zones on the northern side of Mosquito Lagoon and are dominated by the American oyster (*Crassostrea virginica*). Other sessile (attached) and benthic (bottom) invertebrates live in the oyster reef community including the burrowing sponge (*Cliona* spp.), anemones, mussels, clams, and blue crabs. Oysters are sensitive to salinity—an influx of either highly saline sea water or fresh water could lead to massive oyster death. Because oysters are filter feeders, they are also highly susceptible to pollution (Florida DNR 1990).

The impacts of substantial commercial harvesting of clams and oysters, and the health of the oyster reefs in the northern part of the lagoon are another major concern for the lagoon plants and animals. Commercial shell fishing and crabbing is permitted in the national seashore, and there are times when there are more than 100 active permits (Stiner 2004). Harvesters can only use hand rakes. The reefs in the northern end are starting to die at the outer edges (as opposed to the typical progression where the reef dies in the middle while the edges thrive). Dr. Linda Walters at the University of Central Florida researched the reef decline and has found that boat wakes are negatively impacting the reefs (Walters et al. 2007).

Other researchers are looking at oyster diseases that might be contributing to the reef impacts. There is also substantial evidence indicating that barnacles are out-competing young oysters for suitable attachment (fouling) sites. Suitable attachment sites are probably on the decline because most people remove shells from the lagoon instead of throwing them back into

the lagoon to provide attachment sites (an action referred to as “seeding”). Aggressive competition from barnacles, combined with reduced attachment habitat, is thought to contribute to the reduction in oyster/reef health. Ray Grizzle (University of New Hampshire) has digitized maps of many of the reefs, identifying 64 dead and 110 live oyster reef segments within Mosquito Lagoon.

Fishes. The Indian River Lagoon system, including Mosquito Lagoon, has one of the highest fish species diversities of any estuarine system in the United States (Swain et al. 1995). More than 400 species have been reported from the Indian River and adjacent waters. The high diversity of the region has been attributed to the overlap of tropical and temperate fauna, coupled with moderate environmental variation and diversity of habitats (Gilmore 1995). Fish assemblages associated with habitats such as seagrass meadows, spoil islands, and level sand bottom are dynamic and tend to reflect species-specific environmental preferences, movements, and recruitment patterns (Mulligan and Snelson 1983, Brown-Peterson and Eames 1990, Tremain and Adams 1995, Kupchus and Tremain 2001).

The diversity and abundance of fish in the lagoon has led to the development of recreational and commercial fisheries that represent considerable economic value to the entire region. The Mosquito Lagoon fishery is nationally recognized, and a portion of the Banana River, just south of the national seashore, has been designated as a no-take reserve (no recreational or commercial fishing is allowed). Concern over maintaining the reserve and enhancing fisheries in surrounding waters has led to scientific and management studies in recent years (Johnson et al. 1999, Stevens and Sulak 2001, Tremain et al. 2004). Many factors interact to determine the distribution of fish species in the lagoon. Johnson et al. (1999) found that protection from fishing was the major factor contributing to differences in abundance between fished and nonfished areas. Tremain et al. (2004) concluded

physical factors such as salinity, distance to the nearest inlet, and temperature have the greatest influence over species distribution across the lagoon as a whole, while responses to biological factors such as seagrass coverage, depth, and seasonality determine species distribution on a smaller scale.

Fish families present in Mosquito Lagoon important to fisheries include clupeidae (herring), elopidae (tarpon), centropomidae (snook), pomatomidae (bluefish), carangidae (jack), lutjanidae (snapper), sparidae (porgy), sciaenidae (drum), ephippidae (spadefish), cichlidae (cichlid), scombridae (mackerel), mugilidae (mullet), and paralichthyidae (sand flounder). Members of these families are dependent on the aquatic habitats in Mosquito Lagoon to complete their life cycles. Several of the species and life stages present in the lagoon fall under the jurisdiction of the Magnuson-Stevens Fishery Conservation and Management Act and its provision for essential fish habitat, which is defined in the following sidebar.

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801–1882) established and mandated that fishery management plans be developed to responsibly manage exploited fish and invertebrate species in federal waters of the United States. The National Marine Fisheries Service (NMFS) is responsible for designating and conserving essential fish habitat for species managed under fishery management plans. This is intended to minimize, to the extent practicable, any adverse effects on habitat caused by fishing or nonfishing activities, and to identify other actions to encourage the conservation and enhancement of such habitat.

Essential fish habitat is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” (16 USC 1801[10]). Waters include “aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate.” Substrate includes “sediment, hard bottom, structures underlying the waters, and associated biological communities.” Necessary is defined as “the

habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem.” “Fish” includes “finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds,” whereas “spawning, breeding, feeding, or growth to maturity” cover the complete life cycle of those species of interest.

The South Atlantic Fishery Management Council (SAFMC) is the council responsible for managing fisheries and habitat in the waters of the national seashore area. This council has produced several fishery management plans for single and mixed groups of species. These plans, including those for shrimp, red drum, snapper-grouper, and coastal migratory pelagics (seagoing species), were amended in a single document (SAFMC 1998) to address essential fish habitat within the southern Atlantic region. In addition to the fishery management plans prepared by this council, highly migratory species (tuna, billfish, sharks, and swordfish) are managed by the Highly Migratory Species Management Unit, Office of Sustainable Fisheries. NMFS staff prepared a fishery management plan for highly migratory species, which includes descriptions of essential fish habitat for sharks, swordfish, and tuna (NMFS 1999).

Within the essential fish habitat designated for various species, areas termed habitat areas of particular concern (HAPCs) are also identified. These areas either play important roles in the life history (e.g., spawning areas) of federally managed fish species or are especially vulnerable to degradation from fishing or other human activities.

The fish listed below occur in national seashore waters and are managed by the South Atlantic Fishery Management Council and the National Marine Fisheries Service:

- penaeid shrimp
- red drum
- coastal pelagic fish
- coastal sharks
- reef fish

Penaeid Shrimp (*Penaeus* spp.) are managed by the South Atlantic Fishery Management Council and occur in nearshore waters managed by the national seashore are brown

shrimp (*Penaeus aztecus*), pink shrimp (*P. duorarum*), and white shrimp (*P. setiferus*). Other members of this management unit, including rock shrimp (*Sicyonia brevirostris*), seabob shrimp (*Xiphopenaeus kroyeri*), and royal red shrimp (*Pleoticus robustus*), are found in deeper waters beyond the national seashore's jurisdictional area.

Essential fish habitat for penaeid shrimp encompasses habitats used during their life history (SAFMC 1998). This life history has two basic phases, the adult and juvenile benthic phase and the planktonic larval and post-larval phase. Benthic adults aggregate to spawn in shelf waters over coarse calcareous sediments. Eggs attached to the female's abdomen hatch into planktonic larvae. These larvae and subsequent post-larval stages feed on zooplankton in the water and make their way into inshore waters. For the inshore phase of the life history, post-larval stages settle to the bottom and resume a benthic existence in estuaries, which provide rich food sources as well as shelter from predation. Young penaeid shrimp prefer shallow water habitats with nearby sources of organic detritus such as emergent wetlands and the edges of mangrove areas. Emergent wetlands or mangrove are found in Mosquito Lagoon. Young shrimp live in the Indian River Lagoon from April to June.

Essential fish habitat for **red drum** includes tidal freshwater, estuarine-emergent vegetated wetlands (flooded salt marshes, brackish marsh, tidal creeks), mangrove shorelines, seagrasses, oyster reefs and shell banks, unconsolidated bottom (soft sediments), ocean high-salinity surf zones, and artificial reefs (SAFMC 1998). All phases of the life history of red drum can occur in Mosquito Lagoon. Benthic adults and juveniles (Stevens and Sulak 2001) and planktonic larvae (Johnson and Funicelli 1991) have been collected in the area. Juveniles are most abundant in the Indian River Lagoon from April to June. The near-shore waters of the national seashore would be essential fish habitat for adults.

Habitat areas of particular concern for red drum are coastal inlets, all state-designated nursery habitats of particular importance to red drum, documented sites of spawning aggregations, and habitats for submerged aquatic vegetation (SAFMC 1998). In Mosquito Lagoon, spawning areas have been documented by Grant Gilmore (Gilmore et al. 2000) and others (Johnson and Funicelli 1991). Tagging studies conducted in the area have documented that red drum will migrate to ocean inlets — Sebastian to the south and Ponce De Leon to the north, presumably to spawn (Stevens and Sulak 2001, Tremain et al. 2004).

The major **coastal pelagic fish** in inshore and coastal waters around the national seashore are ladyfish, anchovies, herrings, mackerels, jacks, mullets, bluefish, and cobia. Coastal pelagic species migrate over shelf waters of the region throughout the year. Some species form large schools (e.g., Spanish mackerel), while others travel singly or in smaller groups (e.g., cobia). Some coastal pelagic species are found along sandy beaches and barrier islands of east-central Florida (Gilmore et al. 1981, Peters and Nelson 1987). Commonly occurring species in the national seashore include anchovies (*Anchoa* spp.), menhaden (*Brevoortia* spp.), scaled sardine (*Harengula jaguana*), striped mullet (*Mugil cephalus*), hardhead catfish (*Arius felis*), and Florida pompano (*Trachinotus carolinus*). Larger predatory species (particularly bluefish, blue runner, jack crevalle, sharks, and Spanish mackerel) could be attracted to large concentrations of anchovies, herring, and mullet, which aggregate in nearshore areas. The distribution of most species depends on water column structure, which varies spatially and seasonally.

Coastal pelagic species managed by the South Atlantic Fishery Management Council are cobia (*Rachycentron canadum*), Spanish mackerel (*Scomberomorus maculatus*), king mackerel (*S. cavalla*), and little tunny (*Euthynnus alleteratus*) (SAFMC 1998). Of these, only the Spanish mackerel (adults and juveniles) regularly enter Mosquito Lagoon.

Juvenile cobia can also live in the estuary from April to June (SAFMC 1998). Cobia, king mackerel, and little tunny live in nearshore waters.

Essential fish habitat for coastal pelagic species includes sandy shoals of capes and offshore bars, high-profile rocky bottom, and barrier island oceanside waters, from the surf zone to the shelf break zone. This includes the water from the Gulf Stream shoreward and the drifting *Sargassum* (seaweed) mats seen there. Also included are all coastal inlets and all state-designated nursery habitats of particular importance to coastal migratory pelagics (SAFMC 1998). Juvenile Spanish mackerel and cobia live in the Indian River Lagoon from April to June, when average salinities are highest.

There are no specific habitat areas of particular concern designated for coastal pelagic species in the jurisdiction of the national seashore; however, estuaries in general, where species-specific migratory pathways exist, are considered habitat areas of particular concern (SAFMC 1998).

Coastal sharks are those species commonly occurring in inland and nearshore shelf waters. Several managed shark species, including the blacknose, spinner, bull, dusky, sandbar, tiger, sand tiger, bonnet-head, and lemon, live in the national seashore. The young of several of these species use the Indian River Lagoon system, including Mosquito Lagoon, as nursery grounds (Snelson and Williams 1981, Snelson et al. 1984). Essential fish habitat identified by NMFS staff (1999) for coastal shark species is presented in table 8. No habitat areas of particular concern are designated for coastal sharks.

The **reef fish** (snapper-grouper) management unit consists of 73 species. Although the fisheries and adult habitat of most of these species exist well offshore of the national seashore, the young stages of some reef fishes use the Indian River Lagoon as nursery habitat (e.g., Gilmore et al. 1981, SAFMC 1998). The South Atlantic Fishery

Management Council (1998) identifies the following as essential fish habitat for early life stages of some reef fishes—attached macroalgae, seagrasses, salt marshes, tidal creeks, mangrove fringe, oyster reefs and shell banks, soft sediments, artificial reefs, coral reefs, and hard/live bottom.

Gray snapper (*Lutjanus griseus*) is the only reef fish that commonly inhabits Mosquito Lagoon (Johnson et al. 1999, Stevens and Sulak 2001). Gray snapper spawn offshore, releasing eggs and larvae into the water. Larvae are transported through inlets into estuarine areas where they settle to the bottom and occupy habitats such as seagrass meadows. As they grow, young gray snappers will move from seagrass areas to more structured areas including mangrove edges, hard bottom, and artificial structures (docks and seawalls). Other reef fishes, such as lane snapper (*L. synagris*), gag (*Mycteroperca microlepis*), and grunts (*Haemulon* spp., *Orthopristis chrysoptera*), have similar life cycles, and their early life stages could also occur in the inshore waters of the national seashore.

For the reef and estuarine fish species in Canaveral National Seashore's jurisdiction, **habitat areas of particular concern** include mangrove habitats, seagrass habitats, oyster/shell habitats, and offshore hard ground areas that are in the national seashore's jurisdiction. All coastal inlets are also designated as habitat areas of particular concern for reef fishes, although none of these habitats are in the national seashore (SAFMC 1998). Currently, there appears to be a problem of propeller scarring and channeling through the seagrass beds under national seashore jurisdiction. This has led to consideration of "pole or trolling motor only" zones in specific nearshore areas of the national seashore.

TABLE 8: COASTAL SHARK SPECIES AND LIFE STAGES WITH ESSENTIAL FISH HABITAT IDENTIFIED WITHIN THE CANAVERAL NATIONAL SEASHORE AREA

Species	Early Juveniles / Neonate	Late Juveniles / Subadults	Adults
Blacknose shark (<i>Carcharhinus acronotus</i>)	Shallow coastal waters less than 82 feet deep from the Georgia/Florida border to Cape Canaveral, Florida	Shallow coastal waters less than 82 feet deep from the Georgia/Florida border to Cape Canaveral, Florida	N/A
Spinner shark (<i>Carcharhinus brevipinna</i>)	Shallow coastal waters less than 82 feet deep from Cape Hatteras, North Carolina, to Florida	Shallow coastal waters less than 656 feet deep from the Georgia/Florida border south to Cape Canaveral, Florida (28.5°N)	Shallow coastal waters less than 328 feet deep from the Georgia/Florida border south to Cape Canaveral, Florida (28.5°N)
Bull shark (<i>Carcharhinus leucas</i>)	Shallow coastal waters, inlets, and estuaries in waters less than 82 feet deep from just north of Cape Canaveral at 29°N to just south of Cape Canaveral at 28°N	Shallow coastal waters, inlets, and estuaries in waters less than 82 feet deep	N/A
Dusky shark (<i>Carcharhinus obscurus</i>)	Shallow coastal waters, inlets, and estuaries in waters less than 82 feet deep	Shallow coastal waters, inlets, and estuaries in waters less than 82 feet deep	N/A
Sandbar shark (<i>Carcharhinus plumbeus</i>)	Shallow coastal waters, inlets, and estuaries in waters less than 82 feet deep from Montauk, New York, to Cape Canaveral, Florida (27.5°N)	Shallow coastal waters, inlets, and estuaries in waters less than 82 feet deep from Montauk, New York, to Cape Canaveral, Florida (27.5°N)	N/A
Tiger shark (<i>Gaelocerdo cuvier</i>)	Shallow coastal waters to the 656-foot depth line from Cape Canaveral, Florida, (27.5°N) to Montauk, New York	N/A	N/A
Sand tiger shark (<i>Carcharias taurus</i>)	Shallow coastal waters less than 82 feet from Barnegat Inlet, New Jersey, to Cape Canaveral, Florida (27.5°N)	N/A	Shallow coastal waters less than 82 feet from Barnegat Inlet, New Jersey, to Cape Canaveral, Florida (27.5°N)
Bonnethead shark (<i>Sphyrna tiburo</i>)	N/A	Shallow coastal waters, inlets, and estuaries in waters less than 82 feet deep from Cape Fear, North Carolina, to West Palm Beach, Florida	N/A
Lemon shark (<i>Negaprion brevirostris</i>)	Shallow coastal waters, inlets, and estuaries in waters less than 82 feet deep from Bulls Bay, South Carolina, to West Palm Beach, Florida	Shallow coastal waters, inlets, and estuaries in waters less than 82 feet deep from Bulls Bay, South Carolina, to West Palm Beach, Florida	N/A

SOURCE: NMFS 1999

Note: N/A = information is not available

Invasive Animal Species

Invasive animal species can disrupt native animal communities in the national seashore. Feral hogs invade from surrounding disturbed areas and cause substantial damage to freshwater and saltwater wetlands. Feral hogs also have a voracious appetite for snakes, and declines in snake populations (including those of the threatened Eastern indigo snake) have been observed within the national seashore (NPS 2009d). Feral hogs have also targeted sea turtle nests along other beaches close to Canaveral National Seashore, and one hog can destroy up to a dozen nests in a single night. Extensive trapping (up to 2,500 hogs in a recent year at the national seashore and Merritt Island National Wildlife Refuge) does not appear to have reduced the feral hog population. Although feral hogs occupy primarily the mainland portions of the national seashore, some have moved onto the northern and southern ends of the barrier island. Should they continue to spread along the barrier island, they could have devastating impacts on sea turtle reproductive success (NPS 2009d).

Nonnative reptiles such as the brown anole (*Anolis sagrei*), Mediterranean gecko (*Hemidactylus turcicus*), and Indo-Pacific gecko have invaded the national seashore (NPS 2009d). Three other nonnatives, the tropical gecko (*Hemidactylus mabouia*), crested anole (*Anolis cristatellus*), and Cuban treefrog (*Osteopilus septentrionalis*), have been documented nearby and will probably move to the national seashore in the near future. These nonnative species are a management concern because they can negatively impact native species. For example, the brown anole displaces the native green anole (*Anolis carolinensis*) from its preferred habitat and also preys on its young. The other nonnative species that could impact the national seashore in the future are the cactus moth (*Cactoblastis cactorum*) and the Mexican bromeliad weevil (*Metamasius callizona*)

Special Status Species

Species of special status are defined to be those plant and animal species that are listed by a state or federal agency with special protection or conservation designations. In addition, some species are listed by nongovernmental entities as species of special concern. These nongovernment-listed species do not have regulatory protection.

Entities listing species that live in the national seashore are as follows:

- U.S. Fish and Wildlife Service (USFWS)
- Florida Fish and Wildlife Conservation Commission (FWC)

Listing designations include the following:

- Endangered (E) — species considered rare enough that without special management efforts they may become extinct (federal and state designation)
- Threatened (T) — species that without special management efforts are likely to become endangered in the near future (federal and state designation)
- Species of Special Concern (SSC) — species that warrant special protection because of concerns that these species could become threatened or endangered (state designation)
- Delisted, Monitored (DM) – these species are no longer federally listed, but are being monitored
- Candidate (C) – these species are listed by the USFWS as candidates for federal status, and are treated as Threatened species per NPS policy
- Birds of Conservation Concern (BCC) — birds, other than those federally listed as threatened or endangered, that are of the highest conservation concern to the U.S. Fish and Wildlife Service.

Table 9 lists these species by scientific and common name, along with their specific designation and designating entity.

TABLE 9: SPECIAL STATUS SPECIES AT CANAVERAL NATIONAL SEASHORE
(See footnotes at end of table for status abbreviations.)

Scientific Name	Common Name	Agency Status	
		USFWS	FWC
Amphibians			
<i>Rana capito</i>	Gopher frog	N/A	SSC
Reptiles			
<i>Alligator mississippiensis</i>	American alligator	SAT ^a	SSC
<i>Caretta caretta</i>	Loggerhead sea turtle	T	T
<i>Chelonia mydas</i>	Green sea turtle	E	E
<i>Dermochelys coriacea</i>	Leatherback sea turtle	E	E
<i>Drymarchon corais couperi</i>	Eastern indigo snake	T	T
<i>Eretmochelys imbricata</i>	Atlantic hawksbill sea turtle	E	E
<i>Gopherus polyphemus</i>	Gopher tortoise	N/A	T
<i>Lepidochelys kempii</i>	Kemp's ridley sea turtle	E	E
<i>Nerodia clarkii taeniata</i>	Atlantic salt marsh snake	T	T
<i>Pituophis melanoleucus lodingi</i>	Black pine snake	C	N/A
<i>Pituophis melanoleucus mugitus</i>	Florida pine snake	N/A	SSC
Birds			
<i>Aphelocoma coerulescens</i>	Florida scrub-jay	T	T
<i>Caladris canutus rufa</i>	Red knot	C	N/A
<i>Charadrius melodus</i>	Piping plover	T	T
<i>Charadrius wilsonia</i>	Wilson's plover	N/A	SSC
<i>Cistothorus platenis</i>	Sedge wren	N/A	SSC
<i>Dendroica kirtlandii</i>	Kirtland's warbler	E	N/A
<i>Egretta caerulea</i>	Little blue heron	N/A	SSC
<i>Egretta rufescens</i>	Reddish egret	N/A	SSC
<i>Egretta thula</i>	Snowy egret	N/A	SSC
<i>Egretta tricolor</i>	Tricolored heron	N/A	SSC
<i>Elanoides forficatus</i>	Swallow-tailed kite	BCC	N/A
<i>Eudocimus albus</i>	White ibis	N/A	SSC
<i>Falco peregrinus anatum</i>	American peregrine falcon	DM	N/A
<i>Falco sparverius</i>	American kestrel	N/A	T

Scientific Name	Common Name	Agency Status	
		USFWS	FWC
<i>Grus canadensis pratensis</i>	Florida sandhill crane	N/A	T
<i>Haliaeetus leucocephalus</i>	Bald eagle	DM	N/A
<i>Haematopus palliatus</i>	American oystercatcher	N/A	SSC
<i>Laterallus jamaicensis</i>	Black rail	N/A	SSC
<i>Mycteria americana</i>	Wood stork	E	E
<i>Platalea ajaja</i>	Roseate spoonbill	N/A	SSC
<i>Plegadis falcinellus</i>	Glossy ibis	N/A	SSC
<i>Rynchops niger</i>	Black skimmer	N/A	SSC
<i>Sterna antillarum</i>	Least tern	N/A	T
<i>Sterna dougallii</i>	Roseate tern	N/A	T
Mammals			
<i>Balaenoptera borealis</i>	Sei whale	E	N/A
<i>Balaenoptera physalus</i>	Finback whale	E	N/A
<i>Eubalaena glacialis</i>	North American right whale	E	E
<i>Peromyscus polionotus niveiventris</i>	Southeastern beach mouse	T	T
<i>Physeter catodon</i>	Sperm whale	E	N/A
<i>Podomys floridanus</i>	Florida mouse	N/A	SSC
<i>Trichechus manatus latirostris</i>	West Indian manatee (Florida stock)	E, CH	E
Plants			
<i>Chamaesyce cumulicola</i>	Sand dune spurge	N/A	E
<i>Glandularia maritima</i>	Coastal vervain	N/A	SSC
<i>Harrisia fragrans</i>	Fragrant prickly-apple	E	E
<i>Lantana depressa</i> var. <i>floridana</i>	East coast lantana	N/A	E
<i>Lechea divaricata</i>	Pine pinweed	N/A	E
<i>Nemastylis floridana</i>	Celestial lily	N/A	E
<i>Ophioglossum palmatum</i> (= <i>Cheiroglossa palmata</i>)	Hand fern	N/A	E
<i>Persea borbonia</i> var. <i>humilis</i>	Scrub bay	N/A	N/A
<i>Pteroglossaspis ecrinata</i> (= <i>Eulophia ecrinata</i>)	False coco	N/A	T

Scientific Name	Common Name	Agency Status	
		USFWS	FWC
<i>Tephrosia angustissima</i> var. <i>curtissii</i>	Narrow-leaved hoary pea; coastal hoary pea	N/A	E
<i>Tillandsia utriculata</i>	Giant wild pine; giant air plant	N/A	SSC

Notes: E = Endangered; T = Threatened; SSC = Species of Special Concern; BCC = Birds of Conservation Concern; N/A = not applicable; DM = Delisted, Monitored; C = Candidate; CH = Critical Habitat.

- a Treated as threatened due to similarity of appearance to a species that is federally listed to help enforcement personnel who may have difficulty in differentiating between the listed and unlisted species.

Reptiles

American Alligator — Hunting of the American alligator (*Alligator mississippiensis*) for its hide continued until the late 1960s and effectively eliminated the animal from many parts of its historical range. It has been estimated that more than 10 million alligators were killed between 1870, when hunting began in earnest, and the late 1960s, when it was curtailed. Once hunting was curtailed, alligator populations showed themselves to be quite resilient, and population increases throughout the southern states have caused this species to be recategorized on the federal Endangered Species List in some locations, such as Florida, to “threatened due to similarity of appearance” to the American crocodile, which is still on the endangered list. This aids law enforcement officers who encounter live animals, parts, or products of either species so that federal protection can be enforced. In Canaveral National Seashore, alligator habitat is the fresh and brackish marshes along the Intracoastal Waterway and Mosquito Lagoon.

Loggerhead Sea Turtle — The loggerhead sea turtle (*Caretta caretta*) was listed in 1978 as a threatened species, and it is considered “vulnerable” by the International Union for the Conservation of Nature. Recent population studies have concluded that the number of females nesting in the southeastern United States continues to decline. Extensive ground and aerial surveys

conducted as recently as 1990 put loggerhead nest estimates at 50,000 to 70,000 per year in the southeastern United States. This number represents about 35% to 40% of the world’s population of loggerhead turtles. In the United States, the loggerhead’s nesting areas are divided among four states:

- Florida (91%)
- South Carolina (6.5%)
- Georgia (1.5%)
- North Carolina (1%).

Florida beaches account for one-third of the world’s total population of loggerheads. Florida Nesting Beach Surveys showed a 50% decline in the number of loggerhead nests between 1998 and 2007 (Florida Fish and Wildlife Institute 2008).

In the southeastern United States, adult females begin to nest as early as late April, and they continue into early September. Nesting activity is at its peak in June and July. Along the southeastern United States coast, average clutch size varies from 100 to 126 eggs. Loggerheads nest at night. The average interval between nesting seasons is two to three years, but ranges from one to six years. Natural incubation periods average from 53 to 55 days in Florida and 63 to 68 days in Georgia.

Green Sea Turtle — Green sea turtles (*Chelonia mydas*), listed as federally endangered, range worldwide, and several subspecies have been named. Once

widespread in Florida, nesting is confined today to the area between Cape Canaveral and Palm Beach County. Mosquito Lagoon regularly serves as a nursery for green turtles. In January 2010, for example, over one thousand juveniles were recovered during a severe cold-stun event. The only time males are not at sea is when they are first born. When it is time to mate, they migrate from several hundred to more than a thousand miles across the ocean to where they hatched. Female green turtles use the same beaches to nest as their mothers and grandmothers. These turtles nest every two to three years. The Florida nesting season runs from May into September. Although loggerhead nesting has declined in recent years, nesting activity has actually increased exponentially for the green sea turtle from 1989 to 2007 according to Florida Nesting Beach Surveys (Florida Fish and Wildlife Institute 2008). With few exceptions during this time period, the green sea turtle has exhibited a biennial pattern—the number of nests increasing one year and decreasing the next. During 1999 and 2001, less than 100 nests a year were recorded. More than 1,000 nests were recorded in 2005 and 2007, and 899 were recorded in 2008 (Holdsworth et al. 2007).

Leatherback Sea Turtle— The federal government lists the leatherback sea turtle (*Dermochelys coriacea*) as endangered worldwide. Within the United States, the leatherback is known to nest in southeastern Florida, Culebra, Puerto Rico, and St. Croix.

The leatherback is the largest living turtle and is so distinctive that it is placed in its own family, Dermochelyidae. The leatherback's carapace is slightly flexible and has a rubbery texture. No sharp angle is formed between the carapace and the underbelly (plastron), so a leatherback is somewhat barrel-shaped. The largest leatherback on record was a male stranded on the west coast of Wales in 1988. He weighed 2,019 pounds (916 kilograms).

In 1982 Dr. Peter Pritchard, leading turtle zoologist with the Chelonian Research

Institute in Oviedo, Florida, estimated that 115,000 adult female leatherbacks existed worldwide and that roughly half of them probably were nesting in western Mexico (Pritchard 1992). In recent years, however, the number of nesting leatherbacks has been in an alarming decline. As with the green sea turtle, nest counts have been encouraging in recent years. Nesting activity, although not high in Florida, increased exponentially between 1989 and 2007 according to Florida Nesting Beach Surveys (Florida Fish and Wildlife Institute 2008). The national seashore averaged 1.6 nests a year from 1985 to 1998. Between 1999 and 2008 the average has been 9.8 nests per year, with park staff recording a high of 26 nests in 2009. Leatherbacks prefer open access beaches, possibly to avoid damage to their soft plastron and flippers. Unfortunately, such open beaches are vulnerable to severe beach erosion that may result in egg mortality.

Kemp's Ridley Sea Turtle — Mature Kemp's ridley sea turtles (*Lepidochelys kempii*) are restricted almost entirely to the Gulf of Mexico, but immature individuals are known along the entire Atlantic east coast from Padre Island National Seashore in Texas to Cape Lookout, North Carolina. The turtles are also occasionally found in European waters. Nesting is restricted almost entirely to specific beaches in Mexico, and the species is a rare visitor to waters managed by Canaveral National Seashore. Single nests were recorded at the national seashore in 2003 and 2006, and two nests in 2008. The 2006 nest was in the Brevard County portion of the national seashore, a first for Brevard County. This species is one of the most endangered species of sea turtles.

Atlantic Hawksbill Sea Turtle — The federally endangered Atlantic hawksbill (*Eretmochelys imbricata*) is found worldwide in tropical waters and nests on scattered islands and shores throughout the Caribbean. This species nests infrequently on Florida beaches and would be considered a rare visitor to the waters managed by the national seashore. An individual nested at

the national seashore in August 1982 and was tagged and photographed.

Sea Turtle Monitoring — Beginning in 1984, the national seashore has maintained a sea turtle nesting monitoring program. Nest destruction, primarily by raccoons, is a serious threat, with rates exceeding 90% in the early 1980s. To combat this, in 1984, national seashore staff implemented a nest screening program to protect nests while allowing the raccoon to remain as an integral part of the seashore ecosystem. In 1993 and 1994, the University of Georgia compared three methods of nest protection: screening, predator removal, and conditioned-taste-aversion. They found screening to be the most effective and compatible with NPS guidelines and objectives.

The year 2008 was the 25th year for Canaveral National Seashore's sea turtle nest protection program. Since 1995, NPS staff have managed to screen more than 90% of the several thousand nests deposited each year, reducing nest destruction to as low as 5.0% in 2004. The goal is to achieve the 60% hatching rate targeted in the loggerhead and green sea turtle recovery plans (NMFS and USFWS 1991a) without removing predators from their important role in the barrier island ecosystem (Little and Stiner 2004).

Table 10 summarizes the results of 25 years of this monitoring program. The single Kemp's ridley nest in 2003 was examined with much excitement, because this was the first reported nesting for this species in the

national seashore. The clutch size was 83 eggs, and hatching success was 95%.

Canaveral National Seashore had an unusual sea turtle nesting season in 2004. The nesting totals were the lowest since 1988. Four hurricanes impacted hatching success and washed away more than 1,000 nests. A total of 2,542 sea turtle nests were deposited at the national seashore in 2004 — 2,281 loggerhead, 255 green, and six leatherback (see table 10). Nest densities were 59.6 per kilometer for the loggerhead, 6.7 per kilometer for the green, and 0.16 per kilometer for the leatherback. More than 99% of the nests were screened to exclude predators. During the season, less than 1% of the nests were partially or totally destroyed before discovery, and 4.2% of the nests were destroyed after screening. The overall destruction rate for all nests was 5.0%. Every 20th loggerhead, all green, and all leatherback nests were marked for examination. Hatching success rates of 71.9%, 30.4%, and 41.1% were recorded for the loggerhead, green, and leatherback sea turtles, respectively. The unusually low hatching rate for the green turtle was caused by inundation from high tides associated with the hurricanes.

In 2004 nesting patterns followed those of previous years with 63% of sea turtle nests deposited in the southern half of the beach. Nest destruction was again higher in the northern half of the beach at 9.1% compared to nest destruction of only 1.3% in the southern half, where most of the nests were.

TABLE 10: SEA TURTLE NEST TOTALS, 1984–2009, CANAVERAL NATIONAL SEASHORE

Year	Loggerhead	Green	Leatherback	Kemps	Unknown	Total
2010	4,250	1,343	26			5,621
2009	2,729	301	26			3,056
2008	3,637	899	5	2		4,543
2007	2,357	1,249	21			3,627
2006	2,470	396	1	1		2,868
2005	2,547	1,040	13			3,600
2004	2,281	255	6			2,542
2003	3,229	74	16	1		3,320
2002	3,161	857	8			4,026
2001	3,257	7	10			3,274
2000	3,892	662	9			4,563
1999	4,501	5	9			4,515
1998	3,976	427	5			4,408
1997	2,702	21	4			2,727
1996	3,260	222	3			3,485
1995	4,121	47	1			4,169
1994	3,886	364	2			4,252
1993	3,140	28	0			3,168
1992	3,279	298	0			3,577
1991	4,074	25	1			4,100
1990	3,922	185	1			4,108
1989	3,091	41	1			3,133
1988	2,203	43	0		4	2,250
1987	1,670	90	1		15	1,776
1986	3,349	22	3			3,374
1985	2,389	94	0		25	2,508
1984	*					2,125

Sources: Harrison et al. 2004, Holdsworth et al. 2007, NPS 2009d

Note: * = Individual breakdown not available

Sea Turtle Relocation — Canaveral National Seashore was able to assist with an unprecedented rescue of sea turtle eggs due to hatch along the northeastern shore of the Gulf of Mexico during summer 2010. These hatchlings were relocated from the Gulf of Mexico coast in response to the Mississippi Canyon 252/Deepwater Horizon oil spill that began in April 2010. Biologists determined that any hatchlings venturing into the ocean near the spill were at high-risk for survival. A number of state and federal agencies collaborated to transport eggs nearing the end of their incubation period to Kennedy Space Center, just south of Canaveral National Seashore. The sea turtle eggs hatched under carefully monitored conditions and were released the same night as they hatched on nearby federally-owned beaches. Approximately 15,000 hatchlings from 274 nests were relocated, primarily to Canaveral National Seashore. The vast majority of the nests (265) were loggerhead eggs, plus five Kemp's ridley sea turtle nests and four green sea turtle nests.

Atlantic Salt Marsh Snake — The federally threatened Atlantic salt marsh snake (*Nerodia clarkii taeniata*) is a slender water snake with a pattern of stripes that is variously broken into blotches. In Florida, the Atlantic salt marsh snake is restricted to brackish waters and has historically been recorded in Volusia, Brevard, and Indian River counties. These snakes are the only North American snakes restricted to brackish water environments. In national seashore habitats, they occur in the salt marshes and are usually associated with fiddler crab burrows and glasswort. Use of altered sites by this species, as well as other amphibians and reptiles, should be considered in review and evaluation of management alternatives.

Eastern Indigo Snake — The federally threatened eastern indigo snake (*Drymarchon corais couperi*) is a large, heavy-bodied serpent with smooth, shiny scales. It is restricted to the southeastern United States and occurs throughout Florida. Although the eastern indigo is often

found in dry sandy areas such as Florida's high pine communities, it actually prefers slightly moister habitats such as the pine flatwoods and tropical hammocks in the national seashore on both sides of the Intracoastal Waterway. Popular belief holds that the eastern indigo snake is dependent on gopher tortoise burrows for shelter. However, telemetry studies in the national seashore area have found it more frequently in mammal burrows and old stumps.

Birds

Florida Scrub-Jay — The federally threatened Florida scrub-jay (*Aphelocoma coerulescens*) has extremely specific habitat requirements. It resides permanently in oak scrub areas dominated by scrub live oak (*Quercus virginiana*), myrtle oak (*Q. myrtifolia*), and Chapman oak (*Q. chapmanii*), along with palmettos, rosemary, and sand pine. The populations seen in the national seashore were once part of a large continuous population along Florida's Atlantic coastline, but this population has been fragmented by the growth of coastal cities and coastal development. Researchers are greatly concerned about the future of the species due to loss of habitat. Canaveral and the adjacent Merritt Island National Wildlife Refuge use prescribed fire to improve habitat for the scrub-jay.

Piping Plover — The piping plover (*Charadrius melodus*) is a small shorebird found on beaches, sandy areas, tidal flats, and mud flats. Beach and dune habitats in the national seashore could be occasional wintering areas for this species. Heavy and increased human development and use in this bird's limited habitat area have had harmful effects on this species throughout North America, resulting in its federal status as a threatened species.

Wood Stork — Federally endangered wood storks (*Mycteria americana*) nest in Florida and southeastern Georgia, primarily in cypress or mangrove swamps. They are birds of brackish and freshwater wetlands, feeding in marshes, flooded pastures, and along

drainage ditches. The wood stork is the only true stork (*Ciconiidae*) native to North America. Wood storks are seen throughout the national seashore and the Merritt Island Wildlife Refuge.

Roseate Tern — The roseate tern (*Sterna dougallii*) is a slim, medium-sized tern with extremely buoyant flight. It nests on the ground on barren or sparsely vegetated coastline and feeds over the adjacent nearshore waters. Coastal development has robbed this species of many of its traditional nesting sites, and nesting success has been poor during recent years. This species is listed as threatened by the federal government because of habitat loss and disturbance, predation, and competition from expanding gull populations.

Birds of Conservation Concern — The 1988 amendment to the Fish and Wildlife Conservation Act mandated the U.S. Fish and Wildlife Service to “identify species, subspecies, and populations of all migratory non-game birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973.” The goal of this effort is to identify the migratory and nonmigratory bird species (beyond those already designated as federally threatened or endangered) that represent the highest conservation priorities and to draw attention to those species. Forty-six bird species in the national seashore area are listed as species of special concern under this mandate.

Once found almost everywhere throughout Florida, the bald eagle is now gone from much of its old range in the state’s interior and is much less common along the coastline. Nonetheless, bald eagles nest along Florida’s entire coastline, as well as near larger lakes and rivers. Twelve to 14 nesting pairs regularly occur at the national seashore and the adjacent Merritt Island National Wildlife Refuge. Formerly listed as threatened by the federal government, the species was delisted in Florida in 2007. It is still considered a “species of management

concern” at the national seashore and the refuge, and population numbers and hatching success are monitored each year. Prescribed fire activities help to maintain suitable habitat.

Mammals

Southeastern Beach Mouse — The federally threatened southeastern beach mouse (*Peromyscus polionotus niveiventris*) is the smallest of the white-footed mice in Florida. Because of coastal construction, its distribution is almost entirely limited to federal lands managed by the U.S. Air Force, U.S. Fish and Wildlife Service and the National Park Service near Cape Canaveral. The small mammal inventory (Gaines 2003) is designed to assess habitat use by mammal species in the national seashore. Because of the habitat specificity and limited distribution of the southeastern beach mouse, the results of this inventory are important in assessing management plan alternatives.

Table 11 presents the number of individuals of each small mammal species captured at the national seashore in a small mammal inventory conducted in 2003.

Marine Mammals

Bottlenose Dolphin — The bottlenose dolphin (*Tursiops truncatus*) is the marine mammal most likely to be seen off Canaveral National Seashore. Resident groups of this species occur throughout Florida. The bottlenose dolphin is primarily a nearshore species, although an offshore form has been recognized by many experts (Leatherwood and Reeves 1982, 1983). In the Indian River Lagoon system, a resident population of 200 to 800 individuals is believed to exist. Coastal and offshore individuals also occasionally use Mosquito Lagoon. Bottlenose dolphins are rarely seen in waters more than 650 feet (200 meters) deep. They are generally found in local populations or groups that occupy relatively small ranges along a coastline. A

TABLE 11: NUMBER OF INDIVIDUALS OF EACH SMALL MAMMAL SPECIES CAPTURED BY GAINES (2003)

Species	Common Name	Barrier Island Sites				Mainland Sites
		<i>Eldora Beach</i>	<i>Apollo Beach</i>	<i>Klondike Beach</i>	<i>Playalinda Beach</i>	<i>Bills Hill Area Sites 1-3</i>
<i>Oryzomys palustris</i>	Rice rat	—	4	2	1	—
<i>Peromyscus gossypinus</i>	Cotton mouse	24	10	—	5	7
<i>Peromyscus polionotus niveiventris</i> *	Southeastern beach mouse	—	2	13	—	—
<i>Podomys floridanus</i>	Florida mouse	—	2	4	—	—
<i>Rattus rattus</i> **	Black rat	—	—	1	6	—
<i>Sigmodon hispidus</i>	Cotton rat	—	50	106	58	6
<i>Spilogale putorius</i>	Spotted skunk	—	1	—	—	—

SOURCE: Gaines 2003.

Notes: * = Federally listed as threatened; ** = Nonnative species

population can move from one range to another, but these migrations are generally not more than 200 miles (370 kilometers). Bottlenose dolphin feed on a variety of fishes, mollusks, and arthropods. They are a flexible feeder, taking whatever prey species is available. Most mating and calving occurs from February to May, but there is another, shorter mating and calving period from September to November in tropical waters (Schmidly 1981).

All marine mammals are afforded protection under the Marine Mammal Protection Act of 1972. The coastal migratory stock of the bottlenose dolphin along the southeastern United States has been proposed for listing as threatened.

Right Whale — The northern right whale (*Eubalaena glacialis*) is the rarest of the large baleen whales; adults can reach 55 feet long and weigh 70 tons. The northern right whale is a federally listed endangered species, and received international protection in 1949. However, the population of northern right whales has been slow to recover from whaling in previous centuries, and they are

among the most endangered whale species. Cows with calves are occasionally seen in the winter off Canaveral National Seashore beaches.

West Indian Manatee (Florida Stock) — Broad area surveys of Florida's manatee population, a subspecies of the West Indian manatee, were conducted on January 26, 2005, by 20 observers (16 in the air and 4 on the ground) from 12 different agencies. The observers' preliminary count was 3,142 manatees statewide. Observers on Florida's Gulf coast counted 1,548 manatees, and those on the east coast counted 1,594. The 2005 effort produced the second-highest count since the survey began in 1991. The highest number statewide (3,300) was recorded in 2001. On Florida's east coast, manatee populations recorded during these annual surveys have ranged from a low of 580 individuals in 1991 to more than 1,500 in 2005 (Florida Fish and Wildlife Conservation Commission n.d.). Individuals or small groups may regularly be found in Mosquito Lagoon throughout the summer and fall. The manatees are thought to use Mosquito Lagoon as a corridor to move

between areas further south in the Indian River Lagoon system and the freshwater springs inland in central Florida up as far as Cumberland Island, Georgia.

In the national seashore, the greatest threat to manatees is collisions with watercraft; in Florida, watercraft accounted for 22% of all manatee fatalities in 2009 (Florida Fish and Wildlife Conservation Commission 2010). The FWC staff reports manatee mortality by county. Brevard County manatee deaths attributable to watercraft collisions equaled 10.5% (6 out of 57) of total deaths in 2005. In Volusia County, 36.4% (8 out of 22) of manatee deaths in 2005 were attributed to watercraft collisions (FWC 2009). Efforts to reduce this threat have typically included requiring boats to reduce speed. There are 22.5 acres of West Indian manatee critical habitat in the southeastern waters of Canaveral National Seashore. These acres are part of a larger area of critical habitat designated by the USFWS for protection of Florida manatee habitat.

Marine mammal species reported from Florida waters and possibly occurring in the national seashore area are presented in table 12.

Plants

Fragrant Prickly Apple or Caribbean Applecactus — The Caribbean applecactus (*Harrisia fragrans*) is only found along the east-central coast of Florida growing in coastal hammocks and shell middens. It is a spiny cactus, columnar and angled in shape and erect or reclining in form. The species has showy nocturnal flowers and a large-rounded red berry. It was recorded growing in midden material at Turtle Mound in the 1970s, disappeared during several freezes in the late 1980s, and was rediscovered in similar habitat not far from its original location in 2006. It is likely present on some of the islands in the national seashore. This species is federally listed as endangered in some of the areas to the north of Canaveral National Seashore, though it is not a listed

TABLE 12: MARINE MAMMALS POTENTIALLY PASSING THROUGH WATERS OF CANAVERAL NATIONAL SEASHORE¹

Common Name	Scientific Name
Baleen whales	
Minke whale	<i>Balaenoptera acutorostrata</i>
Bryde’s whale	<i>Balaenoptera edeni</i>
Northern right whale	<i>Eubalaena glacialis</i>
Blue whale ²	<i>Balaenoptera musculus</i>
Finback whale ²	<i>Balaenoptera physalus</i>
Sei whale ²	<i>Balaenoptera borealis</i>
Humpback whale	<i>Megaptera novaeangliae</i>
Toothed Whales and Dolphins	
Striped dolphin	<i>Stenella coeruleoalba</i>
Pantropical spotted dolphin	<i>Stenella attenuata</i>
Spinner dolphin	<i>Stenella longirostris</i>
Clymene dolphin ¹	<i>Stenella clymene</i>
Pygmy killer whale	<i>Feresa attenuata</i>
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>
Risso’s dolphin	<i>Grampus griseus</i>
Pygmy sperm whale	<i>Kogia breviceps</i>
Dwarf sperm whale	<i>Kogia simus</i>
Sowerby’s beaked whale ¹	<i>Mesoplodon bidens</i>
True’s beaked whale ²	<i>Mesoplodon mirus</i>
Blainville’s beaked whale	<i>Mesoplodon densirostris</i>
Gervais’ beaked whale	<i>Mesoplodon europaeus</i>
Sperm whale	<i>Physeter macrocephalus</i>
False killer whale	<i>Pseudorca crassidens</i>
Killer whale ²	<i>Orcinus orca</i>
Rough-toothed dolphin	<i>Steno bredanensis</i>
Bottlenose dolphin	<i>Tursiops truncatus</i>
Cuvier’s beaked whale ²	<i>Ziphius cavirostris</i>
Manatees	
West Indian manatee (Florida stock)	<i>Trichechus manatus latirostris</i>

Notes:

¹See table 9 for the status of some of these species that have federal or state designations.

²The presence of these species is uncertain, but they are known to occur in the south Atlantic and could pass through the unit's offshore waters. Reports indicate that 10 different species of whales and dolphins were stranded at the national seashore between 1977 and 2008, including humpbacked whales in 1993 and 2003 and a rare Gervais' beaked whale in 2007.

species in Brevard or Volusia counties. However, the National Park Service protects species of concern within its boundaries even if they are not officially federally listed for the counties in which the park is located.

State of Florida Listed Animal Species. In addition to the federally listed species present in the national seashore, the state (Florida Fish and Wildlife Conservation Commission) also lists 1 amphibian, 10 reptiles, 24 birds, 5 mammals, and 9 plant species as either threatened, endangered, or species of special concern (see table 9).

Gopher Frog — The gopher frog (*Rana capito*) is a species of special concern that is distinct from other Florida frogs in that it shares the burrows of the Florida gopher tortoise. These frogs live in sandhill communities of scrub oak and sand pine. In the national seashore, they are most common in the sand dune and oak areas on the western side of the barrier island, behind the beach line.

Gopher Tortoise — The gopher tortoise (*Gopherus polyphemus*) is a large terrestrial turtle found in through much of the Atlantic and Gulf Coastal plain, from southern South Carolina through peninsular Florida to eastern Louisiana. In the national seashore, the gopher tortoise is seen in sandy ridge and sand dune areas where the water table rarely comes near the surface. Coastal dune habitats and well-managed (frequently burned) scrub flatwoods in the national seashore are prime areas for gopher tortoises. Impacts of fire suppression on this species should be considered in review and evaluation of management alternatives.

Excavation of burrows is the main activity of a gopher tortoise. These burrows, which are

dug using their hind legs, can be up to 10 feet (3 meters) deep and 39 feet (12 meters) long. They give the tortoises a place to sleep and hibernate where they are protected from snakes, carnivorous mammals, and harsh weather conditions. Gopher tortoises spend nights in the burrows and emerge daily in warm weather, usually in the morning before it becomes too hot to forage for food. They can be seen in every month of the year, but their peak activity generally occurs in May or June.

Gopher tortoises lay their eggs from late April to July. These eggs are deposited, five or six at a time, in holes dug in the ground to protect them from the sun. Once in the nest cavity, the eggs incubate for approximately 100 days. Most eggs are laid well away from the mother's burrow. The hatchlings, which are not cared for by either parent, make their own burrows once they have hatched. Gopher tortoises require 16 to 21 years to mature and can live 40 years or longer.

The gopher tortoise is listed as a species of special concern because so much of its habitat has been destroyed by land clearing, development, and suppression of natural fires. In addition, over the past several decades, upper respiratory disease syndrome has infected the tortoise population in the national seashore area. The impact this disease will have is uncertain.

Seigel (2004) reported results of an investigation to determine tortoise hatchling movements and survival patterns in the national seashore. The mean survivorship for radio-tracked individuals was 134 days. After 30 days from hatching, 44% of hatchlings were no longer alive. After the first month, mortality was more gradual. Survivorship was not significantly associated with carapace length or mass. Mammals (most likely raccoons and skunks), consumed 13 hatchlings (65%), a snake consumed 1 hatchling (5%), and the predators of 6 hatchlings (30%) were not determined.

These data reported by Seigel (2004) are similar to those of studies in northern

Florida and southern Mississippi in that extremely high mortality of hatchling tortoises was recorded. Although the timing and sources of mortality differed among studies, the critical finding of all studies is that no monitored hatchlings survived more than about 18 months. Given that these studies were done in different years, in different habitats, and had different groups of predators, the uniformity of the results is striking (Seigel 2004).

Florida Pine Snake — The Florida pine snake (*Pituophis melanoleucus mugitus*) is a large, tan or rusty-colored snake with an indistinct pattern of large blotches on a lighter background. Within the national seashore, these snakes are most often encountered in relatively open canopies and dry sandy areas where they burrow. They are found in sand pine scrub and scrubby flatwoods areas, often in the same habitats as pocket gophers and gopher tortoises. They are a state-listed species of special concern.

Snowy Egret — Snowy egrets (*Egretta thula*) nest in the mangrove, willow, buttonwood, wax myrtle, and similar woody scrub habitats associated with the aquatic areas of the national seashore. The species is a species of special concern in Florida because it has declined in population since the 1930s. As with all wading birds, the number of nesting snowy egrets in Florida depends on the remaining acreage of productive wetlands. For declines in this and other wading bird species to be halted, critical wetlands ecosystems, which are important as nesting and feeding areas, must be preserved.

Tricolored Heron — The tricolored heron (*Egretta tricolor*) is about 22 inches (56 centimeters) in length and has a wingspan of about 3 feet (0.9 meters). It has blue feathers on most of its body, except for a white chest and belly and a rust-colored neck. Tricolored herons breed on the Gulf coast, and on the Atlantic coast from Maine to Florida. They feed mostly on fish, but they also will eat amphibians, insects, and crustaceans. In the national seashore, they are seen in marshes, swamps, mud flats, and

coastal ponds. Tricolored herons are listed as a state species of special concern.

White Ibis — The white ibis (*Eudocimus albus*), a state-listed species of special concern, is a bird of the coastal plains. It nests on islands, marshes, and mangrove stands, and feeds on the adjacent shallow mud flats. Successful nesting depends on there being adequate nearby feeding areas.

Florida Sandhill Crane — Florida sandhill cranes (*Grus canadensis pratensis*) prefer wet prairies, marshy river edges, and sparsely vegetated wetlands. They avoid forests and areas of heavy human habitation. The state lists the Florida sandhill crane as threatened because the species has a very low reproductive potential. This renders the species incapable of responding quickly to changes in environmental conditions.

American Oystercatcher — Although listed as a state species of special concern, the American oystercatcher (*Haematopus palliatus*) has an extensive range. It spends the winter along the coast from Maryland to the Gulf of Mexico, and is abundant on the shores of Florida. At the approach of spring, it moves toward the middle states and North Carolina to breed. In winter, these birds assemble in parties of 25 or 30 individuals, but for most of the year they are typically found in one to four pairs with their families. Offspring appear to remain with the parent birds until the spring following hatching. American oystercatchers are never found inland, not even along large rivers. In the national seashore, they remain on the sandy beaches and saltwater marshes.

Black Skimmer — Black skimmers (*Rynchops niger*) are about the size of a crow. They are black on top and white on the bottom, with a distinctive orange and black bill. Males are larger than females. Black skimmers breed in Maryland from April through November, preferring to nest in colonies on coastal beaches and dredge spoil islands. They spend the winter along the southeastern coast from South Carolina to

Florida, and they are listed as a state species of special concern.

Glossy Ibis — The glossy ibis (*Plegadis falcinellus*) lives in fresh, brackish, and saltwater wetland areas. Even though the glossy ibis has expanded its breeding range in recent years, the overall number of this species appears to be declining. Because of this fact, and the species' dependence on interior wetlands, the state has listed it as a species of special concern.

State of Florida Listed Plant Species. The state Department of Agriculture and Consumer Services lists 24 species of plants occurring in Canaveral National Seashore area as threatened, endangered, or commercially exploited (see table 9).

Sand Dune Spurge — Sand dune spurge (*Chamaesyce cumulicola*) grows across the ground with long, smooth, stringlike, flexible stems. It is endemic to the coastal dune areas of southeastern Florida and listed as endangered by the state because so much of this habitat has been lost.

East Coast Lantana — The *floridana* variety of the East Coast lantana (*Lantana depressa* var. *floridana*) is a small shrub with ground-hugging stems. It is seen in dry pineland and coastal strand areas of Canaveral.

Pine Pinweed — Similar to nodding pinweed, pine pinweed (*Lechea divaricata*) grows in the dry, sandy soil areas of the national seashore.

Hand Fern — The hand fern (*Ophioglossum palmatum* = *Cheiroglossa palmata*) is a tropical fern found almost exclusively in the detritus-filled base or "boot" of cabbage palms in low, moist, and heavily shaded hammocks. It is listed as endangered primarily because of lost habitat due to drainage projects and intensive collection. These plants also are very sensitive to fire, and because of statewide drainage projects, more of their natural habitat is now exposed

to this risk. It is known from a handful of scattered sites at the national seashore.

Scrub Bay — Scrub bay (*Persea borbonia* var. *humilis*) is also called silk bay and occurs in scrub habitats throughout peninsular Florida. The scrub bay is a shrub or small tree, reaching about 10 feet in height. The leaves of scrub bay are shiny green on top and adorned beneath with a dense carpet of silky, rusty-red hairs, an adaptation to reduce water loss by maintaining high humidity at the leaf surface. This plant is listed because of commercial exploitation.

False Coco — False coco (*Pteroglossaspis ecristata* = *Eulophia ecristata*) is a rare orchid species inhabiting open longleaf pine forests and grassy saw palmetto barrens such as those on both sides of Indian River Lagoon. It is rare and under pressure from commercial collectors and hobbyists.

Narrow-Leaved Hoary Pea; Coastal Hoary Pea — Both the *Tephrosia angustissima* and variety *T. a. curtissii* species of hoary pea are critically imperiled. Endemic varieties are known only along coasts from Brevard to Palm Beach counties and inland to Hendry County, Florida. They live in the coastal scrub community that is threatened in Florida.

Giant Wild Pine or Giant Air Plant — Distribution of bromeliads in Florida is determined largely by the frost tolerance of each species. The endangered giant wild pine (*Tillandsia utriculata*) has the greatest cold tolerance, ranging up the Atlantic coast to Virginia. Giant wild pine was added to the state list as endangered because it is under attack by weevils, but the other, similar bromeliad species were already listed because of pressures from land development and collectors.

Coastal Vervain — Coastal vervain (*Glandularia maritima*) is a small creeping plant that is endemic to southern Florida coastal dunes and pinelands. It is listed because so much of its native habitat has been destroyed by coastal development.

Celestial Lily — Endemic to Florida, celestial lily (*Nemastylis floridana*) is a beautiful blue-violet flower that was recently found in a wet hammock on the mainland side of the national seashore. It blooms in the afternoon during July and August.

Soundscapes and Noise

In accordance with NPS *Management Policies 2006* and “Director’s Order #47, Sound Preservation and Noise Management,” the National Park Service strives to preserve natural soundscapes associated with national park system units. By definition, noise is human-caused sound that is considered to be unpleasant and unwanted. Whether a sound is considered unpleasant depends on the individual listening to the sound and the activity being performed by the individual when the sound is heard (e.g., working, playing, resting, and sleeping). While performing certain tasks, people expect and therefore accept certain sounds. For instance, if a person works in an office, sounds from printers, copiers, and typewriters are generally acceptable and not considered unpleasant or unwanted. By comparison, when resting or relaxing, these sounds are not desirable. Sounds that people prefer during these times are referred to as natural quiet, a term used to refer to ambient (outdoor) natural sounds without intrusion of human-caused sounds. Natural quiet can be essential for some individuals to achieve a feeling of peace and solitude. Natural sounds (surf on the beach, the calls of gulls and shorebirds, and wind through dune vegetation) are not considered to be noise.

Generally, the federal government establishes standards for transportation-related noise sources that are closely linked to interstate commerce such as aircraft, locomotives, and trucks. For those sources, states cannot establish more stringent standards. State governments establish noise standards for automobiles, light trucks, and motorcycles. Noise sources associated with industrial, commercial, and construction activities are generally subject to local

control through noise-related plans and policies.

Noise is measured with instruments that record instantaneous sound levels in decibels. A-weighted sound level measurement is used to characterize sound frequencies that can be sensed by the human ear. Most people are exposed to sound levels of 50 to 55 A-weighted decibels (dBA) or higher on a daily basis. Noise levels in residential areas vary depending on the housing density and proximity to parks and open space, major traffic areas, or airports. As shown on table 13, a normal suburban area is about 55 dBA, which increases to 60 dBA for an urban residential area and to 80 dBA in the downtown section of a city.

TABLE 13: TYPICAL OUTDOOR NOISE LEVELS

Day-Night Average A-weighted Sound Level (dBA)	Location
50	residential area in a small town or quiet suburban area
55	suburban residential area
60	urban residential area
65	noisy urban residential area
70	very noisy urban residential area
80	city noise (downtown of major metropolitan area)
88	3rd floor apartment in a major city next to a freeway

SOURCE: FHWA 1980

Studies specifically conducted to determine noise impacts on various human activities show that about 90% of the population is not significantly bothered by outdoor sound levels below 65 dBA (USEPA 1974).

Existing sources of dominant noise at the national seashore have two origins. External

sources include aircraft overflights and periodic launching of space vehicles from the neighboring NASA facility. Internal noise sources include motor vehicles on roads within the national seashore, maintenance equipment (e.g., mowers), visitors in heavily used areas, and motor boats in Mosquito Lagoon.

Space shuttle launch operations, which are scheduled to end soon, are the loudest source of noise in the national seashore area. In 2007, only three shuttle launches occurred, along with four rocket launches (NASA 2008c). These operations, while noisy, are generally well-published before they occur, and can be seen as both a reason to avoid or visit the Canaveral National Seashore depending on the person asked. Shuttle operations, when occurring, add to the ambient noise. Portions of the national seashore that are owned by the National Aeronautics and Space Administration are closed to public access during operations, limiting the impact on visitors during these times (NPS 2008c).

There are about 66 aircraft operations per week at the NASA shuttle landing facility (AirNav 2008). Ninety percent of these operations are completed by general aviation aircraft, 6% from military aircraft (including shuttle landings), and 4% include air taxi operations. Aircraft using this airfield impact the ambient noise in the national seashore area. However, flights are sporadic and mainly from quieter general aviation aircraft.

Canaveral National Seashore has attracted more than one million visitors per year since 2000 (NPS 2008b). The north entrance to the seashore is near Apollo Beach, and the southern access point is near Playalinda Beach. The highest noise levels from visitors and vehicles likely occur in these areas of the national seashore.

In the national seashore there are several boat launches with access to Mosquito Lagoon and the Indian River (NPS 2008b). Several areas of Mosquito Lagoon are restricted to polling and trolling of motor-

ized boats, which limit their impact on the ambient noise in these areas. Personal watercraft use (e.g., jet skis) is not permitted in Canaveral National Seashore, in part because of the noise impacts.

The ambient noise around the perimeter and in the more populated areas of Canaveral National Seashore is likely to be similar to a suburban or urban residential area, which is about 55dBA to 60 dBA (see table 13). In the interior areas of the national seashore, the ambient noise environment is likely to be around 50 dBA.

Air Quality

In accordance with federal Clean Air Act (CAA) requirements, the air quality in a given region or area is measured by the concentration of various pollutants in the atmosphere. The air quality in a region is also influenced by surface topography, the size of the topological “air basin,” and the prevailing meteorological conditions.

Under the act, the U.S. Environmental Protection Agency developed numerical concentration-based standards, or national ambient air quality standards (NAAQS), for pollutants that have been determined to affect human health and the environment. These standards are currently established for six criteria air pollutants: ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), respirable particulate matter (PM), and lead (Pb). If an area’s air quality is better than the standards, it is considered “in attainment.” Brevard and Volusia counties are in attainment for all criteria pollutants (USEPA 2008a).

In August 1977 Congress passed legislation specifically making air quality management of national parks part of a national effort, thereby affecting activities outside as well as inside national seashore boundaries. Canaveral National Seashore is classified as a class II airshed. Class II airsheds are those that are currently in attainment of the national standards. Canaveral National

Seashore is in the Central Florida Intrastate Air Quality Control Region.

The air pollutants of most concern for the Canaveral National Seashore are ozone, carbon monoxide, particulate matter, wet deposition, and dry deposition, which are linked to effects on national seashore resources. These pollutants, their sources, their effects, and recent monitoring data for the national seashore area are described below.

Ozone (O₃). Ozone has been shown to be the principal component of smog, which affects visibility in our national parks. The federal NAAQS thresholds for ozone are 120 parts per billion (ppb) (1-hour) and 80 ppb (8-hour). Brevard and Volusia counties each have two ozone monitoring sites. Brevard County data for 2007, from the AIRS (Aerometric Information Retrieval System) database for monitoring stations AIRS#C009-0007 and AIRS #C009-0011, indicated maximal ozone readings below the 120 ppb 1-hour ambient standard and only one maximum ozone reading slightly above the 80 ppb 8-hour ambient standard. Volusia County data for 2007 from monitoring stations AIRS #C127-2001 and AIRS #C127-5002 indicated maximal ozone readings below both the 1-hour and 8-hour ambient standards (USEPA 2008b).

Carbon Monoxide (CO). Because of its unstable nature, carbon monoxide is usually a localized air pollution problem. In nature, carbon monoxide is released from combustion of plant material during forest fires. On a much larger scale, carbon monoxide is produced by incomplete combustion of the carbon in fuels used in vehicles, coal and oil furnaces, and smelters and steel production. Carbon monoxide is toxic to all animals (and humans), starving the body of needed oxygen.

There are no carbon monoxide monitoring stations in the national seashore. The closest carbon monoxide monitoring station in the EPA air quality monitoring network is in neighboring Orange County. Orange County

data for 2008 indicated CO 1-hour and 8-hour maximum concentrations of 1.1 parts per million (ppm) and 1.0 ppm, respectively, compared to the 35 ppm 1-hour ambient standard and the 9 ppm 8-hour ambient air quality standard (USEPA 2009a). There have been no recorded exceedances of the carbon monoxide ambient standards for the entire state since 1986 (FDEP 2009a).

Particulate Matter. The federal NAAQS thresholds for PM_{2.5} (respirable particulate matter less than 2.5 microns in size, PM_{2.5}) are 15 micrograms per cubic meter (µg/m³) (annual average) and 65 µg/m³ (24-hour). Brevard County has two particulate matter monitoring stations and Volusia County has one particulate matter monitoring station (FDEP 2008c). Brevard County data for 2007 (from the AIRS database for monitoring stations AIRS #C009-0007 and AIRS #C009-0011) indicated PM_{2.5} values between 12.2 µg/m³ and 66.1 µg/m³. Volusia County data for 2007 (from monitoring station AIRS #C127-5002) indicated maximal 24-hour PM_{2.5} readings well below the standards (USEPA 2008b).

Wet Deposition. Wet deposition fluctuates with the amount of annual on-site precipitation, and is useful because it gives an indication of the total annual pollutant loading at the site. Concentration is independent of precipitation amount; therefore, it provides a better indication of whether ambient pollutant levels are increasing or decreasing over the years.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) is a nationwide network of precipitation monitoring sites. The purpose of the network is to collect data on the chemistry of precipitation to monitor geographical and temporal long-term trends. The precipitation at each station is collected weekly and analyzed for hydrogen (acidity as pH), sulfate, nitrate, ammonium, chloride, and base cations (such as calcium, magnesium, potassium, and sodium). The NADP/NTN site at Kennedy Space Center, Florida

(site FL99) has been operating since 1983. Site data show an increase in concentration and deposition of wet nitrate and wet ammonium, but no overall trends in concentration and deposition of wet sulfate.

Dry Deposition. The Clean Air Status and Trends Network (CASTNet) is considered the nation's primary source for atmospheric data to estimate dry acidic deposition. Each CASTNet dry deposition station measures weekly average atmospheric concentrations of sulfate, nitrate, ammonium, sulfur dioxide, and nitric acid; hourly concentrations of ambient ozone; and meteorological conditions required for calculating dry

deposition rates. Dry deposition rates are calculated using atmospheric concentrations, meteorological data, and information on land use, vegetation, and surface conditions. None of the southeast coast network parks has a CASTNet monitor on site. Nine of the parks have a monitor within 120 miles that can or will eventually provide representative data. The most recent data available from the CASTNet monitor in Indian River County, Florida (site IRL141) show a decrease in total nitrogen and total sulfur from 2005 to 2006 (USEPA 2009b).

CULTURAL RESOURCES

HISTORICAL OVERVIEW

Regional Prehistorical Chronology

Humans have inhabited Florida for at least 14,000 years, attracted by the area's fertile estuaries and temperate climate. However, the first major occupation of the St. Johns River Valley and surrounding coastal lagoons occurred during the Middle Archaic Period (5000–4000 BC) as evidenced by the accumulation of large shell middens along the river and lagoons of east-central Florida. Middle Archaic sites are denoted by large-stemmed projectile points, especially the Newman type. In addition, silicified coral was more prevalent than stone as a tool material, and thermal alteration of the stone became more common.

The Middle and Late Archaic periods (4,000–2,000 BC) are subsumed under the pre-ceramic Mount Taylor Period (5000–2000 BC) in the east-central Florida area. The latter portion of the Late Archaic has been termed the Orange Period (1,000–500 BC) based on the production of orange or vegetable fiber-tempered ceramics, including the use of saw palmetto and Spanish moss fibers. The Orange Period is generally recognized as the period when coastal shellfish exploitation became predominant and the first levels of the great coastal shell mounds were laid down. Research conducted in northeast Florida strongly suggests that late Archaic peoples were living year-round along the coast, using the resources of the coastal marshes and the nearby hardwood forests as the basis for their hunting-fishing-gathering lifestyle. The earliest site yet identified in Canaveral National Seashore—the Max Hoeck midden—dates to the Late Archaic period.

The Orange Period evolved into the St. Johns Tradition. The subsistence economy appears to have remained consistent, although there was a change in the ceramic technology as sand began to be used as a tempering agent and the use of fibers was decreased. A

temperless or chalky ware, known as the St. Johns series, made its appearance at this time. Freshwater sponge spicules in the clay give the ware a chalky feel. In the Canaveral area, this period was marked by the appearance of St. Johns Plain ceramics during the St. Johns I Period, and check-stamping—incised ceramics—became the dominant decoration during the St. Johns II Period.

The St. Johns archeological tradition began around 500 BC and continued until approximately AD 1565 when European intrusion significantly altered aboriginal lifestyles. Archeological studies suggest that the construction of burial mounds, increased sedentism, horticultural activities, and the presence of a more stable environment distinguishes the St. Johns Tradition from the preceding Late Archaic Period. The hunting-gathering-fishing lifestyle that characterized the Archaic continued to be sufficient to support the St. Johns peoples.

The St. Johns cultural tradition is divided into six temporal periods based on ceramic styles and other characteristics. The periods are as follows:

- St. Johns I (500 BC- AD 100)
- St. Johns Ia (100-500)
- St. Johns Ib (500-750)
- St. Johns IIa (750-1050)
- St. Johns IIb (1050-1513)
- St. Johns IIc (1513-1565)

Sites associated with the St. Johns culture are distributed throughout the St. Johns River Valley and surrounding coastal lagoons. Oysters became the dominant shellfish used for food during the St. Johns period, and they comprise from 60% to 90% of the bulk of shell heaps in coastal middens. Prominent examples of St. Johns shell middens in the national seashore include Turtle Mound and Castle Windy, and Snyder's Mound is one of the few remaining St. Johns I sites in the region. Smaller sites, generally associated with

resource procurement, tend to be in the western uplands; the pine woods between the river and coast; and in and near bottomland marshes, swamps, and cypress domes. Larger, more permanent sites are along the coast and the river. These are evidenced by large shell midden deposits and occasionally burial mounds and truncated pyramidal ceremonial mounds. The clustering of midden deposits is often considered to be representative of village sites, although they may represent multiple visits to the area over several hundred/thousand years.

Prehistorical Settlement and Subsistence

Archeological research conducted on the east coast of Florida suggests that the aboriginal populations maintained long-term residential base camps from which task-specific forays were made (as opposed to moving the household from place to place).

Residential camps or household sites are characterized by many artifact types and subsistence resource remains. The materials reflected diverse production and consumption activities, and the sites were located so that access to critical resources was maximized — along the shores on the lagoons and marshy embayments. The intermittently occupied sites, such as field camps, were near a concentrated resource location including “good fishing holes” or shellfish beds. These sites had a more specialized toolkit and a narrower range of subsistence items.

Ethnographic studies suggest that in marshy areas, the higher lands tended to be occupied repeatedly, resulting in these areas becoming even higher with the periodic deposition of debris. Shell midden deposits, along the shores of lagoons and other waterways, are of two basic types in the national seashore—large, high concentrated shell heaps, such as Turtle Mound or Seminole Rest, and linear shell ridges, such as Ross Hammock in the national seashore, and the nearby sites of Futch Cove and Edgewater Landing outside the national seashore. The large shell heaps along the shore appear as if they grew up and

toward the water. These sites, and even their previous locations if destroyed, can easily be identified by the extension of the shore line into the lagoon. It is suggested that archeological deposits with this topographic signature may represent areas of special or long-term use. The determination of use depends on the types of artifacts and subsistence remains recovered. Coastal sites formed by transient bands may appear similar to sites occupied by sedentary people who seasonally gathered shellfish. However, the differences in their subsistence strategies should be apparent when all aspects of the settlement system are examined and compared.

Regional Historical Chronology

European Contact in 1513 to Late 18th Century. At the time of European contact, peninsular Florida was dominated by two main groups of Indians — the Timucua, a linguistic group occupying north and central Florida and southeastern Georgia who inhabited the northern part of the present-day national seashore, and the Ais, a small tribal group living along the Atlantic coastal lagoons and inlets to the south. There is some question as to the dividing line between the two groups in the vicinity of the national seashore; some investigators believe that it was near the Haulover Canal. Timucuan culture was based on agriculture, while the Ais adhered primarily to a hunting, fishing, and gathering subsistence economy that relied almost entirely on the sea, lagoons, and rivers. Linguistically, the Timucuan language formed a separate unit, while the Ais spoke dialects more closely related to those of the Muskogean tribes.

There were various tribal divisions within these two groups—in the northern Canaveral area were the Surruque, a group described as being the southernmost tribe of the Timucuan nation and sharing its same linguistic and political cultural affiliations. At the time of European contact, the Surruque populated the area of Ross Hammock south to beyond the Haulover Canal, and the Ulumay of the Ais inhabited the Canaveral area from near Haulover, at the headwaters of the Indian

River, southward to present-day Fort Pierce and the St. Lucie River and inland for some 20 miles. Positioned immediately between the Timucuan nation to the north, and the Ais to the south, the Surruque subsisted on the sea much like the Ais (with supplementary agricultural production), established large villages, and lived in relative peace with their neighbors. During Spanish times the Ais occupied virtually all of the land along the Indian River. So strong was their identification with the river that it was known as the Rio de Ais until the United States took possession of Florida in the early 19th century. The head chief of the Ais lived on the river, probably near the former Indian River inlet, and outlying areas were ruled by lesser chiefs who were at least nominally subject to the head chief.

The lands of the Timucuan and the Ais were the first land sighted by the armed three-vessel Spanish expedition of Juan Ponce de Leon during early April 1513. Ponce de Leon made two landings, the first of which was somewhere between present-day St. Augustine and the St. Johns River, and the second at an undetermined location in the general vicinity of the present-day national seashore. The latter location may have been at present-day Ponce de Leon Inlet, south of Daytona Beach. At this second landing, the first recorded European contact with the natives of Florida occurred, although it is widely believed that other Spaniards had previously come ashore as survivors of shipwrecks.

Following their initial contact with the native population in the Canaveral area, the Spanish concentrated their exploratory efforts along the west coast of Florida. However, there were occasional contacts with the Indians in the region as a result of efforts to rescue shipwrecked sailors from the treasure ships that sailed from Mexico and Peru through the Straits of Florida on their way to Spain.

Jean Ribault reached the upper east coast of Florida in 1562 with 150 French Huguenot (Protestant) colonists and claimed the territory for France as a political asylum for his persecuted co-religionists. Ribault established his settlement—Charlesfort—at present-day

Port Royal, South Carolina. When Ribault returned to Europe, the colony at Charlesfort failed and was abandoned. In April 1564 Rene Goulaine de Laudonniere, who had accompanied Ribault, was sent back to Florida with another company of 300 Huguenots. They settled near the mouth of the St. Johns River, constructing the fort of La Caroline which is today commemorated by Fort Caroline National Memorial in Jacksonville.

Upon hearing of the French fort, King Philip II of Spain sent Pedro Menendez de Aviles to destroy the French fortification and establish a Spanish colony in its place. Menendez's fleet arrived within days of Ribault and attacked the French fleet, but the French escaped.

The Spanish moved to the south and took steps to establish a settlement near the site of present-day Castillo de San Marcos National Monument that would eventually become the city of St. Augustine. Ribault intended to attack the Spanish, but a hurricane swept Ribault's fleet southward along the Florida coast; the fleet wrecked somewhere north of Cape Canaveral.

The remains of one or more ships from Ribault's ill-fated fleet may lie just offshore of the national seashore, and one site in the national seashore may relate to the French shipwreck survivors' camp. Archeological remains appear to indicate an extended occupation by a small European group living among the native population, thus reflecting the establishment of intercultural relations.

In 1605 the Spanish governor of Florida, Pedro de Ybarra, initiated a period of friendship with the Ais by dispatching Alvaro Mexia to visit the Surruque and Ais. Ybarra forged an agreement with the Indians to limit their attacks to Dutch, French, and English intruders and report the presence of Spanish shipwreck survivors to the authorities at St. Augustine. Several European shipwrecks that are associated with this period are believed to lie in the national seashore's boundaries.

French encroachments from the west and English pressure from the north limited the growth of Spanish Florida. The contest with the English led to the destruction of the Spanish missions, frontier warfare in the disputed land between Florida and Georgia, and the eventual cession of Florida to Great Britain under the terms of the Treaty of Paris in 1763.

Before the Treaty of Paris, British planters north of Florida lost many slaves who slipped across the border into Spanish territory to live among the Indians. As a result, slave-hunting expeditions were organized, and the raiders enslaved or killed many of the Florida Indians. The Spanish took the few surviving Indians, who had numbered an estimated 40,000 at the time of European contact, to Cuba when Florida was turned over to Great Britain in 1763.

During the late 18th century bands of displaced Creek, Yamasee, and Miccosukee Indians filtered into Florida from Georgia and Alabama because of conflicts with European settlers and other tribes. These bands would ultimately become known as the Seminole.

In 1766–67 William Bartram, America's first native-born naturalist/artist, visited the Canaveral and Mosquito Lagoon area. Bartram portrayed nature through personal experience as well as scientific observation, and described the region in his *Travels* published in 1791.

The Treaty of 1763 established British colonial government in Florida and divided the region at the Apalachicola River into East Florida and West Florida. Under British land policy, land grants were issued to British citizens capable of establishing viable enterprises in the newly acquired lands. Among the first land speculators to take advantage of this policy was Dr. Andrew Turnbull, a wealthy Scottish physician who, with the financial backing and influence of his partners, established a settlement on more than 40,000 acres in 1767 in newly christened New Smyrna. More than 1,400 Greeks, Spaniards, Sicilians, Minorcans, and Italians helped found the settlement. The

Turnbulls intended to use these Mediterranean peoples, who were acclimated to the semi-tropical Florida weather, to grow a variety of cash crops for export back to England. The colony never became profitable, and many settlers died, primarily as a result of yellow fever and malaria. By 1777 the colony was abandoned, its surviving members migrating to St. Augustine and the surrounding area. The English also established a settlement at St. Lucia, which became a major trading post and eventually evolved into the city of Fort Pierce.

The site of Elliot Plantation provides a prime example of early colonial life in Florida. The plantation is partly in the national seashore and partly in Merritt Island National Wildlife Refuge. The site is the southernmost and earliest British Colonial period sugar plantation in North America. Dating to the 1760s, it is unusually well preserved and contains rare remnants of two period slave villages, as well as the features of a sugar factory or sugar works. Some of the features of the villages include the remains of a blacksmith's shop, the overseer's house, a possible well, and a possible chicken house. Further testing has been recommended for these sites.

Both East Florida and West Florida remained loyal to the British Crown during the American War for Independence. During this war, East Florida was the objective of several attacks by American forces. Under the terms of the Paris Peace Treaty in 1783 that formally ended the war, both East Florida and West Florida were returned to Spain in exchange for the Bahamas. Some 10,000 British colonists left Florida, and the Spanish Crown began issuing land grants in the New Smyrna-Canaveral area to encourage Spanish settlements.

U.S. Territory and State. West Florida was claimed by the United States as part of the Louisiana Purchase in 1803. An increase in American pressure and continued lack of interest by Spain led to a rapid decline in Spanish control of East Florida after 1814. Pirates, thieves, renegade sailors, and runaway slaves all used Florida as a haven from pursuit.

Spain ceded title of West Florida and East Florida to the United States in July 1821 under the terms of the Adams-Onís Treaty. That same year the U.S. Territory of Florida was established. The first decade of American rule brought economic growth to the territory as numerous plantations were developed for the production of cotton, oranges, lumber, sugar cane, tobacco, corn, and rice.

Soon after the War of 1812, Captain Adolphus and Elonza Swift of Falmouth, Massachusetts, settled in “Live Oak Hill” in east central Florida and started the live oak and cedar timber trade to capitalize on government contracts for shipbuilding materials. Live oak was shaped on Shipyard Island, one of the hammock-covered islands in Mosquito Lagoon just across from Turtle Mound, before being shipped north.

As white settlement pressures increased in Florida, government efforts were undertaken to deal with the Indians. By the terms of the 1832 Treaty of Payne’s Landing, some of the Seminole agreed to move to new lands or reservations west of the Mississippi River. The main body of the Seminole rejected this plan, however, choosing instead to battle the U.S. Army.

Opposition to this plan by the Seminoles resulted in heightened tensions until Indian raids on white settlers and the “Dade Massacre” initiated open hostilities in 1835. Economic development was halted abruptly because the sugar mill at New Smyrna, along with other plantations in the area, were destroyed and burned by Osceola, Coacoochee, and their followers.

Douglas Dummett (or Dummitt in other sources), son of a British officer who had emigrated to Florida and settled near New Smyrna, was commissioned captain of Company B, Florida Militia when hostilities with the Seminoles broke out. His “Mosquito Roarers” militia operated in the Canaveral area, attempting to protect local plantations and homesteads.

During the winter campaign of 1837-38, in what came to be known as the Second Seminole War, U.S. military forces mounted a multipronged advance designed to drive the Seminole southward into the rugged and swampy peninsula. Gen. Joseph M. Hernandez assembled his troops and proceeded down to the “haulover” between Mosquito Lagoon and the Indian River where canoes and other shallow draft vessels were portaged. After camping for nearly a month at the “haulover,” and building an earthen fort (Fort Ann) in the present-day Merritt Island National Wildlife Refuge, the main force (all but one company) proceeded south. The fort’s purpose was to forward supplies of provisions, forage, and materials required by the U.S. Army on the mainland to the west. Having seen no action, the post was abandoned during spring 1838.

Despite the efforts of the military, conditions remained unsettled in the area, causing white residents to abandon their plantations and farms and flee to St. Augustine during the late 1830s. An outbreak of citrus scale further devastated citrus cultivation in the area.

As armed conflict with the Seminoles slowly dwindled to a stalemate during the early 1840s, with remaining holdouts of the tribe hidden but considered harmless in the vast Everglades to the south, the U.S. Army and Florida militia established supply posts and routes throughout the area. With the decline of hostilities, adventuring pioneers slowly began to reestablish new lives and homes on the Indian River frontier.

Congress enacted legislation in August 1842 to encourage settlement and development of the Florida peninsula south of Palatka. The legislation, known as the Armed Occupation Act, granted 160-acre homestead tracts to families who would settle south of the line dividing Townships 9 and 10. The act produced the first concentrated development of the Indian River region with more than 20 families settling there.

Douglas Dummett, former leader of the “Mosquito Roarers,” took advantage of the Armed Occupation Act and settled on the lands near the site of Fort Ann on March 16, 1843. The location of his citrus groves (between an arm of the Indian River now known as Dummett Creek on the west and Mosquito Lagoon on the east) was probably the critical factor in protecting his citrus trees from freezes. He increased the size of his grove over the years, and by 1859 his total annual crop production was estimated at 60,000 oranges. By 1867 the Dummett grove was reportedly the largest in the state, and the Dummett homestead (on the west side of State Route 3) included a main house (remnants of house foundations and chimney remain extant), boathouse, storehouse, and kitchen. This grove is credited as beginning the well-known Indian River citrus fruit industry. Dummett was a pioneer of the Indian River citrus industry. After his death in 1873, the Indian River area developed into one of the world’s choicest citrus belts and produced probably the best known oranges in the United States.

To expedite the transportation of cargo along the inland waterway, the federal government spent some \$5,000 in 1854 for the construction of the Old Haulover Canal (just south of the former site of Fort Ann), linking Mosquito Lagoon on the east with the Indian River on the west on the narrowest part of Merritt Island. The possibility of constructing a canal at this point was investigated, and in 1854 federal funds were appropriated for constructing the canal. A contract was let to Dr. George E. Hawkes, a local citrus grower. Hawkes’ used his African American slaves to dig the canal. Completed several years after the close of the Civil War, the waterway was used for shallow draft vessels. It was one of the first major man-made improvements to the inland waterway system that had served Florida travelers since prehistoric times.

Florida seceded from the Union on January 10, 1861, and subsequently joined the Confederacy. Most major military activities bypassed the Canaveral area.

The principal economic activities in the region during the Civil War were salt-making and contraband trading. What has been speculated to be the remains of a Confederate salt-making works, once consisting of huge iron vats in which salt water was evaporated, can be seen in the national seashore. Recent evidence suggests the structure may be much older and related to the Elliott plantation. New Smyrna and the Indian River, particularly the Sand Point area, became a haven for Confederate blockade runners as numerous small vessels ran the Union blockade to Nassau and Cuba carrying cotton to be exchanged for arms, quinine, needles, coffee, piece cloth, and other supplies for Southern military forces.

Following Reconstruction, a resurgent Democratic Party ushered in an era of “Bourbon democracy” in Florida, dedicated to commercialization and industrialization, as well as improvement of state transportation networks and agricultural lands. Steamboat traffic began to increase in the Indian River Lagoon region because of the Intercoastal Waterway construction. The establishment of a waterway transportation route became the most important factor promoting development of communities along the Indian River Lagoon, providing a base for expanding trade in commercial crops and industries. The inland area, mostly low and swampy and more difficult to reach than the communities along the coast, was not heavily settled until drainage projects could create large expanses of dry land for citrus groves. In 1873 the name of the growing community of Sand Point was changed to Titusville in honor of Col. Henry T. Titus, an entrepreneur and leading developer of the town.

In 1877 the community of Eldora (in the northern part of the national seashore) was established on the east side of Mosquito Lagoon as a docking point for shipping citrus crops on the Indian River and Florida Coast Line Canal. Eldora was one of dozens of small waterfront villages in east central Florida that began as homesteads and then grew into truck farms and led to the establishment of post

offices, improved roadways, and river channels.

As both African American and white residents moved to the Mosquito Lagoon region to support its growing economic endeavors, other communities also developed in the present-day national seashore area during the post-Civil War period. In 1872 Butler Campbell, a former slave, moved from South Carolina and established a homestead, which would become known as “Laughing Waters.” This homestead was several miles north of the Old Haulover Canal on the edge of Mosquito Lagoon near the site of the aboriginal village of Surruque. “Laughing Waters” became the nucleus of Haulover, an African American community that changed its name to Clifton in 1889. Another African American community—Allenhurst—was also established south of the canal during the late 19th century. By the turn of the 20th century both Clifton and Allenhurst had become thriving communities. The towns’ remnant buildings were torn down by the National Aeronautics and Space Administration (NASA) during the 1960s, but their cemeteries remain.

Shiloh, populated exclusively by white residents, was also established north of the Old Haulover Canal during the post-Civil War period. The first wooden houses in the northern Merritt Island area were constructed in this community in 1880 after a hurricane wrecked a Bahamas-bound schooner, loaded with lumber, off the coast. The wreckage washed ashore on the beach opposite Shiloh, and the area’s residents used the lumber to construct dwellings.

Because the first Haulover Canal needed improvements, a new Haulover Canal was laid out north of the old waterway by the U.S. Coast Survey in 1875. Construction was completed in 1887, and it was opened for operation by the Florida East Coast Line Canal Company.

The site commonly known as Seminole Rest, but traditionally known as Snyder’s Mound or Oak Hill, was originally settled by whites

during the early 1870s. The area had been harvested for live oaks that were used to build ships, but this ended about 1870 with the advent of steel-hulled naval ship construction. Snyder’s Mound was divided into several lots during the 1870s and 1880s. One lot became the post office that served Oak Hill. The mound, consisting mainly of clam shells that dated from 2000 BC to AD 1565, escaped the fate of many other mounds along Florida’s east coast that were used for road construction materials during the late 19th and early 20th centuries because its owners, the Turnors and the Snyders, refused to sell.

The extant main house at Seminole Rest was constructed sometime before 1890 and may have been moved from its original location elsewhere on the mound. The late Victorian style wood frame structure was enlarged from 9 to 14 rooms plus three baths with addition of a third floor by Christopher Hatton Turnor and his wife Sarah, owners of the property from 1890 to 1911. In 1911 the property was purchased by Wesley H. Snyder, an oil entrepreneur from Pennsylvania who renamed the property Seminole Rest. The property remained in the Snyder family until the late 1980s when it was sold to the Nature Conservancy before its conveyance to the National Park Service. The nearby caretaker’s house or cottage, a Gothic Revival wood frame structure that also dates to pre-1890, may have been the post office for Oak Hill for some years.

In 1885 a House of Refuge was constructed on Mosquito Lagoon in the northern part of the present-day national seashore (Apollo Beach parking area #5) as part of the U.S. Life-Saving Service’s facilities along the Florida coast to aid shipwrecked sailors. This facility became a U.S. Coast Guard Life-Saving Station in 1915. The station was manned throughout World War I, and by World War II it had been designated a Life Boat Station.

Although the “Great Freezes” of 1894-95 devastated the citrus groves of east central Florida and shattered most growers’ dreams of fortune, it resulted in improved techniques

of citrus production. When its agricultural base was impacted by the freezes that destroyed both citrus and a host of blossoming plants that supported apiaries (bee houses), Eldora residents and other affected Floridians began to seek other opportunities and investments. Eldorans shifted their labors to building the modern community of New Smyrna and accommodating the growing trends of tourism and recreation. The town became known for sport hunting and fishing lodges and as a resort for wealthy visitors seeking refuge from cold northern winters.

Development of additional transportation routes to the Indian River Lagoon also fostered the growth of commerce in the region and provided improved access for new residents. The Florida East Coast Railway extended service from St. Augustine south into the Indian River Lagoon region and ultimately to Palm Beach and Miami by 1896. The railroad constructed some of the first bridges over the tributary streams and rivers of the lagoon, and drainage patterns of the pine flat-woods and wetlands of the coastal ridges adjacent to the lagoon began to be altered. Competition between Flagler's railway and the Florida Coast Line Canal and Transportation Company established a transportation network along coastal Florida that led to the founding of a number of coastal communities.

As transportation routes expanded, so did the human population. After the expansion of the railroad and other land-based travel routes, such as the John Anderson Highway and the Dixie Highway (present-day U.S. Highway 1), the population of the Indian River Lagoon region increased from 317 in 1825 to 8,792 persons by 1910.

Commercial exploitation of Indian River Lagoon fisheries did not begin until the late 1890s. The opening of new inlets and the dredging of channels during this period improved boat access which, along with improved land transportation, expanded market access for fishery products.

Flood and drainage control projects and establishment of mosquito control districts after 1910, along with expansion of commercial fishing, citrus agriculture, resort tourism, and a variety of smaller industries, continued to fuel the economy and development of east central Florida until World War II. With completion of the Florida East Coast Railway through the region in 1896 and completion of the Intercoastal Waterway on the west side of Mosquito Lagoon during the late 1890s, the community of Eldora, on the east side of the lagoon, became isolated from the arteries of commerce, and it slowly became an isolated hamlet. Taking advantage of this transition, some individuals from northern states acquired Eldora properties as winter retreats and investment holdings, setting the stage for the 1920s effort to subdivide land on the Eldora peninsula and sell the lots for winter homes as part of the 1920s land boom in Florida. The Moulton-Wells house (also known as the Eldora State House), a wood frame Dutch Colonial Revival structure constructed during 1913-26, is significant as a surviving example of this "winter retreat" era and the early-20th-century settlement and land development in the Volusia County area. The house and acreage were purchased by Walter M. Wells in 1927. Until his death in 1938 he improved the property by landscaping the grounds, maintaining its outbuildings, and cultivating a substantial garden and citrus grove and using his winter home for extensive entertainment and recreation.

During World War II a variety of military installations were developed in the Canaveral area, including airfields, storage and training facilities, and troop housing, thus contributing to the region's growth. Spotter towers, a gun emplacement, and other installations for observation of enemy submarine and air traffic along the Atlantic coast were constructed in the southern portion of the present-day national seashore as part of America's homeland defenses. An observation tower (no longer extant) was built at the Mosquito Lagoon Life Boat Station to search for German submarines during the war.

In the years immediately following 1945, the undeveloped coastal scrub of Cape Canaveral became the home of America's missile testing program. On October 1, 1949, Cape Canaveral was activated as the Joint Long Range Proving Ground under U.S. Air Force administration, and the following year the proving ground was placed under the administration of Patrick Air Force Base; construction of missile launch complexes was begun with the Corps of Engineers as the principal construction agency.

In 1958 the National Space and Aeronautics Administration selected Merritt Island as a major testing and research center for the U.S. space program. Acquisition of Merritt Island land began in 1962 and ended with the eventual purchase of some 140,000 acres extending from the southern tip of Cape Canaveral to Oak Hill, 30 miles to the north. Because it did not directly use all of this land for the space program, the space administration invited the Bureau of Sport Fisheries and Wildlife (which became part of the U.S. Fish and Wildlife Service in 1973) to assist in managing the nonstrategic acreage. The Merritt Island Wildlife Refuge was thus established in 1963 as an overlay of the space center (renamed the John F. Kennedy Space Center after the president's assassination in 1963) to provide a sanctuary for wintering waterfowl, protect habitat for special status species, and serve as a buffer zone for NASA space activities.

The aerospace industrial complex at Cape Canaveral, including Patrick Air Force Base, Cape Canaveral Air Station, and numerous other service industries that produce or service space technology components, resulted in additional development, rapid population growth, and prosperity for east central Florida.

Disney World opened near Orlando in October 1971, boosting the region's economy and attracting even more visitors to the Canaveral area.

On January 3, 1975, Congress established (Public Law 93-626) Canaveral National Seashore

to preserve and protect the outstanding natural, scenic, scientific, ecological, and historic values of certain lands, shoreline, and waters of the State of Florida, and to provide for public outdoor recreation use and enjoyment of same.

Earlier, on December 11, 1974, the Senate Committee on Interior and Insular Affairs reported that the national seashore's enabling legislation was intended

to ensure the continuing protection of the natural features and to afford opportunities for leisure activities in an undeveloped uncrowded setting.

On October 31, 1988, congressional legislation (Public Law 100-564) provided for the expansion of Canaveral National Seashore by authorizing acquisition of approximately 25 acres at Seminole Rest to protect and interpret archeological and historic resources and approximately 10 acres (Stuckey's) for the purpose of establishing an administrative headquarters and visitor center for the national seashore in Volusia County.

ARCHEOLOGICAL RESOURCES

More than 100 archeological sites dating from the transitional and St. Johns periods (ca. 4000 BC to AD 1565) have been recorded in Canaveral National Seashore; most are associated with shell middens or burial mounds. Sites having historic archeological components include shipwrecks and shipwreck-related terrestrial sites, the Civil War "salt works" and Old Haulover Canal, and historic structures associated with the Eldora, Clifton, Allenhurst, and Shiloh communities; the House of Refuge/Coast Guard Station; and Seminole Rest. Various archeological surveys have been conducted in the Cape Canaveral area since the late 1870s.

As early as 1877, J. Francis LeBaron, an engineer for the St. Johns and Indian River Railroad, surveyed mounds along both shores of Mosquito Lagoon. Additional archeological work in the present-day national seashore area was conducted by various researchers between 1885 and 1963.

The first comprehensive survey of Kennedy Space Center lands, which included the southern two-thirds of the present-day national seashore, was conducted by George A. Long, then a candidate for a M.A. degree in Anthropology at the University of Florida, in 1967. The survey focused on the shoreline of Mosquito Lagoon and gave less attention to inland areas or islands. After the national seashore was established, the National Park Service conducted a limited survey of the national seashore lands to the north in 1976. In 1978 John W. Griffin and James J. Miller of Cultural Resource Management, Inc., conducted a cultural resource reconnaissance of Merritt Island National Wildlife Refuge for Interagency Archeological Services, National Park Service, Atlanta. In 1992 and 1996, surveys of the area adjacent to the national seashore's western boundary along State Highway 3 and the southwestern portion of the national seashore were funded by the National Space and Aeronautics Administration.

Although most archeological sites in the national seashore have not been examined in detail, a few have received additional attention. Castle Windy and Ross Hammock were investigated during the late 1950s and early 1960s by Ripley Bullen, Frederick W. Sleight, Adelaide Bullen, and William Bryant. NPS investigations were conducted by the NPS Southeast Archeological Center staff at the Armstrong Site (French shipwreck survivors' camp) in 1990 and 1995 and Seminole Rest in 1993.

Many of the archeological sites recorded in 1967 and 1976 were not revisited until 1991 when national seashore staff, with the help of NPS Southeast Archeological Center staff, began to relocate sites and implement a national-seashore-wide archeological site

monitoring plan. Preparation of this plan involved consideration of resource significance, condition, vulnerability, and known threats.

Portions of the national seashore have been adequately surveyed for archeological sites; however, other sections have received only cursory survey or none at all. Thus, a thorough systematic archeological survey needs to be conducted for the entire national seashore. Although a magnetometer survey was conducted by Southeast Archeological Center staff on the 24 miles of Atlantic beach face in 1994 with additional investigations in 2004, to search for evidence of shipwrecks, the underwater portions of the national seashore, both in the NPS-administered portion of the Atlantic Ocean extending 0.5 mile offshore and in Mosquito Lagoon, have not been systematically surveyed for historic and prehistoric sites. Although these submerged resources are considered property of the state of Florida, the National Park Service is responsible for their administration and preservation.

ETHNOGRAPHIC RESOURCES

An ethnographic overview and assessment for Canaveral National Seashore was started in 2010. Historic resources related to ethnic communities in the vicinity include Clifton and Allenhurst, former African American enclaves to the north and south of the New Haulover Canal, respectively, that thrived on the edge of Mosquito Lagoon during the late 19th and early 20th centuries. A small frame schoolhouse building was discovered in a wooded area near the former community of Clifton after the National Space and Aeronautics Administration purchased the property in the 1960s. An old trunk inside the building contained a few objects, personal papers, letters, and postcards that were associated with Eugenia Campbell, daughter of Butler Campbell, a former slave who moved from South Carolina and homesteaded ("Laughing Waters") in the Clifton area in 1872.

Shiloh, a white enclave north of the Haulover area, was also settled during the post-Civil War era.

Ethnographic resources associated with American Indians may be identified through future consultations, overviews, and assessments. Historic and archeological resources associated with the Seminole Tribe of Florida, the Seminole Nation of Oklahoma, and the Miccosukee Tribe may in the future be identified as ethnographically significant.

PREHISTORIC/HISTORIC STRUCTURES/BUILDINGS

A historic resource study for Canaveral National Seashore was completed in 2008.

The national seashore's List of Classified Structures (LCS) is an inventory of all historic and prehistoric structures that have historical, architectural, or engineering significance in which the National Park Service has or plans to acquire any legal interest. Included are structures that individually meet the criteria of the National Register of Historic Places or are contributing resources of sites and districts that meet National Register criteria. Also included are other structures — moved, reconstructed, and commemorative structures as well as structures achieving significance within the last 50 years — that are managed as cultural resources because of management decisions that have been made pursuant to the planning process.

At present, the following 15 structures are listed in the national seashore's List of Classified Structures:

Max Hoeck Burial Mound (considered eligible for listing in the National Register by the National Park Service)

Old Haulover Canal (listed in the National Register)

Allenhurst Cemetery Headstones (considered ineligible for listing in the National

Register by the National Park Service because of lack of integrity but managed by national seashore as a cultural resource)

Ross Hammock Burial Mound I (listed in the National Register as contributing resource to the Ross Hammock Site)

“Confederate salt works” (listed in the National Register as contributing resource to the Ross Hammock Site)

Ross Hammock Burial Mound 2 (listed in the National Register as contributing resource to the Ross Hammock Site)

Castle Windy (considered eligible for listing in the National Register by the National Park Service)

Turtle Mound (listed in the National Register)

William Bartram Trail Marker 1 (considered ineligible for listing in the National Register by National Park Service because marker does not meet 50-year rule, but it is managed by national seashore as a cultural resource)

William Bartram Trail Marker 2 (considered ineligible for listing in the National Register by National Park Service because marker does not meet 50-year rule, but it is managed by national seashore as a cultural resource)

Bill's Hill Burial Mound (considered eligible for listing in the National Register by National Park Service)

Seminole Rest Main House (listed in the National Register as contributing resource to Seminole Rest)

Seminole Rest Caretaker's House (listed in the National Register as contributing resource to Seminole Rest)

Moulton-Wells House—also known as the Eldora State House (listed in the National Register)

Cistern at Seminole Rest (listed in the National Register as contributing resource to Seminole Rest)

Schultz House (also known as the Leeper House)—in consultation with the state, was found ineligible for listing in the National Register but is managed by national seashore as a cultural resource

CULTURAL LANDSCAPES

According to the National Park Service's *Cultural Resource Management Guideline* (DO-28), a cultural landscape is "...a reflection of human adaptation and use of natural resources and is often expressed in a way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions."

To date the National Park Service has completed a preliminary survey of cultural landscapes at Canaveral National Seashore. Four landscapes have been identified as cultural landscapes potentially eligible for listing on the National Register of Historic Places—Eldora Historic District, Haulover Canal, Indian River Citrus Landscape, and Seminole Rest. Further research is needed to fully document and assess these landscape resources.

RESOURCE CONDITIONS AND THREATS

Archeological sites in the national seashore have been adversely affected by human factors (vandalism, looting, foot and vehicular traffic, backcountry camping, etc.) as well as natural forces (animal burrowing, vegetative growth, weathering, erosion, fire, etc.) The digging of mosquito ditches and the creation of impoundments have damaged some sites located along the Mosquito Lagoon shoreline.

Storms and high water are eroding many lagoon sites, feral hogs and armadillos have dug into middens and mounds, causing changes to its stratigraphy. Several of the island middens have been used by local residents as backcountry campsites. Shipwreck sites are extremely vulnerable to vandalism and the forces of nature. Despite a number of these impacts, which can be severe, recent archeological investigations have found the vast majority of sites to be in stable condition.

Water levels have varied greatly over the past several thousand years. Some prehistoric archeological sites may be submerged, particularly older Archaic sites that were occupied when the sea level was lower than it is today. The proximity of the Windover site (Early Archaic — 7000–8000 BC) in Titusville to the national seashore offers the possibility that similar burials may occur in the swampy and marshy environs of the national seashore.

One of the greatest impacts on the national seashore's archeological resources to date appears to have been the work of antiquarians and early avocational archeologists who carried out extensive explorations but left little in the way of data. Many of the artifact collections resulting from these early nonprofessional efforts were divided among repositories across the United States, further complicating the situation. Even post-World War II investigators have relied heavily on surface collections and trenching of the shell middens and burial mounds. These methods have often resulted in highly biased samples, with little quantification, that are related to a limited research problem.

The historic structures at Seminole Rest and Eldora are maintained. Other prehistoric and historic structures and buildings in the national seashore have been adversely affected by wear and tear, weathering, pest infestations, and lack of maintenance and preservation treatment.

A number of archeological sites at Canaveral National Seashore may be especially vulnerable to the increasing storm frequency and

intensity and increased flooding that is anticipated in the future due to climate change (Loehman and Anderson 2009). Concentrations of shells in middens at Turtle Mound, Castle Windy, Snyder’s Mound, and Ross Hammock may be highly disturbed due to their exposed locations. Burial mounds and other marsh bottomland and western upland sites may be disturbed due to floods.

Additional undiscovered sites may be uncovered or exposed to the elements during storms or floods. The historic Haulover Canal may likewise be disturbed due to increased intensity of flooding and storms. Historic structures such as the Eldora State House, Instone House, and caretaker’s cottage at Seminole Rest may be vulnerable to damage from storms; changes in the freeze/thaw cycle and flood stage may affect the structures and their foundations.

NATIONAL REGISTER OF HISTORIC PLACES EVALUATIONS

During fall 1975, the NPS Southeast Archeological Center staff undertook a cultural resource inventory and assessment of the national seashore. The resultant study, entitled *Canaveral National Seashore: Assessment of Archeological and Historical Resources*, (NPS 1976), concluded that 62 cultural sites were “currently known to lie within the boundaries of Canaveral National Seashore.” Three prehistoric districts, four prehistoric sites, and three historic sites were determined “to be culturally and scientifically significant” and qualified “for nomination to the National Register.” These included the following:

Prehistoric District

Three prehistoric districts in Mosquito Lagoon (later combined into one North Mosquito Lagoon Archeological District that included Turtle Mound, Castle Windy, and 15 other sites on mangrove islands in North Mosquito Lagoon)

Prehistoric Sites

- Ross Hammock Midden
- Ross Hammock Mound
- Cat Hammock
- northwest tip of Shelton Kurt Island

Historic Sites

- Canaveral Shipwreck Site – 18th or 19th century shipwreck
- Old Haulover Canal
- “Confederate salt works”

Consultations with the Florida state historic preservation officer and various Southeast Archeological Center professionals resulted in conclusions that the nominations for the North Mosquito Lagoon Archeological District, Cat Hammock Site, northwest tip of Shelton Kurt Island, and the Canaveral shipwreck site be held until further fieldwork provided needed information in support of the nominations.

Subsequent research and documentation resulted in further NPS conclusions regarding the significance of the national seashore’s cultural resources. According to the national seashore’s current List of Classified Structures, the following properties are considered by the National Park Service to be locally significant under National Register of Historic Places criterion D (historic properties that have yielded, or are likely to yield, information important in prehistory or history), although their National Register eligibility has not been formally evaluated. These include the following:

- Max Hoeck Burial Mound
- Castle Windy
- Bill’s Hill Burial Mound

Properties Listed in, or Determined Eligible for Listing in, the National Register of Historic Places

Turtle Mound (listed in 1970 under criterion D). In the northern part of national seashore,

Turtle Mound is the largest and most prominent of the several prehistoric shell midden mounds along the east central section of the Florida coast.

Old Haulover Canal (listed in 1978 under criterion A). Covering a 4.6-acre parcel, the Old Haulover Canal extends about one-third of a mile from Mosquito Lagoon on the east to Indian River on the west.

Ross Hammock Site (listed in 1981 under criteria A and D). The 9-acre Ross Hammock site includes a shell midden village area dating to the St. Johns I and II periods, two sand burial mounds dating to the St. Johns I period, as well as the “Confederate salt works.”

Seminole Rest (also known as Snyder’s Mound, Snyder’s Hill, Oak Hill, Live Oak Hill) (listed in 1997 under criteria A and D). Covering approximately 21 acres on the west shore of Mosquito Lagoon, Seminole Rest consists of one major prehistoric archeological site and a historic complex containing several structures.

The archeological site consists of a large shell mound (Snyder’s Mound), a small shell-capped mound (Fiddle Crab Mound) about 250 feet to the west of Snyder’s Mound, and several smaller associated middens (major constituent is quahog clam shell).

Eldora State House (listed in 2001 under criterion A). The Eldora State House, a wood

frame Dutch Colonial Revival structure constructed during 1913–26, is significant as a surviving example of the “winter retreat” era of the Eldora community and of the early 20th century settlement and land development in the Volusia County area.

Properties Nominated for Listing in the National Register of Historic Places

Elliott Plantation. Elliot Plantation lies partly in the national seashore and partly in the adjacent Merritt Island National Wildlife Refuge. The site is the southernmost and earliest intact British Colonial period sugar plantation in North America. Dating to the 1760s, it is unusually well preserved and contains rare remnants of two period slave villages, as well as the features of a sugar factory or sugar works. Some of the features of the villages include the remains of a blacksmith’s shop, the overseer’s house, a possible well, and a possible chicken house. Further testing has been recommended for these sites. A National Register nomination is to be completed in fiscal year 2010. The national seashore has already funded two archeological investigations of the site. Merritt Island National Wildlife Refuge, who is partnering with Canaveral National Seashore and the National Aeronautics and Space Administration to conduct the archeological work, also has voiced support for the nomination.

VISITOR EXPERIENCE

VISITOR ACCESS

Canaveral National Seashore is centrally located on Florida's eastern coast midway between Daytona Beach and Melbourne and 42 miles east of the Orlando International Airport. There are a number of transportation networks that provide convenient access to and through the national seashore. Some of the major regional transportation corridors providing visitor access to the national seashore include the following.

Regional Transportation Networks

Interstate Highway 95. Interstate 95 (I-95) is a major four-lane, divided, north-south interstate limited-access highway along the east coast of Florida and the eastern seaboard of the United States. It is part of the Florida Intrastate Highway System and the National Highway System that serves high-speed and high-volume traffic. Paralleling and within 5 to 10 miles of the national seashore's west boundary, I-95 serves as a major tourism and freight corridor for the region, connecting to all the major roadways that provide access to the national seashore. In 2000 the annual average daily traffic on the section of I-95 that parallels the national seashore was 27,485 vehicles per day as recorded by the Florida Department of Transportation.

U.S. Highway 1. U.S. 1 is a four-lane, paved north-south federal highway that parallels I-95 on the east and also provides convenient access to a number of national seashore access ways. In 2000 the annual average daily traffic on the section of U.S. 1 just north of downtown Titusville was 21,500 vehicles per day as recorded by the Florida Department of Transportation.

Bee Line Expressway. The Bee Line Expressway (State Route 528) is a major four-lane, divided east-west principal arterial/expressway that connects Orlando with I-95

and U.S. 1. The Bee Line serves as a major tourism and freight corridor for central Florida. In 2000 the annual average daily traffic on the section of State Route 528 just before its intersection with State Route 407 was 28,000 vehicles per day as recorded by the Florida Department of Transportation.

Intracoastal Waterway. The Intracoastal Waterway provides boat access into Mosquito Lagoon from waters outside the national seashore. The maintenance and operation of the waterway is under the jurisdiction of the U.S. Army Corps of Engineers. The Intracoastal Waterway forms the western boundary of the northern area of the national seashore for 6.5 miles and passes through the national seashore for an additional 7 miles before entering Haulover Canal, which provides access to the Indian River outside the national seashore. Where the waterway passes through Mosquito Lagoon, an easement of 250 feet on either side of the channel center-line has been retained by the Corps of Engineers.

Local Transportation Networks

There are a number of local transportation networks that go through or just outside Canaveral National Seashore. Many of these routes provide visitor access to national seashore features. These corridors are described below from the South District of the national seashore to the North District.

Titusville Road. Titusville Road (S.R. 406; see Alternative A map), outside the national seashore boundary, provides a two-lane, paved arterial connection between Titusville and Kennedy Parkway (S.R. 3), which borders the western boundary of the southern two-thirds of the national seashore. State Route 406 also provides access to Beach Road (S.R. 402) and Merritt Island National Wildlife Refuge's Black Point Wildlife Drive. The space center's gate 4TT, which is used to restrict

public access during NASA launch and landing operations, is just east of the Max E. Brewer Causeway over the Indian River on State Route 402. The posted speed limit is 55 mph, reducing to 35 mph as the road approaches Kennedy Parkway. In 2001 the average annual daily traffic on the section of Titusville Road between the east end of the causeway (gate 4TT) and Beach Road was 4,504 vehicles per day, and the stretch between Beach Road and the Kennedy Parkway was 383 vehicles per day, as recorded by Team ZHA, the preparers of the 2002 *Cape Canaveral Spaceport Master Plan*.

Kennedy Parkway. Kennedy Parkway (S.R. 3) is a north-south arterial that extends north from Merritt Island National Wildlife Refuge and ends at the intersection of U.S. 1 in the Bill's Hill area of the national seashore. Kennedy Parkway bisects the Kennedy Space Center and parallels the western boundary of the national seashore in the south. The primary users of the parkway are NASA employees. The section of the parkway that parallels the national seashore boundary is characterized as a two-lane paved road that also provides visitor access between the south end of the national seashore and the Bill's Hill area; the northern end of Bio Lab Road; two designated, but undeveloped public boat launch areas accessing Mosquito Lagoon; a manatee viewing area adjacent to Haulover Canal; and the Scrub Ridge and Pine Flatwoods interpretive trails — all within the USFWS/NPS Joint Management Area. The parkway also provides access to a developed public launch facility at Haulover Canal, which is just west of the national seashore boundary but within Merritt Island National Wildlife Refuge. Gate 6TT for the space center, which is used to restrict public access during launch and landing operations, is on the parkway just south of the boat launch.

The parkway also provides access to the national seashore's South District maintenance compound, which is west of the national seashore boundary but within Merritt Island National Wildlife Refuge near Wilson's Corner. In 2001 the average annual daily traffic on the section of Kennedy Parkway

between Titusville Road and U.S. 1 was 1,348 vehicles per day, and the stretch between Titusville Road and gate 6TT was 1,296 vehicles per day, as recorded by Team ZHA, the preparers of the 2002 *Cape Canaveral Spaceport Master Plan*.

Beach Road. Beach Road (former S.R. 402; see Alternative A map) is now owned by the National Aeronautics and Space Administration. It is a two-lane, 24-foot wide, paved collector road oriented east-west, and it provides access to Playalinda Beach and the northern section of the space center complex. The posted speed limits on Beach Road range from 35 to 55 miles per hour, with a lower speed imposed along intersection approaches. The speed limit from the entrance station into the national seashore is 25 mph. Beach Road extends east from Kennedy Parkway. The road's at-grade signalized intersection with Kennedy Parkway marks the national seashore's southwest corner. At this point, the road extends 4.5 miles east into the national seashore until it transitions into the Playalinda Beach Road.

About 1 mile east of the national seashore boundary and the intersection of Kennedy Parkway and Beach Road, the national seashore maintains an entrance station and fee collection booth. The South District ranger station and curatorial facility are accessed just south of this facility. There are eight interpretive and wildlife viewing pullouts, five on the north side and three on the south side, which are dispersed along Beach Road between the national seashore entrance station and Playalinda Beach Road. Just east of the Kennedy Parkway, Beach Road is gated and closed routinely around sunset, prohibiting overnight public use in this area of the national seashore. In 2001 the average annual daily traffic on the section of Beach Road outside the national seashore, between Titusville Road and Kennedy Parkway, was 3,601 vehicles per day, and the stretch between Kennedy Parkway and Playalinda Beach was 1,018 vehicles per day, as recorded by Team ZHA. Beach Road is maintained by the refuge, although the national seashore maintains the grass shoulders.

Bio Lab Road. Bio Lab Road is a two-way gravel road (sometimes not two lanes) connecting Beach Road with Kennedy Parkway. It traverses the southwestern shoreline of Mosquito Lagoon and provides excellent opportunities for wildlife observation. The south terminus of the road at Beach Road is east of the entrance station, and it is possible for visitors to bypass the entrance station and fee collection booth. To discourage this type of shortcutting into the national seashore, plastic bollards have been placed along the centerline of Beach Road to prevent south-bound visitors from turning east on Bio Lab Road from Beach Road.

Florida State Route A1A. In the north end of the national seashore, A1A provides access to the national seashore from I-95 through New Smyrna Beach to its Volusia County southern terminus at Apollo Beach. Route A1A is a two-lane, paved, north-south route that mainly parallels I-95 and U.S. 1. Route A1A provides access to and through most of Florida's eastern coastal beach communities.

Volusia County's Public Transit System (Votran). Volusia County operates a public transit bus system that includes service to the New Smyrna community. The closest bus stop to the national seashore is in a public parking area on the corner of S. R. A1A and Hiles Boulevard, approximately 4 miles north of the national seashore's northern boundary.

National Seashore Transportation Networks

There are a number of roads, beach, and water access areas available in the national seashore. These access features are described below from the South District to the North District.

Playalinda Beach Road. Playalinda Beach Road (about 4.8 miles long) is a two-lane, 20-foot wide, paved roadway that parallels the west side of the primary north/south dune ridge along Playalinda Beach. The road originates from Beach Road (S.R. 402) and provides vehicular access to a number of designated beach access areas and the Eddy

Creek boat launch facility. The roadway provides excellent sight distances because of the absence of grade changes and the general absence of severe curves and lateral obstructions.

Playalinda Beach Access Areas. There are 13 designated beach access areas providing public parking, restroom facilities, and boardwalk trails over the primary dune to access Playalinda Beach. The first series of beach access areas start about 0.25 mile north of the intersection with Beach Road (S.R. 402). There are four parking areas (#1 through #4), with 500 feet between each lot, with parking capacities ranging between 51 and 108 vehicles. Parking area #2 is the only area with designated oversized vehicle parking. Farther north (0.5 mile), a second series of three beach access areas (#5 through #7) accommodate 88 vehicles each and are separated by about 400 feet. Parking area #8 (0.5 mile farther north) accommodates 109 vehicles and provides an accessible trail to the beach for visitors with disabilities. Parking areas #9 and #10 (0.5 mile farther north) accommodate 78 vehicles each and are 800 feet apart. The last series of parking areas (#11 through #13) are the only beach access parking areas on the west side of the road. They accommodate only 50 to 60 vehicles each and are separated by 800 feet and 1,000 feet, respectively. Just beyond parking area #13, a turnaround loop is provided, along with a gated, restricted access drive into NASA's Camera Pad #10 area. The total parking capacity of all 13 beach access areas is 1,005 standard and 18 oversized vehicles.

Eddy Creek Boat Launch Area. Located 2 miles north of the Beach Road and Playalinda Beach intersection, the Eddy Creek boat launch area provides boat access into Mosquito Lagoon. The paved boat launch and parking area accommodates 24 standard, four accessible, and 10 boat trailer parking spaces; a courtesy dock; an interpretive pavilion; a storage building; and restrooms.

Klondike Beach Access. Access into this area is by permit only, and maximum capacity is 25 people/day. This 12-mile stretch of primitive beach and shoreline is between Playalinda

Beach in the south and Apollo Beach in the north. It is accessible by foot from either beach area or via boat by way of Mosquito Lagoon or the Atlantic Ocean.

Apollo Beach Road. The roadway serving Apollo Beach is a two-lane undivided paved road approximately 5.5 miles in length that parallels the beach behind the primary dune. It originates at the national seashore boundary at the terminus of S.R. A1A, which serves the New Smyrna beach community. Apollo Beach Road goes south and ends in a turnaround loop and parking area. Like the Playalinda Road, this roadway has excellent sight distances because of the absence of grade changes and the general absence of curves and lateral obstructions. The road accesses a number of visitor use and administrative use areas, including the national seashore's visitor information center, ranger station, maintenance compound, beach access areas, boat launch areas, interpretive trails, and the Eldora Hammock area.

Apollo Beach Access Areas. There are five beach access areas providing public parking, restroom facilities, and boardwalk trails over the primary dune to access Apollo Beach. The first area is just south of the entrance station and accommodates the largest visitor parking capacity in the North District—82 standard, 3 accessible, and 3 oversized vehicle parking spaces. Boardwalk trails to the beach are provided on each end of the parking lot; the north side is accessible for visitors with disabilities. The only outdoor shower available for public use in the national seashore is here. Beach access area #2, 2 miles farther south, accommodates 24 standard and 1 accessible parking spaces. Beach access area #3, about another mile south, accommodates 24 standard and 1 accessible parking spaces. Beach access area #4, about another mile south, accommodates 21 standard and 1 accessible parking spaces. Beach access area #5, just over 2 miles farther south, accommodates 34 standard and 2 accessible parking spaces and provides an accessible trail to the beach for visitors with disabilities. The total parking capacity of all 5 beach access areas is

193 standard (including accessible) and 3 oversized vehicles.

Beach access for equestrian riders is provided over the administrative boardwalk across from the visitor information center. Parking is permitted in a designated area near the boardwalk. A permit is required, and use is restricted to Apollo Beach with a maximum of six horses at any one time. During sea turtle nesting season, horseback riding is prohibited (April 15 through October 31 or when the first turtle nest is laid).

The total parking capacity of Apollo Beach is about 20% of that provided at Playalinda Beach. Consequently, Apollo Beach fills to capacity more often and sometimes requires a temporary closure to visitors entering this area by automobile.

Parking lot #5 consistently fills to capacity shortly after the national seashore opens in the morning. Visitors who arrive later hoping to use this access into the undeveloped heart of the national seashore are unable to find parking. Roadway congestion is sometimes a problem because some visitors wait for spaces to become open, requiring NPS rangers to clear these areas.

For those visitors who do visit Apollo Beach, they find more opportunities to experience natural seashore environments because of the greater distance between beach access areas. Fewer visitors on the beach in some areas allow an uncrowded experience.

Eldora Hammock Road. Almost 1.5 miles south of the entrance station, Apollo Beach Road provides access to Eldora Hammock Road. This road is a 1.2-mile, one-way paved loop through the Eldora Hammock area, and it accesses four visitor use areas, spaced approximately 0.25 mile apart. The second parking area (#7) provides access to an undeveloped canoe/kayak boat landing for Mosquito Lagoon and accommodates 11 standard and 1 accessible parking spaces. Parking area #7 provides access to a fishing pier and accommodates 8 standard and 1 accessible parking spaces. Parking area #8

provides access to a shell and sand trail to the historic Eldora State House and dock facility. Restrooms are provided at the parking area, which accommodates 20 standard, 1 accessible, and 2 oversized vehicle parking spaces. Parking area #9 provides access to the Eldora Hammock Interpretive Trail and accommodates 8 standard and 1 accessible parking spaces.

Apollo Beach North Boat Launch Area. Located just inside the national seashore's north boundary, a developed boat launch facility provides 24-hour boat access into Mosquito Lagoon. The paved boat launch and parking area accommodate 22 boat trailer parking spaces, a courtesy dock, and restrooms.

Apollo Beach South Boat Launch Area. At the southern terminus of the Apollo Beach Road and opposite parking area #5, an undeveloped, gravel boat launch area provides for boat access into Mosquito Lagoon. The area accommodates parking space for up to four boat trailers.

Accessible Facilities

At Apollo Beach, the visitor information center and education pavilion are accessible, the Turtle Mound Interpretive Trail is accessible with assistance, and there is an accessible boardwalk across the dune from parking lot #1 to the beach. Two accessible boardwalks are provided at Playalinda Beach in the South District (one opposite the Eddy Creek access road and another at parking area #8). A beach wheelchair is available for loan to visitors at the visitor information center at Apollo Beach and at the entrance station at Playalinda Beach. All national seashore restroom facilities are accessible. Recent renovations at Seminole Rest included providing an accessible entry into the main house and elevator access to the second floor. The interpretive loop trail was also made accessible.

Visitor Access Restrictions

The John F. Kennedy Space Center, south of the national seashore, is an active national security area. Launch and retrieval activities at the space center may require the National Space and Aeronautics Administration (NASA) to impose temporary closures of areas of the national seashore and national wildlife refuge. The entire South District is closed to the public during space shuttle operations. Visitors who are unaware of the closures in time to make alternate plans are often frustrated, disappointed, or irate.

Natural cycles of the seashore environment influence visitor use. Fall hurricanes require evacuation of visitors and closure of facilities. Summer proliferation of mosquitoes and other insects in vegetated areas force visitors to seek shelter in the more hospitable beach and lagoon. The islands, hammocks, and shell mounds receive little visitor use until insects vacate in winter.

VISITOR OPPORTUNITIES

Canaveral National Seashore offers visitors a wide range of recreational, interpretive, and educational opportunities on both land and water. User groups include the following:

- sightseers/wildlife viewers (birders, etc.)
- beach sunbathers/enthusiasts
- swimmers/surfers
- boaters
- commercial boat tour operators
- fishermen
- hunters and trappers
- commercial fishing guides
- commercial shellfish harvesters
- backcountry campers
- equestrians
- hikers
- bicycle riders
- environmental education groups
- school groups—elementary, secondary and post-secondary groups

Surveys have been conducted at the national seashore for several years to assess visitor

satisfaction with the overall quality of facilities, services, and recreational opportunities. Satisfaction has been relatively high when compared to satisfaction surveys at other units of the national park system. The survey for fiscal year 2003 reflected a positive 91% satisfaction measure (composite Very Good and Good scores). Visitors at Canaveral National Seashore were most satisfied with the quality of walkways/trails/roads (97%), sightseeing (97%), outdoor recreation (97%), and assistance from employees (95%). Some scores related to interpretation were less positive: visitor center (94%); map/brochure (94%); learning about nature, history, or culture (92%); exhibits (91%); ranger programs (84%). By far the lowest satisfaction was with restrooms (only 58%).

Recreational Opportunities

Beach Areas. Many opportunities for recreational activities such as sunbathing, wading, fishing, shell collecting, wildlife observation, and photography are provided at three beach locations. Informational wayside exhibits at many parking areas and interpretive exhibits on some boardwalks present topics related to beach ecology and safety. Beach camping at one site on Apollo Beach is permitted six months of the year. Seasonal equestrian use is permitted in select locations. The best opportunities for visitors seeking solitude can be found along Klondike Beach. This section of the national seashore is designated as “backcountry” and is limited to 25 persons per day on the south end of the beach and 25 persons per day on the north end of the beach; a permit is required.

At Turtle Mound a trail with interpretive markers provides access to a prehistoric mound.

Mosquito Lagoon. Mosquito Lagoon has outstanding opportunities for fishing, wildlife viewing, backcountry camping, canoeing, kayaking, and motorboating. Seasonal hunting of migratory waterfowl is allowed within both the national seashore and national wildlife refuge and is part of the refuge’s waterfowl

management plan. Backcountry camping (by reservation only) is permitted at 14 designated lagoon islands sites year-round. Fishing/wildlife observation decks provide additional recreational opportunities. Commercial fishing guide services and boat tour operators are permitted on the lagoon by way of a commercial use authorization. Commercial harvesting of clams, oysters, shrimp, crabs, bait fish, and fish in accordance with Florida state laws is permitted by way of a commercial harvesting permit.

The historic Eldora Statehouse provides visitors with a look into the early 20th century settlement and history of this part of Florida. Interpretive tours and signs are provided.

Bill’s Hill Area. This area of the national seashore is just north of the USFWS/NPS Joint Management Area. Access is by way of U.S. 1 and Bill’s Hill Road (south of the town of Oak Hill). There are a number of remnant sand and shell roads into the area that provide access to a remote pine flatwoods area and Mosquito Lagoon. Adventurous hikers and shoreline fisherman are the primary users because the area has not yet formally been developed to accommodate public access and visitor use.

Seminole Rest, north of Bill’s Hill, provides visitors with an opportunity to visit an important prehistoric shell mound. A museum and historic houses provide insights into the early 20th century settlement of the area.

Information, Interpretation, and Education

Entrance Stations. Visitors have opportunities to interact with NPS personnel for orientation and information at entrance stations in the North and South districts of the national seashore. A brochure and map, available at each entrance station, provides basic information about Canaveral National Seashore and Merritt Island National Wildlife Refuge. Visitors arriving at the Apollo Beach entrance station are encouraged to stop at the visitor information center for directions to

other points of interest in the national seashore.

Visitor Information Centers. The national seashore visitor information center at Apollo Beach is staffed with NPS rangers and volunteers who provide visitors information on how to best visit the national seashore. The center includes an office, information desk, audiovisual room, a sales area dedicated to interpretive and visitor convenience materials, and a few exhibits. Exhibits include a touch table of seashore objects and a wall aquarium displaying “Creatures of the Lagoon.” Two glass-enclosed exhibits display models of the Eldora State House and the 1886-1920 Mosquito Lagoon Coast Guard Station. The other room is used for video projection, which accommodates 30 visitors. This space does not accommodate peak visitation, nor does it allow for effective visitor orientation or interpretation. Water and restrooms are also provided. Outside the center, along the Mosquito Lagoon shoreline, are an education pavilion and dock. The pavilion is used to assemble groups for interpretive presentations. The dock is where visitors can access the interpretive pontoon boat tours through Mosquito Lagoon. A shell and sand parking area accommodates 21 standard and 2 accessible parking spaces.

There is no national seashore visitor information center in the South District. This district includes the heavily visited Playalinda Beach adjacent to Kennedy Space Center and Titusville, Florida. However, the Merritt Island National Wildlife Refuge visitor information center near the southwest boundary of the national seashore distributes an information brochure describing the wildlife refuge and national seashore. Other information and interpretation at the center focuses on national wildlife refuge resources and stories.

Some information about the national seashore is available at Canaveral National Seashore headquarters in Titusville, for the few visitors who find and stop at the office. Videos, pre-visit packets, and the national seashore’s website also provide information.

Historic Sites. There are two historic sites open to the public in Canaveral National Seashore. The first site includes the Eldora State House, surrounded by century-old oaks; it is a representative remnant of the once-thriving village of Eldora. For a century people lived here and adapted to changing economic and social trends. Now the only surviving structure is listed on the National Register of Historic Places. The building has been restored and is open to visitors when volunteers or NPS staff are available. A small sales area and exhibits on the first floor help visitors learn about the history of this site. Access to the site is by way of the Eldora Hammock road; a short trail from a parking area leads visitors through an oak forest to the building overlooking Mosquito Lagoon. A trailhead wayside exhibit interprets the village and invites visitors to walk to the Eldora State House. A bulletin board at the parking lot includes information about hours of operation.

The second historic site, Seminole Rest, is along the west shoreline of Mosquito Lagoon in the town of Oak Hill in southern Volusia County. Access is by private vehicle only. It is easily reached via Interstate 95 or U.S. 1. The entrance to the site is about 1.5 miles from U.S. Highway 1 via either of two routes. Signs on the highway in Oak Hill directing visitors to Seminole Rest do not identify the site as an NPS area.

Seminole Rest consists of several prehistoric shell mounds dating from 2000 BC to AD 1565. Snyder’s Mound, the largest mound at this site, is unique because few structures this large remain intact today. Two turn-of-the-century buildings (main and caretaker houses) have been built atop the mound, which has aided in its preservation. A 0.5-mile loop trail provides access to historic and prehistoric features of the site. In the more sensitive areas the trail is an elevated boardwalk, transitioning into a paved walkway closer to the parking area. The historic structures and shell mounds are interpreted by wayside exhibits depicting Timucuan and later cultures that relied on bounty of the lagoon for survival. Benches and wayside exhibits

encourage visitors to pause for beautiful views of the lagoon and contemplation of past and present uses of resources in this area. The site includes a large parking area and restrooms.

Interpretive Trails. In addition to the Seminole Rest trail described above, there are four additional self-guided trails in the national seashore that are interpreted with pamphlet trail guides or wayside exhibits. The Castle Windy trail is directly across the Apollo Beach Road from parking area #3, which serves as the trailhead parking area. The 0.25-mile trail is an interpretive sand path that crosses the barrier island to Mosquito Lagoon, providing access through an upland hammock area to a prehistoric Timucuan Indian midden dating to around AD 1000. A trail guide pamphlet interprets numbered stops along the way, introducing visitors to the types of natural and cultural features found in this unique hammock community.

The Turtle Mound Trail is less than a mile from the Apollo Beach entrance station. A small paved, parallel parking area accommodates 10 standard and 1 accessible parking spaces on the west side of the road. This self-guiding, 1,000-foot boardwalk trail leads visitors through an upland hammock area to the top of another Timucuan Indian mound along Mosquito Lagoon. Two overlook platforms provide unobstructed panoramic views of the Atlantic Ocean and Mosquito Lagoon. A gated, unimproved, two-track drive just south of the parking area provides limited access to a clearing adjacent to Mosquito Lagoon, which is sometimes used for larger groups attending interpretive programs.

The 0.5-mile Eldora Hammock Trail is a loop sand trail that winds through a densely vegetated upland hammock area. A number of trail plaques along the trail provide a series of philosophical quotes highlighting the environmental preservation movement.

The U.S. Fish and Wildlife Service maintains a number of interpretive trails in the Merritt Island National Wildlife Refuge. The Scrub Ridge Interpretive Trail, within the national

seashore boundaries in the NPS/USFWS Joint Management Area, provides visitors with an opportunity to learn about the endangered scrub-jay and its habitat. The Pine Flatwoods Trail interprets the role of fire in maintaining the natural ecosystem.

Interpretive and Educational Programs. The small staff provides a variety of information, interpretation, and education programs at the national seashore. Large shade structures with benches on the dune at Eddy Creek in the South District and at the visitor information center in the North District are used for scheduled interpretive presentations. Other undeveloped sites throughout the national seashore, including the shoreline area near Turtle Mound, are also used for staging programs. Conducted activities include recreational skills and safety, talks, walks, exploration of cultural sites, investigation of marine biology, and canoe/pontoon boat trips into Mosquito Lagoon. As staffing allows, some programs are also conducted in classroom settings at local schools.

Visitor Services

Many services are not available inside the national seashore. There is no drinking water and there are no developed picnic areas, food services, or telephones, available at national seashore beaches. Food, lodging, gasoline, and recreational equipment rental are provided in communities outside the national seashore boundary.

FIGURE 1: RECREATION VISITS

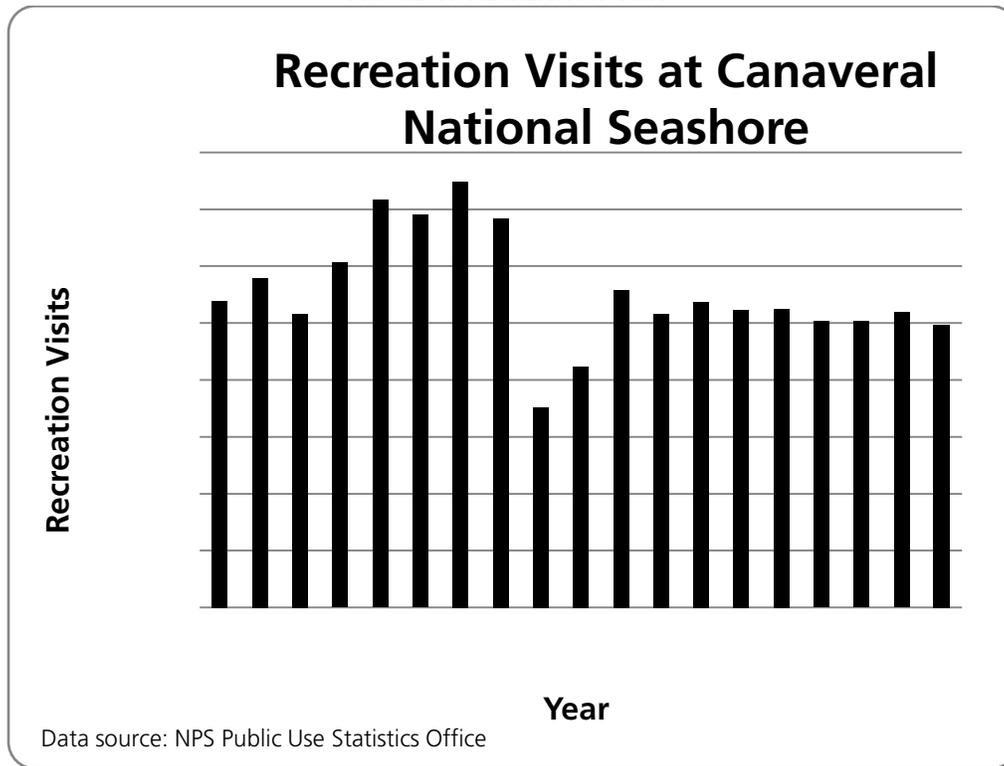


TABLE 14: VISITOR USE

Year	Recreation Visits	Overnight Stays
1990	1,079,022	948
1991	1,159,001	965
1992	1,032,992	1,581
1993	1,211,492	2,549
1994	1,432,880	2,122
1995	1,380,438	1,900
1996	1,496,961	3,215
1997	1,368,632	5,185
1998	703,301	2,311
1999	846,512	2,142
2000	1,115,345	2,189
2001	1,062,962	4,332
2002	1,075,747	3,694
2003	1,045,898	3,931
2004	1,050,211	2,308
2005	1,007,446	2,277
2006	1,005,401	2,883
2007	1,038,450	2,900
2008	994,453	2,474
2009	1,001,664	2,081

SOURCE: NPS Public Use Statistics Office

VISITOR USE

Figure 1 and table 14 display historical visitor use data in recreation visits to the national seashore and overnight stays for the last 19 years. (Recreation visits are one person entering a park system unit for any part of a day for recreation purposes, and overnight stays are one person spending the night in a backcountry campsite.) During this period, the national seashore averaged about 1,117,000 recreation visits per year. During the last 10 years, the annual average was 995,000. Visitor use has been more than one million recreation visits a year for all but two consecutive years during the last 18 years. In the last eight years, the national seashore hosted between 1.0 million and 1.1 million recreation visits annually. Visitation has fluctuated over the years, by as much as 100,000 visitors.

The national seashore offers primitive camping opportunities on some of the islands in the north end of Mosquito Lagoon and on the beach. Overnight use, while relatively low, has exhibited an up and down trend

fluctuating from a low of 948 in 1990 to a high of 5,185 in 1997. In 2009 overnight stays numbered 2,081.

The impacts of climate change on visitor experience may range from altered timing of visitation to restrictions on public access. Longer, hotter summers may shift the spring and fall visitation seasons, and visitation may decline during the hottest summer months or during months with increased storms. Visitor facilities may need to be upgraded or moved to withstand severe weather and floods. Energy expenditure for cooling buildings may increase in the summer, and expenditures for heating facilities may decline in the winter. Pollen-based allergies and outbreaks of mosquito-borne diseases may also increase. Visitation for birding and fishing may change if new species from the south shift northward into the national seashore or if extant species move northward or have dramatic declines in population, as might occur with the manatee. Sea level rise and erosion, or the need to protect certain areas, may alter visitor access to certain parts of the national seashore.

PUBLIC HEALTH AND SAFETY

Many of Canaveral National Seashore's visitors come from other parts of the United States or foreign countries. They are unaware of the numerous dangers presented by a Florida barrier island environment. Although the National Park Service attempts to inform visitors of dangers through signs, bulletin boards, brochures, and individual contacts, the seashore continues to present a variety of hazards. These include drownings and near drownings as a result of rough surf conditions, strong ocean currents, and rip tides; getting struck by sudden lightning storms (central Florida receives more lightning strikes than any other section of North America); sunburn and heat stroke/exhaustion; jellyfish/

Portuguese man-of-war stings (in the ocean surf); stepping on sting rays (in Mosquito Lagoon); bites by poisonous snakes, sharks, and sick or rabid animals; boating accidents (in Mosquito Lagoon); fish hooks (on the ocean beach and in Mosquito Lagoon); and surfing. Jagged protrusions on the beach from shipwrecks and other marine debris pose additional threats.

First aid services are available at the visitor contact station in the North District.

Lifeguard stations are staffed from 10:00 am to 5:00 pm at Apollo Beach area #1 and Playalinda Beach areas #1 and #2 from Memorial Day to Labor Day.

There is no bicycle path to the visitor contact station in the North District. This is a hazard because the roadway is barely wide enough for two motor vehicles to pass. The adjacent community's bike path ends abruptly at the national seashore's boundary, forcing cyclists who enter the national seashore to ride in the lane of traffic.

Florida state regulations require water quality monitoring of public beach areas. The regulations require the national seashore to sample water monthly for bacteria such as *enterococci* to determine if conditions are safe for swimmers.

Offshore shipping and the Intracoastal Waterway along the national seashore's boundary provide the potential for toxic spills. Occasionally, hazardous waste washes up on the beach, primarily from offshore shipping. This includes toxic material and medical waste.

Day use permits to access Klondike Beach allow NPS staff to know who is in the area.

NATIONAL SEASHORE OPERATIONS

ORGANIZATION

Management of the Canaveral National Seashore is organized into the superintendent's office and five functional divisions. Operations are further organized into a three-district framework with the North District encompassing Apollo Beach, Eldora Hammock, and the northern portion of Mosquito Lagoon; the Central District encompassing Seminole Rest and Bill's Hill; and the South District encompassing Playalinda Beach and the Joint Management Area (including the southern two-thirds of Mosquito Lagoon). As of 2011, there were 53 full-time-equivalent (FTE) positions authorized for supporting national seashore operations.

TABLE 15: PERCENTAGE CHANGE IN STAFFING BY FISCAL YEAR

Fiscal Year	Total FTE	Percentage Change
2011	53	0%
2010	53	1.0%
2009	52	8.3%
2008	48	1.1%
2007	45.5	5.8%
2006	43	-8.5%
2005	47	2.2%
2004	46	6.9%
2003	43	-6.5%
2002	46	-6.1%
2001	49	-2.0%
2000	50	-3.9%
1999	52	-1.9%
1998	53	26.2%
1997	42	13.5%
1996	37	-

Superintendent's Office

The superintendent of Canaveral National Seashore is responsible for managing the seashore, its staff, all of its programs, and its interactions with stakeholders, visitors, agencies, and organizations. The superintendent supervises the five division

chiefs. These divisions provide the full scope of functions and activities needed to provide for resource and visitor protection, resource management, interpretation, education, maintenance of national seashore infrastructure, and administrative support. National seashore headquarters is based in a leased building in Titusville, Florida.

Administration Division

The Administration Division is responsible for the national seashore's payroll, budget, procurement, contracting, and property management activities. Administration also has responsibility for human resources and information technology. The main base of operations for administrative staff is the headquarters building in Titusville. Staff in this division advise superintendent in all matters relating to law, policy, and regulation relating to the administration of the national seashore, including but not limited to performance management, position management, accountability, management reviews, and internal controls.

Law Enforcement Division

The Law Enforcement Division is responsible for all activities related to visitor and resource protection, including visitor and employee safety, lifeguard services, emergency response, emergency medical services, search and rescue, patrols, security, structural fires, and law enforcement in the national seashore. The main base of operations for this division is the headquarters building in Titusville, with district ranger stations at Apollo Beach, and Playalinda Beach.

Law enforcement efforts at the national seashore strive to provide visitor protection services for more than one million visitors annually in a recreational setting that also features remote backcountry areas and an

extensive array of natural and cultural resources. Most visitors to the national seashore arrive by automobile, but increasing numbers are accessing the national seashore by bicycle, on foot, or by boat. The national seashore is accessible primarily from urban areas to its north and southwest; however, the national seashore's vast watershed is accessible and traversable via the Intracoastal Waterway on a 24-hour basis. Other areas of the national seashore, such as Seminole Rest and the Bill's Hill area, are also open and accessible on a 24-hour basis.

The national seashore's boundaries extend for 24 miles from north to south, and 0.5 mile into the ocean. Law enforcement work is more difficult because of major commercial and noncommercial fishing activities in the national seashore; multiple, conflicting, and competing user groups; some 180 documented archeological sites; an expanding incidental business permit program that includes numerous commercial fishermen and commercial guide services; and major post-9/11 antiterrorism and national security concerns related to the Kennedy Space Center and other nearby national assets.

The national seashore staff protect numerous significant and varied natural and cultural resources. Following is a list of law enforcement concerns relating to these resources:

1. Some 180 plus archeological sites are not routinely patrolled because of insufficient staff.
2. Commercial shell fishing and incidental business permit activities are not adequately monitored because of staff shortages.
3. Staff shortages and post-9/11 mandates (homeland security details and NASA security restrictions) result in ranger patrol activity that is reactive instead of proactive.
4. Mosquito Lagoon estuary activities in general are not monitored adequately because of staff and equipment limitations. The national seashore has two fully equipped law enforcement vessels to

provide for marine estuary protection and enforce boat safety regulations.

5. Mainland poaching activities are not monitored adequately because of insufficient staff.

Resource Management Division

The Resource Management Division is responsible for all activities related to the management, preservation, and protection of the national seashore's cultural and natural resources. Activities include inventory and monitoring of resource conditions; research, restoration activities, species-specific management programs such as the sea turtle protection program; wildland fire management; archives and collections management; and historic site protection. The division is operated out of the headquarters building in Titusville.

Interpretation Division

The Interpretation Division is responsible for providing education services for diverse audiences, interpretation of themes, staffing the Apollo Beach visitor information center and Seminole Rest, providing information and orientation for visitors through personal (guided) and nonpersonal services (e.g., website, publications, exhibits, and Volunteers-in-the-Parks program), and the fee collection program. Until 2009, interpretation services was a part of the Law Enforcement Division, with limited staffing available for managing interpretive and educational programs. With the recent establishment of a separate division, increases in staffing were approved and partially funded, and the fee collection program was transferred to this division. This organizational change provided fee collection staff an opportunity to dedicate 20% of their time to expanded interpretive programs. The Chief of Interpretation's office is located in the newly constructed Apollo District Ranger Office, and there are district operations at the Apollo Beach visitor information center, Seminole Rest, and the administrative

complex across from the Playalinda Beach entrance station.

Maintenance Division

The Maintenance Division is responsible for operation and maintenance of facilities and equipment, including historic and nonhistoric structures and grounds, utilities, roads and parking areas, trails and trailheads, signs, docks, boats, and vehicles. (See following “Facilities and Infrastructure” discussion.)

The facility manager is stationed at headquarters in Titusville, and the other employees are assigned to field locations. These include the North District maintenance complex adjacent to the visitor information center at Apollo Beach; the South District maintenance complex at Wilson’s Corner, just outside the national seashore in the wildlife refuge; and a small maintenance field office in the caretaker’s house at Seminole Rest.

Volunteers and Partners

Currently, Canaveral National Seashore has 160 active volunteers on its roster. During FY 2003 about 17,000 hours of work were logged by volunteers. Some 50 volunteers conduct the sea turtle protection program each summer, and volunteers staff the national seashore’s visitor contact station, Eldora State House, and Seminole Rest; assist with environmental education programs and other public interpretive programs; conduct turtle programs in area schools; and help with maintenance projects. The national seashore relies on volunteers more and more each year.

The national seashore provides trailer pad space that enables a volunteer/couple to stay at the national seashore during the busy winter months and staff the Eldora State House. The primary problem facing the volunteer program is its seasonal nature; there is plentiful volunteer help in the winter, but the numbers dwindle to just a few year-round residents during the remainder of the year. This results in reduced volunteer support on

all programs and activities except for the visitor contact station.

The existing partnership between the national seashore, Merritt Island National Wildlife Refuge, and the Kennedy Space Center has provided critical support for national seashore operations. Merritt Island National Wildlife Refuge provides planning and support for prescribed fire, feral hog eradication, monitoring of special status species, exotic plant control, and environmental research. Kennedy Space Center provides GIS support, long-term monitoring of amphibians and reptiles, monitoring of water quality and shoreline erosion, training support, supplies, graphic design, and printing.

In addition to the primary support received from both of these federal agencies, there are a number of local groups who have partnered with the national seashore resulting in enhanced effectiveness in managing such a diverse resource. The Nature Conservancy conducts scrub-jay monitoring. The University of Central Florida is implementing oyster reef restoration in Mosquito Lagoon and providing long-term monitoring of invasive aquatic species. The Saint Johns River Water Management District conducts marsh restoration and sea grass monitoring.

Other partners provide additional funds to support national seashore programs and activities. Eastern National is a nonprofit cooperating association that provides educational products and services to visitors. A portion of proceeds are donated back to national seashore interpretive and educational programs. Eastern National operates bookstores at the visitor information center at Apollo Beach and the main house at Seminole Rest. The Friends of Canaveral provide fundraising support, programs, and some exhibits. The Florida Department of Environmental Protection provides support and funding for exotic plant removal.

Facilities and Infrastructure

Introduction. Infrastructure at Canaveral National Seashore includes a diverse set of facilities or “assets” (e.g., historic and non-historic structures, roads, parking areas, utility systems, maintained landscapes, backcountry campsites, and communication systems).

Increased operational requirements, reduced funding, and vacant staff positions have caused the staff to defer routine maintenance of some facilities. Deferred maintenance is work that should ideally have been done at specific times but was not, primarily because of budget constraints. Deferred maintenance often leads to costly repairs over time. The National Park Service is striving to reduce the deferred maintenance backlog throughout the national park system. The national seashore reassesses the conditions of facilities and updates the database every two years.

Structures. National seashore staff is responsible for maintaining 67 structures. Examples include a visitor information center, entrance stations, ranger stations, maintenance shops, storage buildings, research facilities, fire caches, a curatorial facility, employee residences, comfort stations (restrooms), and 3 historic structures (the Eldora State House and the main and caretaker houses at Seminole Rest).

Visitor Contact Facilities — There are five visitor contact facilities in the national seashore. Two are entrance stations, one at Apollo Beach (280 square feet) and the other at Playalinda Beach (192 sf). These facilities provide visitors with their first opportunity to come in contact with national seashore staff and obtain national seashore information.

Just beyond the entrance station at Apollo Beach, a visitor information center is provided. The small (1,540 sf) 20-year-old facility consists of two double-wide trailers and an attached room and porch; however, a new Visitor Center facility is currently undergoing construction and is expected to be completed in 2011. The overcrowded and undersized current facility has limited space

for exhibits, storage, sales, and reference materials; a 30-seat auditorium is too small to handle the numerous school groups and tour buses that arrive at the national seashore. The facility does not provide space or a climate-controlled environment for display of artifacts. Two, single-toilet restrooms must be accessed from outside.

The Eldora State House (3,330 sf) provides another opportunity for visitors in the north area of the national seashore to interact with NPS staff and volunteers. The historic structure has been rehabilitated, with exhibits and a small sales area provided.

At Seminole Rest, the first floor of the recently renovated main house (1,900 sf) provides a small book sales outlet operated by Eastern National.

Administrative Facilities — In addition to the leased headquarters building in Titusville, there are a number of facilities throughout the national seashore that provide space for management support activities. In the Apollo Beach area, north of the visitor information center, there is a ranger station. A small parking area accommodates 8 to 10 vehicles. A boathouse and dock accommodate patrol boat access into Mosquito Lagoon and provide shelter for a pontoon boat that is used for interpretive tours during the weekends.

Directly across Apollo Beach Road from the visitor center entrance, a shell and sand drive accesses a number of former residential garages, which currently provide storage for emergency equipment (591 sf), lifeguard operations (576 sf), and resource management (744 sf). An administrative beach access boardwalk on the north side provides for quick beach access by NPS personnel during emergencies. The dune crossover is also the designated access route for visitors on horseback.

South of the visitor information center parking area, two access drives connect to the North District maintenance complex. The complex accommodates a maintenance shop (1,600 sf), equipment repair shop (1,536 sf),

garage (2,880 sf), storage sheds (264 and 576 sf), and a fuel station. Circulation in this area and onto Apollo Beach Road can get congested at times because of the layout of facilities and the fact that maintenance traffic travels through the visitor center parking area.

In the Eldora Hammock area, there are a number of former residential properties that are currently used for NPS administrative purposes. Between parking areas #7 and #8, a shell and sand access drive connects to the former Hebner property, where the garage (383 sf) provides for resource management storage. On the adjacent property to the south, a second shell and sand drive provides access to the former Grey property, presently used as short-term housing for researchers.

Just south of parking area #8, a 0.5-mile shell and sand drive extends south from the Eldora Hammock Road and provides access to two former residential properties. The first property, about 0.125 (1/8) mile south of the junction, includes the former Feller house (1,587 sf), which is maintained by the National Park Service but is being used by the University of Central Florida as a research station under a cooperative agreement with the national seashore. The second property, the Schultz house (1,352 sf) and garage (551 sf), is being used by the national seashore for temporarily housing employees, researchers, and interns and/or for staging special events.

At Seminole Rest, the upper floor of the main house (1,900 sf) provides interpretive staff office space, and the caretaker's house (1,461 sf) provides space for a ranger station and maintenance field office.

In the South District, there are three staging areas for national seashore operations — the Wilson's Corner maintenance complex, the South District administrative complex, and the lifeguard operations area.

The South District maintenance area at Wilson's Corner is just outside the national seashore but within Merritt Island National Wildlife Refuge. NPS-owned facilities include

a maintenance shop (2,354 sf); east pole shed (1,100 sf); west pole shed (2,688 sf); Bally building (390 sf) housing maintenance supplies; and a petroleum, oil, and lubrication building (168 sf). Because a water source is not available on-site, water would continue to be trucked in and stored for NPS use. Potable water would continue to be provided separately.

The South District administrative complex includes a ranger station (1,210 sf), curatorial storage facility (1,000 sf), and garage (1,181 sf).

The lifeguard operations area, south of the Playalinda Beach Road, includes a beach maintenance garage (1,080 sf); lifeguard building (577 sf); and a petroleum, oil, and lubrication building (286 sf). Beach access for all-terrain vehicles (ATVs) for staff responding to beach emergencies as well staff and volunteers supporting the turtle management program is provided by an administrative boardwalk dune crossover (245 lf).

Beach Access Points. There are three main beach areas in the national seashore— Playalinda, Klondike, and Apollo. These features are described in more detail under the visitor experience section of this chapter.

Roads, Trails, and Boat Ramps. These features are described in more detail under the visitor experience section of this chapter.

Campsites. There are 14 primitive back-country campsites with only picnic tables and grills on the lagoon islands in the national seashore. Two group campsites (one group per site) are available on Apollo Beach during the winter.

Utilities. Drinking water is available for national seashore visitors at the visitor information center at Apollo Beach, and an unscreened outdoor shower is available at parking area #1.

National seashore areas on NASA property have restrictions on the level of development permitted. For this reason, in the Playalinda Beach area drinking water and showers (and

water and sewer utility service) have not been provided.

Each parking area has recirculating chemical vault toilets with 1,050-gallon storage tanks, which are pumped out on a regular basis. The North District visitor contact station, ranger station, and maintenance area and their associated buildings are connected with the New Smyrna Beach water and sewage systems. Structures in the Eldora area, including the Eldora State House, are connected to the New Smyrna Beach water system but do not have sewer connections. These buildings all have septic systems. Overhead telephone and powerlines supply service to the entrance stations, visitor information center, and Eldora Hammock area. In the South District, the lifeguard operations, maintenance, and administrative complex areas are also serviced by overhead lines. There are no telephones at any of the parking areas.

An aboveground fuel storage tank for gasoline is available at the maintenance area in the North District.

Additional utility systems supporting the South District administrative complex include a well, pumphouse, and septic system.

Marine Vessels

Canaveral National Seashore uses three vessels in its marine operations. These include the following:

Vessel No. 1 is a pontoon boat that is used primarily for public natural history interpretive programs. The boat is operated all year except for July and August (because of heat and the distracting effects of insects). Additionally, this vessel is used for special tours and resource management activities.

Vessel No. 2 is a patrol boat powered that is used mostly for law enforcement activities, but the boat is also occasionally used for resource management activities.

Vessel No. 3 is a patrol that is used for law enforcement, emergency medical service, search-and-rescue, and resource management activities.

The three vessels are also used for maintenance activities related to backcountry campsites on the islands, including garbage removal and facility upkeep.

REGIONAL SOCIOECONOMICS

INTRODUCTION

Canaveral National Seashore straddles Volusia and Brevard counties on the coast of east-central Florida. These two counties make up the area of analysis for socioeconomic impacts.

The southern boundary of the national seashore adjoins the John F. Kennedy Space Center. The national seashore occupies part of the area that was originally acquired for use by the National Aeronautics and Space Administration (NASA) for the U.S. space program. This land was acquired but not needed for the space program, and so was turned over to the National Park Service and U.S. Fish and Wildlife Service to manage. The space center is the core of space operations in east-central Florida. The national seashore, Merritt Island National Wildlife Refuge, and the Kennedy Space Center are premier tourist attractions in this part of Florida.

POPULATION

In 2008, Florida was the fourth most populous state in the United States, with nearly 18.3

million people. There are 67 counties in Florida, and Brevard and Volusia counties together accounted for about 5.6 % of the state’s population. Brevard County ranked 10th and Volusia County ranked 11th in the state in population. In 2008 the gateway towns ranged in population from less than 1,600 for Oak Hill to about 44,700 for Titusville (table 16).

Since 1990, Volusia County has grown from 370,700 to nearly 498,000 in 2008—an annual rate of growth rate of 1.7% (table 16). The total increase of more than 127,000 for the 18-year period was more than 34%. Likewise, Brevard County grew from just under 399,000 to about 537,000, an increase of nearly 138,000 persons—representing an annual growth rate of 1.7%. The total increase was 34%. These growth rates were higher than the national rates, but they lagged slightly behind Florida’s growth rates of 2.0% annually and 42% overall. Population growth in the last 18 years in Florida has been nearly twice that of the United States as a whole.

However, population growth in the nearby towns varied considerably. For example, Oak Hill had a high growth rate (4.2% from 1990 to 2000) and increased its population by more than 50% (461 persons) during the decade

TABLE 16: POPULATION OF THE AFFECTED AREA

Area	1990	% of State Population	2000	% of State Population	2008	% of State Population
Volusia County	370,712	2.9%	443,343	2.8%	498,036	2.7%
New Smyrna Beach	16,543	0.1%	20,048	0.1%	23,325	0.1%
Edgewater	15,337	0.1%	18,668	0.1%	21,415	0.1%
Oak Hill	917	0.01%	1,378	0.01%	1,596	0.01%
Brevard County	398,978	3.1%	476,230	3.0%	536,521	2.9%
Titusville	39,394	0.3%	40,670	0.3%	44,756	0.2%
Cocoa	17,722	0.1%	16,412	0.1%	16,478	0.1%
Florida	12,937,926	100.0%	15,982,378	100.0%	18,328,340	100.0%
USA	248,709,873		281,421,906		304,059,724	

SOURCE: U.S. Census Bureau, 1990a, 2000a, and March 16, 2006

TABLE 17: POPULATION GROWTH

Area	Annual Rate of Growth 1990–2000	Total % Increase 1990–2000	Annual Rate of Growth 2000–2008	Total % Increase 2000–2008	Annual Rate of Growth 1990–2008	Total % Increase 1990–2008
Volusia County	1.8%	19.6%	1.5%	12.3%	1.7%	34.3%
New Smyrna Beach	1.9%	21.2%	1.9%	16.3%	1.9%	41.0%
Edgewater	2.0%	21.7%	1.7%	14.7%	1.9%	39.6%
Oak Hill	4.2%	50.3%	1.9%	15.8%	3.1%	74.0%
Brevard County	1.8%	19.4%	1.5%	12.7%	1.7%	34.5%
Titusville	0.3%	3.2%	1.2%	10.0%	0.7%	13.6%
Cocoa	-0.8%	-7.4%	0.1%	.4%	-0.4%	-7.0%
Florida	2.1%	23.5%	1.7%	14.7%	2.0%	41.7%
USA	1.2%	13.2%	1.0%	8.0%	1.1%	22.3%

Source: U.S. Census Bureau, 1990a, 2000a, and March 16, 2000

between the censuses. Growth then slowed, and its population increased by about 16% from 2000 to 2008. Titusville's population remained relatively stable over the 18-year period, with an overall annual growth rate of only 0.7% and a total increase of about 10% or 4,086 people. To the south and more distant from the national seashore, the city of Cocoa actually lost population with a negative growth rate of about -0.4%. This community lost more than 1,300 persons—a -7.4% decline during the 1990s. Cocoa has since increased its population slightly (66 people or less than 1%) from 2000 to 2008.

INCOME

Per Capita Income

Income is one important measure of the socioeconomic condition of an area. The per capita personal income (PCPI) for Florida, at 100% of the 2008 national average, is on par with that of the nation as a whole (table 18). (Per capita personal income is the total personal income divided by the total population of an area. Personal income included income from all sources—wages, investments, social security, etc.) The residents of Volusia County had average per capita personal incomes that were about 10% and 9% less than the state and national averages in 1989 and 1999. Volusia County continued to advance its per capita personal income and in

TABLE 18: PER CAPITA PERSONAL INCOME

Area	1989	% of 1989 State PCPI	1999	% of 1999 State PCPI	2004	% of State PCPI
Volusia County	\$13,288	90.4%	\$19,664	91.2%	\$22,582	96.0%
New Smyrna Beach	\$14,501	98.7%	\$23,547	109.2%	na	-
Edgewater	\$11,025	75.0%	\$17,017	78.9%	na	-
Oak Hill	\$9,003	61.3%	\$16,158	75.0%	na	-
Brevard County	\$15,093	102.7%	\$21,484	99.7%	\$23,477	99.8%
Titusville	\$14,274	97.1%	\$18,901	87.7%	na	-
Cocoa	\$11,347	77.2%	\$15,665	72.7%	na	-
Florida	\$14,698	100.0%	\$21,557	100.0%	\$23,532	100.0%
USA	\$14,420	98.1%	\$21,587	100.1%	\$24,020	102.1%

na = not available

SOURCE: U.S. Census Bureau, 1990d and 2000b

2004, at \$22,580, it was 96% of the state figure. New Smyrna Beach had a per capita personal income that was only slightly below the state average in 1989 and one that exceeded the state average by nearly \$2,000 in 1999. The communities of Edgewater and Oak Hill had much lower per capita personal incomes in 1989 and 1999 than the state and national average, even though Edgewater made some slight gain and Oak Hill had made a significant relative gain (75% of the state per capita personal income versus 61% in 1989) by 1999.

The per capita personal incomes for Brevard County compare favorably with Florida and the United States in 1989 and 1999. In 2004 the county figure was 99.8% of the Florida average of \$23,530. However, the cities of Titusville and Cocoa were not as prosperous. In 1989 Titusville was below, but close to the state average per capita personal income. By 1999 it had slipped to less than 90% of the state average. Cocoa started at about 77% (\$11,347) of the state average of \$14,700, but by 1999 Cocoa had a per capita personal income that was less than 73% (\$15,665) of Florida's per capita personal income of \$21,557.

In 2004 the national per capita income had risen to \$24,020, and the Florida per capita personal income was slightly less at \$23,532.

Both counties were nearly equal to the state average with Volusia at 96.0% and Brevard at 99.8% of the Florida per capita personal income. This represented a relative improvement over the 1999 figure for Volusia County.

Median Income

Median household incomes are shown in table 19. The median income is the value at which half of the households have incomes above and half of the households have incomes below the median value. The Florida state median income was about 90% of the national value in 1989, 1999, and 2004. Volusia County median incomes were only about 90% of the state value in 1989 and 1999. In 2004 the county had improved to about 95% of the state value. New Smyrna Beach and Edgewater were comparable to the county, but Oak Hill was quite a bit lower than the county and state figures.

Brevard County had median incomes that were higher than the state averages for the years shown, but by 1999 they had fallen below the national figures by nearly \$1,895 in 1999 and \$1,700 in 2004. Titusville was better off than the state in 1989, but became relatively less well off by 1999. The community of Cocoa's median income was 85% that of the

TABLE 19: MEDIAN HOUSEHOLD INCOME

Area	1989	% of 1989 State Median Income*	1999	% of 1999 State Median Income	2004	% of 2004 State Median Income
Volusia County	\$24,818	90.3%	\$35,219	90.7%	\$39,048	94.7%
New Smyrna Beach	\$23,630	86.0%	\$35,372	91.1%	na	-
Edgewater	\$25,053	91.2%	\$35,852	92.4%	na	-
Oak Hill	\$19,250	70.0%	\$32,130	82.8%	na	-
Brevard County	\$30,534	111.1%	\$40,099	103.3%	\$42,971	104.2%
Titusville	\$8,425	103.4%	\$35,607	91.7%	na	-
Cocoa	\$23,279	84.7%	\$27,062	69.7%	na	-
Florida	\$27,483	100.0%	\$38,819	100.0%	\$41,236	100.0%
United States	\$30,056	109.4%	\$41,994	108.2%	\$44,684	108.4%

na = not available

SOURCE: U.S. Census 1990d, 2000b, and 2004b

state in 1989 and only 70% of the state average in 1999. The lower per capita and median incomes coincide with Cocoa's loss of population during this period.

EARNINGS BY MAJOR INDUSTRIES

Both counties had diversified economies, but in each certain industrial sectors were more

important than others. In Brevard County the top three industry sectors (in 2003) by earnings were manufacturing (16.4% of total earnings), administrative and waste services (12.6%), and health care and social assistance (11.3%) (see table 20). Total earnings for the county were \$9.7 billion. These three sectors

TABLE 20: EARNINGS BY INDUSTRY
Earnings in 1,000s of dollars for 2003

Industry / County	Brevard	% of Brevard Total	Volusia	% of Volusia Total	Florida	% of Florida Total
Farming	\$7,235	0.1%	\$49,297	0.8%	\$1,791,793	0.5%
Forestry, Fishing, etc., and Other	(D)	-	(D)	-	\$1,582,976	0.5%
Mining	(D)	-	(D)	-	\$483,927	0.1%
Utilities	\$37,696	0.4%	\$37,077	0.6%	\$2,357,217	0.7%
Construction	\$593,598	6.1%	\$451,472	7.3%	\$24,061,064	6.9%
Manufacturing	\$1,596,451	16.4%	\$442,486	7.2%	\$22,561,978	6.5%
Wholesale Trade	\$236,439	2.4%	\$212,166	3.6%	\$19,104,253	5.5%
Retail Trade	\$760,784	7.8%	\$656,783	10.7%	\$28,549,038	8.2%
Transportation and Warehousing	\$145,997	1.5%	\$100,544	1.6%	\$10,981,599	3.2%
Information	\$204,746	2.1%	\$133,602	2.2%	\$12,043,139	3.5%
Finance and Insurance	\$300,577	3.1%	\$214,261	3.5%	\$24,053,889	6.9%
Real Estate and Rental and Leasing	\$122,318	1.3%	\$367,583	6.0%	\$10,583,314	3.1%
Professional and Technical Services	\$923,691	9.5%	\$337,384	5.5%	\$28,827,362	8.3%
Management of Companies and Enterprises	\$70,470	0.7%	\$63,235	1.0%	\$5,569,356	1.6%
Administrative and Waste Services	\$1,221,147	12.6%	\$237,493	3.9%	\$24,138,051	7.0%
Educational Services	\$83,938	0.9%	\$165,579	2.7%	\$3,631,053	1.0%
Health Care and Social Assistance	\$1,100,152	11.3%	\$930,114	15.1%	\$36,426,836	10.5%
Arts, Entertainment, and Recreation	\$91,017	0.9%	\$164,009	2.7%	\$6,636,012	1.9%
Accommodation and Food Services	\$245,071	2.5%	\$280,796	4.6%	\$13,150,355	3.8%
Other Services, except Public Administration	\$309,753	3.2%	\$299,240	4.9%	\$12,624,889	3.6%
Federal, Civilian	\$471,918	4.9%	\$107,174	1.7%	\$9,670,073	2.8%
Military	\$225,987	2.3%	\$34,840	0.6%	\$6,556,287	1.9%
State Government	\$97,057	1.0%	\$145,849	2.4%	\$9,034,191	2.6%
Local Government	\$862,741	8.9%	\$701,035	11.4%	\$31,967,814	9.2%
Total	\$9,720,267	100.0%	\$6,142,584	100.0%	\$346,386,466	100.0%

Note: (D) Data not shown to avoid disclosure of confidential information, but the estimates for these items are included in the totals.
SOURCE: Bureau of Economic Analysis, April 2005b

accounted for more than 40% of the total. Adding the next two largest sectors—nearly 59% of all earnings. The industries professional and technical services (9.5%) and local government (8.9%)—accounts for most closely associated with tourism (arts, entertainment, and recreation) and accommodation and food services together provided only 3.5% of all earnings for the county. (Not all earnings in these two segments are attributable to tourism, but the use of these two segments for tourism does provide a frame of reference for comparison.) At the state level, these two industry sectors accounted for 5.7% of Florida's total earnings of \$346.4 billion for 2003.

Although the population of Volusia County was only slightly less than that of Brevard County, total earnings (\$6.1 billion) for Volusia County were only about 60% of the total for earnings in Brevard County. The major industries by earnings in Volusia County (in 2003) were health care and social assistance (15.1% of the total), local government (11.4%), and retail trade (10.7%). Including construction (7.3%) and manufacturing (7.2%), the top five sectors account for more than half of all earnings. Tourism (the arts, entertainment, and recreation, and accommodation and food services sectors) is relatively more important than in Brevard County, providing about 7.2% of all earnings. Total earnings for both counties were \$15.8 billion in 2003.

EMPLOYMENT BY MAJOR INDUSTRIES

The major sources of employment in Brevard County were retail trade (12.8% of the total), administrative and waste services (11.7%), health care and social assistance (10.9%) (see table 21). These industries provided more than one-third of all the nearly 255,800 positions in 2003. Add manufacturing (9.3%) and local government (7.8%), and more than half of all jobs are accounted for. Tourism,

including the arts, entertainment, and recreation, and the accommodation and food services sectors, provided nearly 9% of the jobs in this county. Providing 9% of the jobs and only 3.5% of the earnings indicates that tourism-related positions are relatively low paying and/or these positions can also be seasonal as well as being part-time rather than full-time jobs. The largest sources of jobs do not necessarily provide the largest earnings in a local economy.

Again, although both counties' economies are diversified, a few industry sectors account for most of the employment opportunities. Three of the 24 industrial sectors accounted for more than one-third of all 194,000 jobs in Volusia County in 2003. Retail trade (14.5% of the total), health care and social assistance (12.6%), accommodation and food services (9.1%), local government (8.8%), and construction (7.6%) employed more than half of the county's workers. In this county tourism-related positions made up more than 11% of the jobs.

UNEMPLOYMENT

Unemployment in the gateway communities in Volusia County was lower than in the state, nation, or Volusia County overall (table 22). A little more than 700 persons in this local workforce of nearly 17,000 were unemployed in 2000. At the same time the county's available civilian workforce of more than 200,000 had more than 12,600 people unemployed. (Note: U.S. Census unemployment estimates count only those who are actively seeking but have not found employment.) The opposite pattern occurred in Brevard County. The county had an unemployment rate of 4.9%, which was lower than the one for Florida or the nation at the same time. Yet the gateway towns had higher unemployment rates resulting in more than 1,700 people being out of work. Brevard County had a larger available workforce than Volusia County, yet it had fewer people out of work — about 10,700.

TABLE 21: EMPLOYMENT BY INDUSTRY (NUMBER OF FULL- AND PART-TIME JOBS FOR 2003)

Industry / County	Brevard	% of Brevard Total	Volusia	% of Volusia Total	Florida	% of Florida Total
Farming	807	0.3%	2,970	1.5%	97,589	1.0%
Forestry, Fishing, etc., & Other	(D)	-	(D)		90,285	1.0%
Mining	(D)	-	(D)		13,211	0.1%
Utilities	632	0.2%	510	0.3%	25,385	0.3%
Construction	17,049	6.7%	14,680	7.6%	619,025	6.6%
Manufacturing	23,858	9.3%	9,854	5.1%	410,012	4.4%
Wholesale Trade	5,385	2.1%	5,211	2.7%	343,833	3.7%
Retail Trade	32,741	12.8%	28,170	14.5%	1,093,594	11.6%
Transportation and Warehousing	4,063	1.6%	3,209	1.7%	277,449	3.0%
Information	3,379	1.3%	3,159	1.6%	195,839	2.1%
Finance and Insurance	7,471	2.9%	5,737	3.0%	464,897	4.9%
Real Estate and Rental and Leasing	10,482	4.1%	7,581	3.9%	450,372	4.8%
Professional and Technical Services	17,162	6.7%	9,458	4.9%	576,582	6.1%
Management of Companies and Enterprises	1,001	0.4%	757	0.4%	71,400	0.8%
Administrative and Waste Services	29,910	11.7%	13,011	6.7%	958,758	10.2%
Educational Services	3,692	1.4%	5,508	2.8%	134,793	1.4%
Health Care and Social Assistance	27,908	10.9%	24,475	12.6%	906,614	9.6%
Arts, Entertainment, and Recreation	5,569	2.2%	4,787	2.5%	243,026	2.6%
Accommodation and Food Services	16,911	6.6%	17,719	9.1%	689,710	7.3%
Other Services, except Public Administration	15,320	6.0%	13,639	7.0%	588,262	6.3%
Federal, Civilian	5,600	2.2%	1,381	0.7%	123,591	1.3%
Military	3,493	1.4%	1,021	0.5%	109,067	1.2%
State Government	2,362	0.9%	3,302	1.7%	211,170	2.2%
Local Government	19,870	7.8%	16,985	8.8%	701,037	7.5%
Total	255,782	100.0%	194,037	100.0%	9,395,501	100.0%

Note: (D) Data not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

SOURCE: Bureau of Economic Analysis, 2005

TABLE 22: EMPLOYMENT STATUS 2000

Area	Civilian Labor Force	Employed	Unemployed	Percent of Civilian Labor Force Unemployed
Volusia County	201,658	189,035	12,623	6.3%
New Smyrna Beach	7,977	7,610	367	4.6%
Edgewater	8,329	7,997	332	4.0%
Oak Hill	538	522	16	3.0%
Brevard County	218,095	207,366	10,729	4.9%
Titusville	18,229	17,071	1,158	6.4%
Cocoa	7,545	6,974	571	7.6%
Florida	7,407,458	6,995,047	412,411	5.6%
United States	137,668,798	129,721,512	7,947,286	5.8%

SOURCE: U.S. Census Bureau, 2000b

In 2004 the unemployment rates for Brevard (5.0%) and Volusia (6.2%) counties changed only a little, but the number of unemployed individuals increased from 23,352 to 25,645, an increase of 2,293 (table 23). (Note: data for cities and towns was not available at the time of this writing.) Relatively speaking, the two-county region was better off than the state and nation because at the same time Florida and the nation had unemployment rates were more than 7% each.

POVERTY

Both Volusia and Brevard counties had lower poverty rates than the state or nation in 1989 and in 1999 (table 24). Although both counties were relatively better off when compared to Florida and the nation, there were pockets of higher rates of poverty as evidenced by Oak Hill in 1989 (23.3%) and 1999 (14.4%), and Cocoa in 1999 (24.1%). In fact, poverty in Cocoa increased by nearly 200 people, rising from 21.4% to more than 24% in 10 years. Poverty rates in 2004 remained about the same for Volusia County (11.5%), decreased for Brevard County (8.6%) and the state (12.2%), and increased to 13.1% for the nation. (Note: data for cities and towns was not available at the time of this writing.)

TABLE 23: EMPLOYMENT STATUS 2004

Area	Civilian Labor Force	Employed	Unemployed	Percent of Civilian Labor Force Unemployed
Volusia County	215,965	202,578	13,387	6.2%
Brevard County	243,604	231,346	12,258	5.0%
Florida	8,291,669	7,700,854	590,815	7.1%
United States	144,720,309	134,259,460	10,460,849	7.2%

SOURCE: U.S. Census Bureau, 2004b

TABLE 24: POVERTY

Area	Number of Individuals Below the Poverty Level in 1989	Percent Below the Poverty Level in 1989	Number of Individuals Below the Poverty Level in 1999	Percent Below the Poverty Level in 1999
Volusia County	43,568	12.1%	49,907	11.6%
New Smyrna Beach	2,286	14.0%	2,157	10.8%
Edgewater	1,556	10.2%	1,718	9.2%
Oak Hill	224	23.3%	190	14.4%
Brevard County	35,815	9.1%	44,218	9.5%
Titusville	4,137	10.6%	4,932	12.4%
Cocoa	3,757	21.4%	3,951	24.1%
Florida	1,604,186	12.7%	1,952,629	12.5%
United States	31,742,864	13.1%	33,899,812	12.4%

SOURCE: U.S. Census Bureau, 1990d and 2000b

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND KENNEDY SPACE CENTER

The National Aeronautics and Space Administration and Kennedy Space Center have been a key part of the regional economy since the 1960s. This importance increased over the years with the buildup of the manned space program, the moon landing, and the space shuttle flights to build the international space station. Now the National Aeronautics and Space Administration is transitioning from the space shuttle program, ending in 2010, to continued support of satellite and other launches. A result of the Consolidated Appropriations Act of 2008 (Public Law 110-161) is that the work at the space center will change, requiring a different mix of skilled workers and fewer of them.

The redirection of NASA programs, operations, and activities is likely to have substantial effects on socioeconomics in Titusville and Brevard and Volusia counties.

ECONOMIC IMPACT OF CANAVERAL NATIONAL SEASHORE

In recent years the National Park Service has supported researchers at Michigan State University as they developed and refined a model—the NPS Money Generation Model, version 2 (MGM2)—that provides an easy-to-understand analysis of the economic impact of a park unit on the local/regional economy. The MGM2 was used to estimate the economic impact of Canaveral National Seashore in terms of sales, income, and jobs attributable to visitor use at the national seashore in 2003 (tables 25 and 26) (Michigan State University 2001).

This model employs the annual amount of visitor use at a park unit as a main data requirement, so the economic impact varies from year to year depending upon the annual visitation to the park unit. Visitor use is segmented into local and nonlocal visitors (nonlocal visitors come from outside the two-county area), and day use or overnight visitors (overnight visitors stay in hotels or campgrounds both inside and outside the park unit). The average amount spent per party-day was \$110. (Party days are the number of days

TABLE 25: VISITS AND SPENDING BY VISITOR SEGMENT (2003)

	Local Day Use Visitors	Nonlocal Day Use Visitors	Hotel Visitors	Camp Visitors	Total
Recreation Visits	208,918	417,835	313,376	105,769	1,045,898
Segment Shares in Recreation Visits	20%	40%	30%	10%	100%
Party Days	83,551	167,102	250,653	83,685	586,502
Average Spending per Party Day	\$39	\$56	\$176	\$91	\$110
Total Spending (millions)	\$3.22	\$9.31	\$44.19	\$7.71	\$64.44

SOURCE: Michigan State University

TABLE 26: ECONOMIC IMPACTS OF VISITOR SPENDING BY SECTOR (2003)

Sectors	Sales (Million's)	Personal Incomes (Millions)	Jobs	Value Added (Millions)
Direct Effects				
Motel, Hotel, B&B, and Cabins	\$20.87	\$6.81	454	\$10.34
Campsites	\$1.84	\$0.60	40	\$0.91
Restaurants and Bars	\$14.25	\$4.85	407	\$6.76
Admissions and Fees	\$6.28	\$2.17	185	\$3.56
Retail	\$6.93	\$3.54	190	\$5.53
Others	\$4.12	\$1.39	56	\$1.99
Total Direct Effects	\$54.29	\$19.36	1,333	\$29.09
Secondary Effects	\$25.02	\$9.08	353	\$15.69
Total Effects	\$79.31	\$28.44	1,687	\$44.78

SOURCE: Michigan State University

each visitor party spends in the local area. Average spending per party-day is the average expenditures one visitor group spent per day in the local area.)

The model estimated that visitors to the national seashore spent more than \$64 million in 2003. The direct effects of this spending resulted in \$54 million in sales and \$19 million in personal income (wages and salaries), supported 1,333 jobs, and provided \$29 million in value added (the sum of employee compensation, proprietary income, and indirect business tax; value added is the value added by the region to the final good or service being produced). Secondary effects occur as money from sales and income recir-

culates within the local area, adding additional amounts to sales, income, jobs, and value added.

The \$64 million in expenditures supported a total of \$79 million dollars in sales, \$28 million in personal income, 1,687 jobs, and \$45 million in value added. Although these figures represent a valued contribution to the local economy, they are but a small part of the totals for the two-county region, i.e., \$26.38 billion (BEA 2005) in total personal income and more than 449,800 full and part-time positions (BEA 2005) for the region in 2003.

In 2006, all visitors to the national seashore spent an estimated \$71.4 million, including

nonlocal visitors who spent about \$67.8 million. This direct spending supported 1,364 jobs and contributed more than \$41.9 million of value added to the local economy.

OTHER TOPICS OF INTEREST

National Seashore Budget

The annual expenditures by the national seashore represent an additional input of federal funds into the regional economy. From 2001 to 2009 the total operating budget for the national seashore has risen from \$2.13 million to \$3.27 million. These direct expenditures and the employees’ expenditures of wage and salary income result in further indirect effects because the funds recirculate within the regional economy—adding to sales, income, and jobs. Expenditures by the national seashore for labor, goods, and services occur mostly within the local region. These funds are allocated for resource preservation and management, visitor services (including law enforcement and interpretation), facility operations and maintenance, and administration.

Commercial Use Authorizations

There are approximately 79 commercial use authorizations (CUAs) in place. Two businesses offer canoe tours, two provide boat tours, one features kayak tours, and the rest cover fishing guides. All permits are issued on a calendar year basis, and fees are charged to cover the costs of administering the program.

In 2008 there were 100 commercial harvesting permits and 78 fishing guide/tour boat permits issued on behalf of the U.S. Fish and Wildlife Service and the National Park Service. (NPS staff manage the commercial harvesting and guiding permitting for both the national seashore and the refuge.) Income from these activities amounted to \$34,800 (table 27). Some of the commercial harvesters make a living fishing for shellfish, others work at it part-time, and others do it for a hobby. It is likely that the commercial fishing guide/tour

boat business may have some participants that operate in a similar manner.

TABLE 27: COMMERCIAL USE PERMITS

Commercial Use	Cost	No. of Permits	Revenue
Fishing/Tour Boat Guides renewal	\$250	75	\$18,750
new	\$350	3	\$1,050
Commercial Harvesting	\$150	100	\$15,000
Total		178	\$34,800

SOURCE: National Park Service

Payments in Lieu of Taxes

The Payments in Lieu of Taxes (PILT) program makes payments to local governments to help offset losses in property taxes due to nontaxable federal lands within their boundaries. Table 28 displays the amounts of these payments for recent fiscal years. PILT funds help fund local government services like police and fire protection, school and road construction, etc. Payments are determined by a formula that considers population, receipt sharing payments, and the amount of federal land within an affected county. The amount of PILT payments that are made each year are determined by congressional appropriation levels.

TABLE 28: ANNUAL PAYMENTS IN LIEU OF TAXES

Fiscal Year	Volusia County	Brevard County
2001	\$18,373	\$29,689
2002	\$19,328	\$31,233
2003	\$22,132	\$35,664
2004	\$22,700	\$36,681
2005	\$23,200	\$37,490
2006	\$23,594	\$38,126
2007	\$23,475	\$37,933
2008	\$37,256	\$60,202
2009	\$38,138	\$61,627

SOURCE: National Association of Counties

The National Park Service manages almost all federal lands that qualify for the PILT program in the two counties. During fiscal year 2007, Brevard County received \$37,933, covering a total of 26,289 acres of federally owned lands within the county. Volusia County received \$23,475 for 16,269 acres of federal lands. As table 28 shows, these payments are relatively small, and they do not vary much from year to year. (Note that

USFWS-owned lands do not qualify for the PILT program. Local governments receive federal funds in lieu of taxes for USFWS lands as provided by the Refuge Revenue Sharing Act [16U.S.C. 715s], as amended. Brevard County does not receive any funding from this program. Volusia County has received annual payments ranging between about \$3,500 to \$6,200 for the Merritt Island National Wildlife Refuge in recent years.)

IMPACT TOPICS CONSIDERED BUT DISMISSED

NATURAL RESOURCES

Natural or Depletable Resource Conservation Potential

There would be no measurable differences in natural or depletable resource conservation among the alternatives being considered in this management plan. Limited construction activities would reduce surface natural resources, such as vegetation and wildlife habitat; however, these effects are addressed under the “Vegetation and Wildlife” section in “Chapter 4: Environmental Consequences.”

Energy Efficiency and Conservation Potential

Under any alternative, the National Park Service would continue to implement its policies of reducing costs, eliminating waste, and conserving resources by using energy-efficient and cost-effective technology (NPS 2006b). The National Park Service would continue to look for energy-saving opportunities in all aspects of national seashore operations. Because the National Park Service would promote energy efficiency under any alternative, this impact topic was dismissed from further consideration.

Prime or Unique Farmlands

In 1980 the Council on Environmental Quality directed federal agencies to assess the effects of their actions on farmland soils classified by the U.S. Natural Resources Conservation Service as prime or unique. Prime farmlands are soils that produce general crops such as common foods, forage, fiber, and oil seed; unique farmlands produce specialty crops such as fruits, vegetables, and nuts. The U.S. Fish and Wildlife Service manages about 150 acres of nonactive orange groves near Haulover Canal and is returning the groves to their natural state. There are no prime or

unique farmlands on the national seashore (NPS 1982), and prime or unique farmlands was dismissed as an impact topic.

Ecologically Critical Areas Wild and Scenic Rivers, Other Unique Natural Areas

Canaveral National Seashore was set aside to preserve Mosquito Lagoon as an Estuary of National Significance, and to preserve other prime habitat for federally threatened and endangered species. Impacts on the Mosquito Lagoon estuary are discussed in the “Water Resources” section under “Chapter 4: Environmental Consequences.” Impacts on prime habitat are addressed in the “Fish and Essential Fish Habitat” and “Special-Status Species” sections under in chapter 4. There are no wild and scenic river designations within the national seashore. Therefore, this topic was dismissed from detailed analysis.

Carbon Footprint

For the purpose of this planning effort, “carbon footprint” is defined as the sum of all emissions of carbon dioxide and other greenhouse gases (e.g., methane and ozone) that would result from implementation of either of the action alternatives. Understanding the carbon footprint of each alternative is important for determining its contribution to climate change.

It has been determined that the action alternatives described in this document would only emit a negligible amount of greenhouse gases that contribute to climate change; therefore, this impact topic has been dismissed from detailed analysis in this plan. The reasons for dismissing this impact topic are that (1) no new road construction is proposed under either alternative, and (2) changes to facilities are largely in-kind and should have an overall benefit due to newer sustainable building practices. Because of the negligible

amount of greenhouse gas emissions that would result from each alternative, a quantitative measurement of their carbon footprint was determined by the planning team not to be practicable.

Night Sky

NPS *Management Policies 2006* state that the National Park Service will preserve, to the greatest extent possible, the natural lightscapes of parks, including natural darkness. The agency strives to minimize the intrusion of artificial light into the night scene by limiting the use of artificial outdoor lighting. Mitigation of necessary lighting to reduce impacts on wildlife and visitors would include shielding and using minimal impact lighting techniques on existing and new facilities. The actions proposed in the alternatives would have negligible to minimal and highly localized impacts on the night sky, and management actions would be similar under all alternatives. Therefore, this topic was dismissed from further analysis.

CULTURAL RESOURCES

Museum Collections

Museum collections was dismissed as an impact topic because Canaveral National Seashore only maintains a small portion of its museum collection (with the exception of archival documents), and none of the alternatives considered in this plan affect the collections.

Although the national seashore's website indicates that the museum collection currently contains 340,896 cataloged objects, the national seashore's August 2003 "Scope of Collection Statement" indicates that when fully cataloged, its museum collection will include more than 1 million items, most of which are shellfish remains and other archeological objects (and associated field records) collected from midden sites and housed at the NPS Southeast Archeological

Center in Tallahassee, Florida. Curated objects include natural history items (plant specimens, fish, amphibians, reptiles, and faunal remains from archeological sites); history objects (potsherds, structural elements from historic structures, tools from archeological sites, bottles, personal belongings from an early 20th century ethnic community, and miscellaneous objects); and archival materials. All but some reference items are eventually slated for deposit in the Timucuan Ecological and Historic Preserve museum storage facility.

Facilities in the national seashore that exhibit museum items include the Eldora State House and the Apollo Beach visitor information center. Although no artifacts are exhibited in the main house at Seminole Rest, some museum objects may eventually be displayed in that rehabilitated historic structure.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts on Indian trust resources from a proposed project or action by Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes.

None of the actions that might be implemented as a result of the plan alternatives would change any existing conditions or practices concerning American Indian treaty or statutory rights or cultural interests that the tribes traditionally associated with the national seashore maintain. However, such recognition does not translate into the creation of a trust resource because these actions take place in the context of preserving and managing the resources for the benefit of all Americans as required by the Organic Act and subsequent legislation. There are no Indian trust resources as defined in the order in the

national seashore. Therefore, this topic was dismissed from further consideration.

SOCIAL RESOURCES

Environmental Justice

Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. According to the U.S. Environmental Protection Agency (1998), environmental justice is the

fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. The goal of this "fair treatment" is not to shift risks among populations, but to identify potentially disproportionately high and adverse effects and identify alternatives that may mitigate these impacts.

There are both minority and low-income populations in the vicinity of the national seashore. However, environmental justice is dismissed as an impact topic because

- NPS staff actively solicited public participation as part of the planning process and gave equal consideration to input from all persons, regardless of age, race, income status, or other socioeconomic or demographic factors.
- The impacts associated with implementation of the alternatives would not disproportionately affect any minority or low-income population or community.
- Implementation of the alternatives would not result in any identified effects that would be specific to any minority or low-income community.
- NPS staff does not anticipate that any adverse impacts on public health and/or the socioeconomic environment would appreciably alter the physical and social structure of the nearby minority or low-income populations or communities.

Urban Quality and Design of the Built Environment

Limited construction would occur under any of the alternatives. New construction would be built to match the style and/or enhance the existing buildings. However, these actions would cause little impact on the built environment because the national seashore currently has very limited development. Therefore, quality of the built environment was dismissed from further analysis in this assessment.

Chapter **4**

Environmental Consequences



INTRODUCTION

The National Environmental Policy Act of 1969 (40 CFR 1500-1508) requires that environmental documents include discussion of the environmental impacts of a proposed federal action, feasible alternatives to that action, and any adverse environmental effects that could not be avoided if a proposed action should be implemented. In this case, the proposed federal action is implementation of the *General Management Plan / Environmental Impact Statement* for Canaveral National Seashore. This chapter contains the analysis of the environmental impacts on natural resources, cultural resources, visitor experience, national seashore operations, and regional socioeconomics that would result from the actions of each of the four alternatives. The analysis is the basis for comparing the beneficial and adverse effects that would be caused by implementing each alternative.

Because the proposed actions described in the alternatives are general and conceptual, the impacts of these actions are analyzed in general qualitative terms. Thus, this environmental impact statement should be considered a programmatic analysis. If and when site-specific developments or other actions are proposed for implementation after the *Final General Management Plan* is published and approved, appropriate detailed environmental and cultural compliance documentation would be prepared in accordance with the requirements of the National Environmental Policy Act and the National Historic Preservation Act.

For each topic in this chapter, first, the methods and assumptions are described and then the impacts that would occur from implementing each alternative are analyzed. Each alternative discussion also includes a description of the cumulative effects, followed by a conclusion. At the end of the impact section there is a brief discussion of the unavoidable adverse impacts, irreversible

and irretrievable commitments of resources, the relationship of short-term uses of the environment and the maintenance and enhancement of long-term productivity, and the energy requirements and conservation potential. The impacts of each alternative are briefly summarized in table 6 at the end of chapter 2.

TERMS AND ASSUMPTIONS

Each impact topic includes a discussion of impacts, including the intensity, duration, and type of impact. *Intensity* of impact describes the degree, level, or strength of an impact as negligible, minor, moderate, or major. Because definitions of intensity vary by resource topic, separate intensity definitions are provided for each impact topic. *Duration* of impact considers whether the impact would occur over the short term or long term. Unless otherwise noted, *short-term* impacts—generally less than three years—are those that would no longer be detectable because the resource or value would return to its predisturbance condition or appearance. *Long-term* impacts refer to a change in a resource or value that is expected to persist for three or more years. The *type* of impact refers to whether the impact on the resource or value would be *beneficial* (positive) or *adverse* (negative).

The impact analyses for the action alternatives (alternatives B, C, and D) describe the difference between implementing alternative A (the no-action alternative) and implementing the action alternative. In other words, to understand the consequences of any action alternative, the reader must also consider what would happen if no action were taken.

CLIMATE CHANGE

The impacts of climate change on the national seashore are not expected to differ among the alternatives, and the lack of qualitative information about climate change effects adds to the difficulty of predicting how these impacts will be realized in the national seashore. For example, mangroves may be impacted by sea level rise, and storm frequency and intensity may impact cultural resources and visitor amenities.

The range of variability in the potential effects of climate change is large in comparison to what is known about the future under an altered climate regime in the national seashore in particular, even if larger-scale climatic patterns such as increases in air and water temperature, increased seasonal precipitation, and more frequent severe thunderstorms have been accurately predicted for the Atlantic Coast (Loehman and Anderson 2009). Therefore, the potential effects of this dynamic climate on national seashore resources were included in “Chapter 3, Affected Environment.” However, they will not be analyzed in detail in “Chapter 4, Environmental Consequences” with respect to each alternative because of the uncertainty and variability of outcomes, and because these impacts are not expected to differ among the alternatives.

Although many specific effects of climate change, and the rates of changes, are not known at the present time, additional data and climate change modeling will become available during the life of this *General Management Plan*. The best available scientific climate change data and modeling will be incorporated into specific management planning, decisions, or actions that may be taken under any of the alternatives described in this plan.

CUMULATIVE IMPACTS

Council on Environmental Quality regulations, which implement the National

Environmental Policy Act (NEPA), requires assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes such other actions. Cumulative impacts can result from individually minor but collectively important actions taking place over a period of time.

Cumulative impacts are considered for both the no-action and the action alternatives. These impacts were determined by combining the impacts of the alternatives proposed in this document with the impacts of other past, present, and reasonably foreseeable future actions. To do this, it was necessary to identify other such projects or actions at Canaveral National Seashore and in the surrounding area as listed below.

Canaveral National Seashore

The national seashore has developed a number of sites to accommodate visitor use. These include paving beach access roads and parking, constructing a number of boardwalk dune crossovers to access beach areas, and boat ramps and docks to enhance access to Mosquito Lagoon. The historic structures including the Eldora State House and the main and caretaker’s houses at Seminole Rest have been rehabilitated and are open to visitor use. Recent actions include the construction of a new ranger station. A visitor center facility and education pavilion are currently under construction.

Merritt Island National Wildlife Refuge (USFWS)

The wildlife refuge offers a visitor information center, boat ramps, walking trails, and a one-way wildlife drive with interpretive media for a windshield tour of area resources. Most visitor activities in the refuge are concentrated near Titusville. The

national wildlife refuge visitor information center distributes the combined brochure for the wildlife refuge and the national seashore, but does not attract visitors looking for the national seashore. The NPS/USFWS Joint Management Area represents a portion of the refuge within the boundary of the national seashore.

John F. Kennedy Space Center (NASA or KSC)

Almost two thirds of the national seashore's acreage is under NASA ownership. Space shuttle, satellite, and other space exploration vertical launch activities are scheduled throughout the year. Between 1990 and 2001, satellite launches averaged about 16 launches per year. Space shuttle launches over the same time period have averaged about 7 missions per year. The space shuttle landing facility, a 3-mile paved runway, is southwest of the southwest corner of the national seashore's boundary. This facility accommodates some commercial space cargo flights; however, its primary purpose is for accommodating space shuttle landings. Other facilities at the space center are used for rocket and satellite launches. Any of these operations may require complete closure of public access to the southern third of the national seashore for security purposes. Closures are enforced typically three to five days before launch and the day of landing. Access is restricted by use of gates along Titusville Road (State Route 406) and Kennedy Parkway (State Route 3). Facility development at the space center is ongoing. In addition to the projects discussed in the cumulative impacts analyses, new facilities may be constructed and managed by the military, the National Aeronautics and Space Administration, or private companies.

Intracoastal Waterway

The Intracoastal Waterway provides boat access into Mosquito Lagoon from waters outside the national seashore. The

maintenance and operation of the waterway is under the jurisdiction of the U.S. Army Corps of Engineers. The Intracoastal Waterway forms the western boundary of the northern area of the national seashore for 6.5 miles and passes through the national seashore for an additional 7 miles before entering Haulover Canal, which provides access to the Indian River outside of the national seashore. Where the waterway passes through Mosquito Lagoon, an easement of 250 feet on either side of the channel centerline has been retained by the Corps of Engineers. The Corps of Engineers conducts periodic dredging activities along the Intracoastal Waterway and beach replenishment at New Smyrna Beach. The Corps of Engineers also permits or reviews wetland restoration projects in conjunction with Volusia County and the St. John's River Water Management District.

IMPAIRMENT OF NATIONAL SEASHORE RESOURCES

In addition to determining the environmental consequences of implementing the preferred and other alternatives, NPS *Management Policies 2006* (section 1.4) requires analysis of potential effects to determine whether or not proposed actions would *impair* national seashore resources and values.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park unit resources and values. NPS managers must seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on a park unit's resources and values. However, the laws do give NPS managers discretion to allow impacts on resources and values when necessary and appropriate to fulfill the purposes of the park unit, as long as the impact does not constitute impairment of the affected resources and values. That discretion is limited by the statutory requirement that the

National Park Service must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that would, in the professional judgment of the responsible NPS manager, harm the integrity of a park unit's resources and or values and violate the 1916 NPS Organic Act's mandate (NPS *Management Policies 2006* 1.4.5). An impact on a park unit's resources or values may, but does not necessarily, constitute an impairment. An impact is more likely to constitute impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's *General Management Plan* or other relevant NPS planning documents as being of significance.

Impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park. A determination on impairment is made for each impact topic related to the park's cultural and natural resources. A determination of impairment is not required for impact topics such as visitor experience, the socioeconomic environment, and national seashore operations. The determination of impairment for the preferred alternative is found in appendix C.

IMPACTS ON NATURAL RESOURCES

GEOLOGIC RESOURCES AND SOILS

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential effects of a proposed action on geological resources. Generally, adverse effects can be avoided or minimized if proper construction techniques, erosion-control measures, and structural engineering design are incorporated into project development.

Methodology

Effects on geologic resources and soils would be substantive if they would (1) alter the stratigraphy and geological structures that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or (2) change the soil composition, structure, or function within the environment. Prime farmland and unique soils were dismissed from analysis because no prime or unique farmlands exist within the national seashore, as stated in the *General Management Plan* (NPS 1982).

In addition to these parameters, the thresholds to determine geological resources and soils impacts are defined as follows:

- Negligible:** The impact would result in no measurable or perceptible changes to soils or geologic resources.
- Minor:** The impact is slight but detectable, and would result in small but measurable changes in soils or geologic resources; the effects would be localized.
- Moderate:** The impact is readily apparent and would result in easily detectable changes to soils or geologic resources; the effects would be localized.
- Major:** The impact is severely adverse or exceptionally beneficial and would result in appreciable changes to soils or geologic

resources; the effects would be on a regional scale.

Impacts of Implementing Alternative A (The No-action Alternative)

Maintenance of access roads is presumed to include filling potholes, resurfacing paved roads, clearing out drainage structures, and/or grading and adding gravel to gravel roads.

Implementation of alternative A, the no-action alternative, is not expected to have any new impacts on geologic resources or soils at Klondike Beach or in the Titusville area. Therefore, these geographic areas are not discussed for this alternative.

Playalinda Beach Area. Impacts on geologic resources and soil would remain long term and negligible because of maintaining the access road. Effects on soils would continue to be soil compaction and destruction of soil structure, as well as increased erosion and sedimentation.

Apollo Beach Area. Impacts on geologic resources and soils would remain long term, negligible to minor, and adverse because of maintenance of access roads and pristine beaches and use of the unpaved parking area and fire cache. Effects would continue to be soil compaction and destruction of soil structure.

Impacts on soils would remain long term and negligible with the continued maintenance of parking areas along Apollo Beach Road associated with Turtle Mound. Maintenance of the boardwalk trail and protection of the mound would continue to result in long-term beneficial impacts because soils would be protected from public access and associated compaction and disturbance of natural soil structure.

Eldora Hammock Area. Impacts on soil would remain long term and negligible with maintenance of the access roads and parking areas. Effects on soils would continue to be soil compaction, destruction of soil structure, potential erosion and transport of suspended sediments during storms, and erosion and sedimentation.

Effects of continued maintenance of the Eldora Hammock and Castle Windy trails would continue to be long term, minor, and adverse from removal of vegetation or disturbance of soils, which could result in potential erosion and transport of suspended sediments during storms.

Impacts of maintenance activities at the marine science educational station and resource management storage garage at the former Hebner property would remain long term and negligible and could include erosion and transport of suspended sediments during storms.

Long-term beneficial impacts would continue at the lands south of the Eldora Hammock area because of restricted visitor access into this area.

Northern Mosquito Lagoon. No new impacts on geologic resources or soils would be expected from the continued boat launch partnership at the Apollo Beach boat launch area. Long-term, negligible, impacts would continue because of maintenance of informal campsites at Northern Mosquito Lagoon islands and parking area #5 across from the boat launch. Impacts would be associated with any necessary removal of vegetation or disturbance of soils, which could result in potential erosion and transport of suspended sediments during storms.

Oak Hill Area. No impacts on geologic resources or soils are anticipated under this alternative.

NPS/USFWS Joint Management Area. Impacts on geologic resources and soils on Bio Lab Road would continue to be long term, minor, and adverse for alternative A. This is because of maintenance of the gravel road, which is assumed to involve grading and addition of gravel as necessary. Bio Lab Road maintenance would continue to contribute to erosion and sedimentation.

Overall, impacts from implementing alternative A would have long-term, negligible to minor, adverse impacts on geologic resources and soils.

Cumulative Impacts. Cumulative impacts were determined by combining the impacts of the alternatives proposed in this document with the impacts of other past, present, and reasonably foreseeable future actions. Past, present, and anticipated future projects that would contribute to impacts on geologic resources or soils include the following:

1. space shuttle launches from the NASA space shuttle landing facility will likely end in 2011; however, rockets and satellites would continue to be launched from Kennedy Space Center. No new construction is expected for rocket and satellite launches at this time.
2. potential development and operation of a commercial vertical launch complex at Canaveral Air Force Station
3. construction of launch infrastructure at nearby Cape Canaveral Spaceport as part of U.S. Commercial Space Transportation Developments (report completed in January 2007; construction has not begun)
4. deployment and operation of evolved expendable launch vehicle systems at Cape Canaveral Air Station (*Environmental Impact Statement* completed in April 1998)
5. continued preparations for and implementation of the Mars Science

- Laboratory mission at Cape Canaveral Air Station
6. development of the International Space Research Park (ISRP) on the Kennedy Space Center (*Environmental Impact Statement* completed in 2004; construction has not begun)
 7. U.S. Army Corps of Engineers periodic dredging activities along the Intracoastal Waterway (ongoing)
 8. U.S. Army Corps of Engineers beach nourishment along New Smyrna Beach (ongoing)
 9. mosquito control activities by St. Johns River Water Management District, Brevard County, and Volusia County (ongoing)

Refer to the “Cumulative Impacts” discussion at the beginning of this chapter for more information on all the cumulative actions impacting Canaveral National Seashore.

Projects that involve launches of space vehicles, including projects 1 through 6, could deposit engine exhaust products as well as hydrochloric acid and aluminum oxide from launch exhaust. The impact of these activities would be expected to result in a short-term, moderate, adverse impact on geologic resources and/or soils, because launches would temporarily increase acidity in nearby soils. However, multiple monitoring studies have found that the soils close to the launch area are high in calcium carbonate and therefore acidic deposits from launches are quickly neutralized; therefore, long-term impacts from hydrochloric acid would be minimal (NASA 2008b, NASA 2006).

Construction of the International Space Research Park at Kennedy Space Center would result in short- and long-term, minor to moderate impacts on geologic resources and soils. This proposed park would primarily disturb previously disturbed soils, citrus groves, and remnant wetlands,

although a small portion of the project would disturb previously undisturbed soils. Therefore, construction of this park would increase soil erosion and the number of impervious surfaces. Storm water detention ponds would be constructed to capture runoff, and a central greenway would reduce the potential for soil erosion (NASA 2004).

Dredging activities along the Intracoastal Waterway would continue to have a short- and long-term moderate impact on soils. During dredging activities, sediment is removed to deepen the Intracoastal Waterway and allow entrance of shipping vessels. Erosion of soil from activities associated with alternative A would slightly increase the amount of sediment eventually being deposited into the Intracoastal Waterway; however, this increase would not be expected to impact the frequency of dredging operations.

Although implementation of alternative A would not directly impact beach sediment, beach nourishment activities at New Smyrna Beach would be expected to have short-term, moderate, adverse and long-term beneficial impacts. Short-term moderate adverse impacts would occur during pipeline installation for beach sediment delivery. After initial construction activities have ceased and nourishment operations have begun, a long-term beneficial impact would be expected because sediment erosion would be reduced.

Mosquito control would continue to have short-term minor and long-term negligible impacts on geologic resources and soils because of pesticide accumulation in soils. Approved larvicides are applied on select marsh sites among the lagoon islands, so no long-term impacts would be expected.

Overall, the actions of past, present, and reasonably foreseeable future actions by others would be moderate, adverse, and long term.

The impacts of other actions described above, in combination with the impacts of alternative A, would likely result in short- and long-term, negligible to moderate adverse and long-term, minor, beneficial cumulative impacts on geologic resources and soils. Alternative A is expected to contribute a small component to these impacts.

Conclusion. Under the no-action alternative, no changes to current conditions would occur within the national seashore. Conditions for geologic resources and soils would remain as described in the “Affected Environment” chapter. Maintenance activities on roads and parking areas would continue to result in long-term, negligible to minor, adverse impacts on soils associated with any necessary removal of vegetation or disturbance of soils, which could result in potential erosion and transport of suspended sediments during storms. Long-term beneficial impacts would be expected to continue from restricted public access to Turtle Mound and the lands south of the Eldora Hammock area.

The actions proposed in alternative A, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, adverse and long-term and beneficial cumulative impacts on geologic resources and soils.

Impacts of Implementing Alternative B (The NPS Preferred Alternative)

Implementation of alternative B, the preferred alternative, could result in short- and long-term, negligible to minor, adverse impacts on geologic resources and soils. Long-term beneficial impacts would also be realized through revegetation of sites.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all

relevant impacts are considered in the final analysis. There would be no new impacts on geologic resources or soils at Klondike Beach or Titusville under this alternative.

Playalinda Beach Area. Long-term, minor, adverse impacts would be expected at the Playalinda Beach area. Construction of a bike path would result in increases in impervious surfaces and associated soil erosion and sedimentation. There would be no new long-term impacts on soils because the new restrooms would be built in the footprint of the existing restrooms.

The boardwalk would be relocated and strengthened to support emergency all-terrain vehicles (ATVs). This would result in short-term, minor, adverse impacts because additional posts would be required to strengthen the boardwalk. These activities would result in localized soil disturbance.

Relocating lifeguard operations closer to Eddy Creek would result in negligible adverse impacts on soils.

Apollo Beach Area. Short-term, minor, adverse impacts would result from burial of overhead lines. Overhead line burial would disturb soil, resulting in temporary erosion and sedimentation until regrowth of vegetation occurs. Construction of bike trails would result in long-term, minor adverse impacts from increased impervious surfaces, erosion, and sedimentation. Replacement of the visitor center would be expected to result in short-term, minor, adverse impacts. Once construction is complete and revegetation has occurred, impacts on soil would be anticipated to be negligible.

Long-term, beneficial impacts on soils would be expected from planting vegetation to screen maintenance facilities from the views of visitors. The additional vegetation would result in a reduction in storm water runoff, erosion, and sedimentation.

Eldora Hammock Area. Short-term, minor adverse impacts would be expected from construction activities during overhead power and telephone line burial because of vegetation removal resulting in minor increases in erosion and sedimentation. Once the area has been revegetated, impacts on soil would be negligible.

Extension of the Castle Windy Trail along the lagoon could result in short-term, minor, adverse impacts on geologic resources and soils during construction because of increased erosion and sedimentation caused by increased impervious surfaces and removal of vegetation. After construction, the impacts from the new trail would be long term and minor because of increased impervious surfaces, soil erosion, and sedimentation.

Northern Mosquito Lagoon. Long-term, negligible to minor, beneficial impacts would be expected from establishing a pole/troll zone, therefore reducing sediment disturbance. Establishing a slow-speed zone between the Eldora State House, parking lot #7, and the first island to the west would result in long-term beneficial impacts by reducing shoreline erosion.

Oak Hill Area. Restoration of the Stuckey property (if acquired) to natural conditions would result in long-term beneficial impacts from decreased impervious surfaces, erosion, and sedimentation. Short- and long-term adverse impacts would result from construction of a parking area and trails because of increased impervious surfaces, erosion, and sedimentation.

NPS/USFWS Joint Management Area. Impacts for the NPS/USFWS Joint Management Area for alternative B would be the same as the impacts described (if alternative A.

Merritt Island National Wildlife Refuge. If a joint administrative facility were constructed, short- and long-term, minor, adverse

impacts could occur from increased impervious surfaces and erosion and sedimentation from construction of new headquarters and maintenance facilities on undeveloped land.

Cumulative Impacts. Cumulative impacts on geologic resources and soils for alternative B were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative B. The adverse cumulative impacts would be short and long term and negligible to moderate. Long-term beneficial cumulative impacts would also be realized. Alternative B would contribute a small component to these impacts.

Conclusions. Activities associated with implementing alternative B would result in short- and long-term, minor, adverse impacts on geologic resources and soils, primarily due to construction efforts that would increase impervious surfaces and result in erosion and sedimentation. In addition, long-term beneficial impacts would be anticipated because vegetative cover would be increased at certain locations.

The actions proposed in alternative B, together with other past, present, and reasonably foreseeable actions described in alternative A, would likely result in short- and long-term, negligible to moderate, adverse, and long-term beneficial cumulative impacts.

Impacts of Implementing Alternative C

Implementation of alternative C would result in short-term, negligible to minor and long-term, minor, adverse impacts on geologic resources and soils. Long-term beneficial impacts would also be realized by the restoration of property to its natural condition and through revegetation efforts.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no new impacts on geologic resources or soils at Klondike Beach or Titusville under this alternative.

Playalinda Beach Area. Long-term moderate adverse impacts would be expected from replacing restroom facilities and developing a bike path, which could result in increased impervious surfaces, soil erosion, and sedimentation. If relocation of lifeguard operations closer to the beach occurred, it would result in negligible impacts on soils.

Apollo Beach Area. Short- and long-term minor to moderate adverse impacts on geologic resources and soils would be expected from constructing a bike path and burying overhead power lines. These activities would result in increased impervious surfaces, soil erosion, and sedimentation.

Constructing a shade pavilion at Turtle Mound, and creating an unpaved parking area for horse trailers would result in short- and long-term, moderate, adverse impacts due to grading and filling, increased impervious surfaces, soil erosion, and sedimentation. Depending on the new location, the unpaved horse trailer parking area might result in increased erosion and sedimentation if vegetation was removed.

Restoration of natural conditions at the location of the current maintenance facility complex (functions would relocate to the Bill's Hill area or the Stuckey property, if acquired), would result in long-term, beneficial impacts from decreased impervious surfaces and erosion.

Eldora Hammock Area. Short- and long-term minor adverse impacts on geologic resources and soils would occur from construction of interpretive and foot trails at

Eldora State House, extension of the Castle Windy Trail, additional parking areas, and removal and construction of facilities at the former Hebner property. These construction activities would result in increased impervious surfaces and soil erosion and sedimentation.

Short-term, minor adverse impacts would be expected from construction activities on previously disturbed road shoulders during installation of water and sewer service because of vegetation removal. Construction would result in minor increases in erosion and sedimentation. Once the area has been revegetated, impacts on soil would be negligible.

Northern Mosquito Lagoon. The new slow-speed zone at Eldora would result in long-term beneficial impacts by reducing shoreline erosion.

Oak Hill Area. Construction for the national seashore headquarters/visitor center/maintenance facilities at either the Stuckey property (if acquired) or Bill's Hill would result in short- and long-term moderate adverse impacts. Construction would increase impervious surfaces, soil erosion, and sedimentation.

NPS/USFWS Joint Management Area. Impacts for alternative C at the NPS/USFWS Joint Management Area would be the same as those described for alternative A at the NPS/USFWS Joint Management Area. There would be no new impacts on soils from the limited public access to Target Rock.

Merritt Island National Wildlife Refuge. Centralizing maintenance functions at either the Stuckey Property (if acquired) or Bill's Hill would have no additional impacts on geologic resources and soils at the current Wilson's Corner site at Merritt Island National Wildlife Refuge due to continued use by the U.S. Fish and Wildlife Service.

Cumulative Impacts. Cumulative impacts on geologic resources and soils for alternative C were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative C. The adverse cumulative impacts would be short and long term and negligible to moderate. Long-term beneficial cumulative impacts would also be realized. This alternative's contributions to these cumulative impacts would likely not be large.

Conclusions. Activities associated with implementing alternative C would result in short- and long-term, minor to moderate, adverse impacts on geologic resources and soils primarily from construction efforts that would increase impervious surfaces, resulting in erosion and sedimentation. Long-term beneficial impacts would be anticipated because vegetative cover would be increased at certain locations.

The actions proposed in alternative C, together with other past, present, and reasonably foreseeable actions described in alternative A, would likely result in short- and long-term, negligible to moderate, adverse, and long-term, beneficial cumulative impacts.

Impacts of Implementing Alternative D

Implementation of alternative D would result in short-term, negligible to minor, adverse and long-term, minor, adverse impacts on geologic resources and soils. Beneficial impacts would also be realized by the restoration of property to its natural condition and through revegetation efforts.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no new impacts on

geologic resources or soils at Klondike Beach or Titusville under this alternative.

Playalinda Beach Area. Construction of sustainable restroom facilities would result in increases in impervious surfaces and associated soil erosion and sedimentation—long-term, negligible, adverse, impacts. Relocating lifeguard operations closer to Eddy Creek would result in negligible impacts on soils.

The administrative boardwalk would be relocated and strengthened to support emergency all-terrain vehicles (ATVs). This would result in short-term, minor, adverse impacts because additional posts would be required to strengthen the boardwalk. These activities would result in localized soil disturbance.

Apollo Beach Area. Long-term beneficial impacts would be expected from planting vegetation to screen North District maintenance facilities from the views of visitors. The additional vegetation would result in a reduction in storm water runoff, erosion, and sedimentation.

Eldora Hammock Area. Short- and long-term, minor adverse impacts on geologic resources and soil would be expected at the former Hebner property from the construction of trailer pads, extension of utility lines, and expansion of facilities resulting in increased impervious surfaces and erosion and sedimentation.

Short-term, minor adverse impacts would be expected from construction activities on previously disturbed road shoulders during installation of water and sewer service because of vegetation removal. Construction would result in minor increases in erosion and sedimentation. Once the area has been revegetated, impacts on soil would be negligible.

Northern Mosquito Lagoon. Long-term, negligible to minor, beneficial impacts would

be expected from establishing pole/troll zones, therefore reducing sediment disturbance. Establishing a slow-speed zone between the Eldora State House, parking lot #7, and the first island to the west would result in long-term beneficial impacts by reducing shoreline erosion.

Oak Hill Area. Construction of connecting trails would result in short- and long-term, minor, adverse impacts from increased impervious surfaces and erosion and sedimentation.

NPS/USFWS Joint Management Area. Impacts for alternative D at the NPS/USFWS Joint Management Area would be the same as those described for alternative A.

Merritt Island National Wildlife Refuge. . If a joint administrative facility were constructed, short- and long-term, minor, adverse impacts would occur from implementing alternative D, resulting in increased impervious surfaces and erosion and sedimentation from construction of a maintenance facility on undeveloped land near the USFWS visitor center.

Cumulative Impacts. Cumulative impacts on geologic resources and soils for alternative D were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative D. The adverse cumulative impacts would be short and long term and negligible to moderate. Long-term beneficial cumulative impacts would also be realized. This alternative's contributions to cumulative impacts would likely not be large.

Conclusions. Activities associated with implementing alternative D would result in short- and long-term, minor, adverse impacts on geologic resources and soils primarily due to construction efforts that would increase impervious surfaces, potentially resulting in erosion and sedimentation. In addition, long-term beneficial impacts

would be anticipated as vegetative cover would be increased at certain locations, partially offsetting the increase in impervious surfaces.

The actions proposed in alternative D, together with other past, present, and reasonably foreseeable actions described in alternative A, would likely result in short- and long-term, negligible to moderate, adverse, and long-term beneficial cumulative impacts.

FLOODPLAINS

Impacts on floodplains, both adverse and beneficial, are described for alternatives A, B, C, and D. A discussion is presented for each affected geographic area.

Methodology

A proposed action would have significant effects on floodplains if it were to increase potential for flood hazards or violate established laws or regulations adopted to protect water resources. The thresholds to determine floodplains impacts are defined as follows:

Negligible: Impacts on floodplains would result in no measureable or perceptible changes to floodplains.

Minor: Impacts on floodplains (e.g., loss of floodplain volume capacity, loss of recharge area, and an increase in storm water runoff to floodplains) would be slight, but detectable, or would result in small but measureable changes to floodplains. The effects would be localized.

Moderate: Impacts on floodplains (e.g., loss of floodplain volume capacity, loss of recharge area, and an increase in storm water runoff to floodplains) are readily apparent and would result in easily

detectable changes to floodplains. The effects would be localized.

Major: Impacts on floodplains (e.g., loss of floodplain volume capacity, loss of recharge area, and an increase in storm water runoff to floodplains) are severely adverse or exceptionally beneficial and would result in substantial changes. The effects would be on a regional scale.

Impacts of Implementing Alternative A (The No-Action Alternative)

Implementation of alternative A, the no-action alternative, would not be expected to impact floodplains at the Klondike Beach area and Titusville area. Therefore, these geographic areas are not discussed for this alternative. Long-term, negligible, adverse impacts on floodplains at the other geographical areas are expected as a result of implementing alternative A.

Playalinda Beach Area. No new impacts on floodplains would be expected from the implementation of alternative A in the Playalinda Beach area. Long-term, negligible to minor, adverse impacts would continue as a result of existing impervious surfaces in the area, which would maintain the current amount of storm water runoff to floodplain areas.

Apollo Beach Area. The implementation of alternative A in the Apollo Beach Area would continue to have long-term, negligible, adverse impacts on floodplains because of the presence of impervious surfaces, which would maintain the current amount of storm water runoff to floodplain areas.

Eldora Hammock Area. The implementation of alternative A in the Eldora Hammock Area would continue to have long-term, negligible, adverse impacts on floodplains because of the presence of impervious surfaces, which would maintain the current amount of storm water runoff to floodplain areas.

Northern Mosquito Lagoon. The implementation of alternative A in the Northern Mosquito Lagoon would continue to have long-term, negligible, adverse impacts on floodplains because of the presence of impervious surfaces, which would maintain the current amount of storm water runoff to floodplain areas.

Oak Hill Area. No new impacts on floodplains would be expected from the implementation of alternative A in the Bill's Hill area or on the Stuckey property.

The implementation of alternative A in the Oak Hill area would also continue to have long-term, negligible, adverse impacts on floodplains because of the presence of impervious surfaces, which would maintain the current amount of storm water runoff to floodplain areas.

NPS/USFWS Joint Management Area. Long-term, negligible, adverse impacts on floodplains would continue as a result of the presence of impervious surfaces in the boat access areas, and the continued maintenance of Bio Lab Road, which would maintain the current amount of storm water runoff to floodplain areas. No new impacts on floodplains would be expected from the implementation of alternative A in the Manatee viewing area, Scrub Ridge Trail, Pine Flatwoods Trail, Sand Road/Trail, historic properties, or the NASA tracking facilities in this area.

Merritt Island National Wildlife Refuge. The implementation of alternative A in the Merritt Island National Wildlife Refuge would continue to have long-term, negligible, adverse impacts on floodplains because of the presence of impervious surfaces at the South District maintenance area at Wilson's Corner, which would maintain the current amount of storm water runoff to floodplain areas. No new impacts on floodplains would be expected from the implementation of alternative A at the current USFWS visitor information center.

Cumulative Impacts. Cumulative impacts on floodplains were determined by combining the impacts of the alternatives proposed in this document with the impacts of other past, present, and reasonably foreseeable future actions. Past, present, and anticipated future projects that would contribute to impacts on floodplains include the following:

1. potential development and operation of a commercial vertical launch complex at Canaveral Air Force Station
2. construction of launch infrastructure at nearby Cape Canaveral Spaceport as part of U.S. Commercial Space Transportation Developments (report completed in January 2007; construction has not begun)
3. development of the International Space Research Park (ISRP) on the Kennedy Space Center (*Environmental Impact Statement* completed in 2004; construction has not begun)
4. U.S. Army Corps of Engineers period dredging activities along the Intracoastal Waterway (ongoing)
5. U.S. Army Corps of Engineers beach nourishment along New Smyrna Beach (ongoing)
6. mosquito control activities by St. Johns River Water Management District, Brevard County, and Volusia County (ongoing)

Refer to the “Cumulative Impacts” discussion at the beginning of this chapter for more information on all the cumulative actions impacting Canaveral National Seashore.

Development of a commercial vertical launch complex at Canaveral Air Force Station would result in short- and long-term, minor to moderate, adverse impacts on floodplains. The development and operation of the complex would be on about 200 acres of the Air Force Station. Proposed Site 1 is outside the 100-year floodplain; therefore,

there would be no impacts. Proposed Site 2 is within the 100-year floodplain (NASA 2008a); therefore, short-term, moderate, adverse impacts on floodplains would be expected because of construction activities and associated ground disturbances and increased storm water runoff. Long-term, moderate, adverse impacts on floodplains would also be expected because of a permanent loss of floodplain volume capacity and increase in impervious surfaces.

Construction of the International Space Research Park at the space center would result in short- and long-term, negligible to minor, adverse impacts on floodplains. The proposed park would primarily disturb previously disturbed areas, citrus groves, and remnant wetlands, although a small portion of the project would disturb a previously undeveloped area. Construction of the park would increase impervious surfaces and potential storm water runoff to floodplains; however, storm water detention ponds would be constructed to capture runoff, and zones have been established to avoid impacts on wetlands, which provide natural flood control. Land use plans have been developed to mitigate wetlands impacts and manage storm water flow pursuant to “Executive Order 11988, Floodplains,” and “Executive Order 11990, Protection of Wetlands.” Therefore, adverse impacts are expected to be negligible to minor (NASA 2004).

Although implementation of alternative A would not directly impact beach sediment, beach nourishment activities at New Smyrna Beach would be expected to have short-term, minor, adverse impacts on floodplains. Short-term, minor, adverse impacts would occur during pipeline installation for beach sediment delivery. After initial construction, activities have ceased and nourishment operations have begun, a long-term beneficial impact would be expected because sediment erosion within the floodplains would be reduced.

The impacts of other actions described above, in combination with the impacts of alternative A, would likely result in short- and long-term, negligible to moderate and adverse, and long-term, negligible, and beneficial cumulative impacts on floodplains. Alternative A is expected to contribute a small component to these impacts.

Conclusion. Long-term, negligible, adverse impacts on floodplains would be expected to continue from alternative A because of the presence of impervious surfaces (e.g., buildings, parking areas, and roads) within or adjacent to the 100-year floodplain. Impacts from the existing conditions at the national seashore would continue to be negligible.

The actions proposed in alternative A, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, and adverse, and long-term, beneficial cumulative impacts on floodplains.

Impacts of Implementing Alternative B (The NPS Preferred Alternative)

Implementation of alternative B, the preferred alternative, would continue to have no impacts on floodplains at the Klondike Beach area and Titusville area. Therefore, these geographic areas are not discussed for this alternative. For all other geographic areas, short- and long-term, negligible to moderate adverse impacts on floodplains would be expected as a result of implementing alternative B.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis.

Playalinda Beach Area. Short-term, negligible to minor, adverse impacts would be expected from the construction of the bike path and sustainable restrooms within the Playalinda Beach access area. Short-term, negligible, adverse impacts on floodplains would be expected from relocating the boardwalk to accommodate ATV access due to construction activities within the 100-year floodplain.

Long-term, minor, adverse impacts on floodplains would be expected from the implementation of alternative B due to increased impervious surfaces from the bike path at Playalinda Beach. No new impacts would be expected from the implementation of alternative B if lifeguard operations were moved.

Apollo Beach Area. Short-term, minor to moderate, adverse impacts on floodplains would be expected because of construction activities proposed in alternative B, including replacing existing restrooms with more sustainable systems, removing and burying overhead power and telephone lines, and constructing a bike path. Most of the developed portion of the Apollo Beach area is outside the 100-year floodplain. Increased runoff during construction activities could impact nearby floodplain areas.

Long-term, negligible to minor, adverse impacts on floodplains would be expected from the implementation of alternative B because of the permanent increase in impervious surfaces from the national seashore entrance relocation and bike path. Storm water runoff to floodplain areas from these impervious surfaces would increase.

Long-term, negligible, beneficial impacts would be expected from screening the Apollo Beach maintenance area with native vegetation, because this would be expected to reduce runoff in floodplain areas.

Eldora Hammock Area. Short- and long-term, negligible, adverse impacts would be expected from the extension of the Castle Windy Trail, which would negligibly increase surface runoff.

Northern Mosquito Lagoon. Implementation of alternative B would have no new impacts on floodplains in the boat access areas and water and islands north of the Gomez Grant Line to the national seashore's north boundary line.

Oak Hill Area. Short-term, negligible to moderate, adverse impacts on floodplains would be expected from implementing alternative B. Most of Bill's Hill is in the 100-year floodplain; therefore, several proposed construction activities could occur within or affect nearby floodplains.

Construction of parking and trailheads at Bill's Hill would have short- and long-term, negligible to minor, adverse impacts. The central portion of Bill's Hill is higher in elevation and is outside the 100-year floodplain. Impacts on the floodplain would be lessened if parking was constructed outside the floodplain; however, drainage from parking would still cross the floodplain areas of Bill's Hill, thereby adding additional runoff that would otherwise recharge to groundwater. Construction of gravel parking rather than paved surfaces would greatly reduce storm water runoff potential. Therefore, with mitigation, long-term adverse impacts from polluted storm water runoff from the parking areas would not be expected.

Long-term, negligible to minor, beneficial impacts on floodplains would be expected from the implementation of alternative B at the Stuckey property, if acquired, if impervious surfaces on the property are removed. Removal of impervious surfaces and restoration to natural conditions through revegetation would be expected to decrease storm water runoff to floodplains.

Restoration of some portion of the abandoned citrus groves for interpretive purposes would have long-term negligible impacts because of removing undergrowth and maintaining the grove.

NPS/USFWS Joint Management Area. No new impacts would be expected on floodplains from the implementation of alternative B.

Merritt Island National Wildlife Refuge. Short-term, minor, adverse impacts on floodplains could be expected from relocating maintenance operations from Wilson Corner (and administrative headquarters functions from Titusville) to a new multiagency facility near the USFWS visitor center, should it be constructed. Alternative B would have long-term, minor to moderate, adverse impacts on floodplains from the development of new impervious surfaces at the combined interagency site assuming the new facilities would be built within the 100-year floodplain. Negligible to minor, adverse impacts on floodplains would be expected if the facilities are constructed outside the 100-year floodplain because of increased storm water runoff to nearby floodplains.

Cumulative Impacts. Cumulative impacts on floodplains for alternative B were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative B. The cumulative impacts on floodplains would likely be short and long term, negligible to moderate, and adverse, and long term and beneficial. Alternative B would not likely contribute an appreciable portion to these cumulative impacts.

Conclusion. Improvements in several locations, such as trailheads and parking areas, would create additional short- and long-term, negligible to minor, adverse impacts on floodplains.

The actions proposed in alternative B, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, and adverse, and long-term beneficial cumulative impacts on floodplains. Alternative B would not likely contribute an appreciable portion to these cumulative impacts.

Impacts of Implementing Alternative C

Implementation of alternative C would continue to have no impacts on floodplains at the Klondike Beach area and Titusville area. Therefore, these geographic areas are not discussed for this alternative. For all other geographic areas, short- and long-term, negligible to moderate, adverse impacts on floodplains would be expected as a result of implementing alternative C.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis.

Playalinda Beach Area. Short-term, negligible to minor, adverse impacts on floodplains would be expected as a result of implementing alternative C in the Playalinda Beach area. Construction of a bike path might occur within the 100-year floodplain, and would increase impervious surfaces and storm water runoff, particularly if paved.

Relocation of the lifeguard support operations would be expected to have short-term, minor, adverse impacts, particularly if the lifeguard support area is relocated to an area within the 100-year floodplain.

Apollo Beach Area. Short-term, minor to moderate, adverse impacts on floodplains would be expected from implementing alternative C in the Apollo Beach area. Most of the developed portion of the Apollo Beach area is outside of the 100-year flood-

plain; however, increased runoff during construction activities could impact nearby floodplain areas because of increased storm water runoff and increased impervious surfaces.

With mitigation, there would be long-term, negligible, adverse impacts on floodplains from the new unpaved parking for horse trailers, access for horses, and the bike path.

Long-term, negligible, beneficial impacts would be expected from screening the North District maintenance area with native vegetation because that would be expected to reduce runoff.

Eldora Hammock Area. Short-term, minor to moderate, adverse impacts on floodplains would be expected from implementing alternative C in the Eldora Hammock area. Construction of a parking area at Castle Windy Trail and demolition and construction of the new facilities at the former Hebner Property might occur within the 100-year floodplain.

Long-term, minor, adverse impacts on floodplains would be expected from alternative C. The parking area at Castle Windy Trail, extension of Castle Windy Trail and incorporation of trails throughout the Eldora State House area, and construction of new facilities at the former Hebner Property would permanently increase impervious surfaces and storm water runoff to floodplains.

Northern Mosquito Lagoon. Short- and long-term, negligible, adverse impacts on floodplains would be expected from implementing alternative C in the Northern Mosquito Lagoon from paving the parking area across from parking area #5. Impervious surfaces would be slightly increased in the area, thereby increasing storm water runoff to floodplains. No other new impacts on floodplains would be expected in this area.

Oak Hill Area. Short- and long-term, minor to moderate, adverse impacts on floodplains would be expected from construction activities proposed in alternative C, including construction of visitor center/ administrative headquarters and maintenance facilities at the Stuckey property (if acquired) or Bill's Hill, construction of a marsh trail at Seminole Rest, and creation of additional trails and access and parking areas at Bill's Hill. Ground disturbances during construction would increase erosion potential and storm water runoff to floodplain areas; however, implementation of proper erosion and sediment control and storm water management practices during and following construction would mitigate these effects. Most of Bill's Hill and the Stuckey property are within the 100-year floodplain. Long-term impacts on floodplains would be expected from a relatively large amount of impervious surfaces being introduced and vegetation being permanently removed for construction. If these new facilities are constructed within the 100-year floodplain, a moderate, long-term, adverse impact would be expected because of the permanent loss of floodplain volume capacity and recharge area.

NPS/USFWS Joint Management Area. No impacts on floodplains would be expected from the implementation of alternative C.

Merritt Island National Wildlife Refuge. Although the NPS maintenance functions would be relocated to the Stuckey property (if acquired) or Bill's Hill, there would continue to be long-term, negligible, adverse impacts on floodplains because the Wilson Corner structures (impervious surfaces) would presumably remain at Wilson Corner and be used by the U.S. Fish and Wildlife Service.

Cumulative Impacts. Cumulative impacts on floodplains for alternative C were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alterna-

tive A) and the impacts of implementing alternative C. The adverse cumulative impacts would be short and long term and negligible to moderate. Long-term beneficial cumulative impacts would also be realized. This alternative's contribution to these impacts would be small.

Conclusion. The greatest potential short- and long-term adverse impacts on floodplains would be from the construction of the visitor center/ administrative headquarters and maintenance facilities at the Stuckey property (if acquired) or Bill's Hill. Additional short- and long-term, negligible to minor, adverse impacts would also be expected from construction of parking areas, trails, and smaller structures.

Long-term, negligible, adverse impacts would also continue because of impervious surfaces within or adjacent to the 100-year floodplain.

The actions proposed in alternative C, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, adverse, and long-term beneficial cumulative impacts on floodplains.

Impacts of Implementing Alternative D

Implementation of alternative D would have no new impacts on floodplains at the Klondike Beach area or at the Titusville area. Therefore, these geographic areas are not discussed for this alternative. For all other geographic areas, implementation of alternative D would result in short- and long-term, negligible to moderate, adverse impacts on floodplains.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis.

Playalinda Beach Area. Short-term, negligible, adverse impacts on floodplains would be expected from relocating the boardwalk to accommodate ATV access, relocating the lifeguard operations, and replacing the chemical toilets. Long-term adverse impacts would be negligible once these construction activities were complete.

Apollo Beach Area. Short-term, minor to moderate, adverse impacts on floodplains would be expected from implementing alternative D in the Apollo Beach area. Most of the developed portion of the Apollo Beach area is outside the 100-year floodplain; however, increased runoff during construction activities would be expected to impact nearby floodplain areas because of increased storm water runoff.

Long-term, minor to moderate, adverse impacts on floodplains would be expected from implementing alternative D. The addition of the exterior shower in parking area #2 would add a negligible amount of impervious surfaces in the Apollo Beach area.

Long-term, negligible, beneficial impacts would be expected from screening the North District maintenance area with native vegetation because that would be expected to reduce runoff.

There would be long-term, negligible, adverse impacts on floodplains from the new unpaved parking for horse trailers and the relocation of the administrative boardwalk access for horses.

Eldora Hammock Area. Alternative D would include a negligibly larger amount of impervious surfaces than alternative A with the addition of the trailer pads at the former Hebner property.

Northern Mosquito Lagoon. Implementation of alternative D would have no new impacts on floodplains in the boat access areas and water and islands north of the

Gomez Grant Line to the national seashore's north boundary line.

Oak Hill Area. Short- and long-term, negligible to minor, adverse impacts on floodplains would be expected from implementing alternative D within the Oak Hill area. Ground disturbances associated with construction of a marsh trail at Seminole Rest; and creation of additional access, parking, trails, and trailheads at Bill's Hill and the Stuckey property (if acquired) would increase erosion potential and storm water runoff to floodplain areas. Most of Bill's Hill and the Stuckey property are in the 100-year floodplain. Improvements placed in the 100-year floodplain, if unavoidable, would represent a permanent loss of floodplain volume capacity and ground surface available within the floodplain for recharge of surface water. Therefore, long-term adverse impacts from polluted storm water runoff from the parking areas would not be expected.

NPS/USFWS Joint Management Area. No new impacts on floodplains would be expected from the implementation of alternative D.

Merritt Island National Wildlife Refuge. Short-term, minor, adverse impacts on floodplains would be expected from the construction of the new multiagency maintenance facility in the USFWS maintenance facility area. Long-term, minor to moderate, adverse impacts on floodplains would likely occur with the development of new impervious surfaces at the combined interagency site, assuming the facility would be built within the 100-year floodplain. Negligible to minor adverse impacts would be expected if the facility is constructed outside the 100-year floodplain because of increased storm water runoff to nearby floodplains.

Cumulative impacts. Cumulative impacts on floodplains for alternative D were determined by combining the impacts of past,

present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative D. The adverse cumulative impacts would be short and long term and negligible to moderate. Long-term beneficial cumulative impacts would also be realized. This alternative's contribution to these impacts would not likely be large.

Conclusion. Short- and long-term, negligible to moderate, adverse impacts on floodplains would be expected as a result of alternative D. The greatest potential short- and long-term adverse impacts would be from the construction of the visitor information center in the Apollo Beach area and construction activities in the Oak Hill area.

The actions proposed in alternative D, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, adverse and long-term beneficial cumulative impacts on floodplains.

WETLANDS

The impacts on wetlands at Canaveral National Seashore are analyzed below for alternatives A, B, C, and D. A discussion is presented for each affected geographic area.

Methodology

Evaluation criteria for impacts on wetlands are based on the U.S. government's "no net loss" policy. A loss of a wetland includes degradation of size, functionality, quality, and connectivity of wetlands. A proposed action would have substantial effects on wetlands if it were to do one or more of the following:

- violate established laws or regulations adopted to protect wetlands

- substantially adversely affect water quality
- threaten or damage unique hydrologic characteristics
- cause irreparable harm to wetland flora or fauna or beneficial uses of wetland ecosystems

Common impacts on wetlands include filling, grading, removal of vegetation, construction, and changes in water levels and drainage patterns. Most disturbances that result in impacts on wetlands are controlled by state and federal wetland regulatory programs.

Impacts result from disturbances that occur in areas outside the wetland, such as uplands and other wetlands or waterways. Common impacts include influx of surface water and sediments, fragmentation of a wetland from a contiguous wetland complex, loss of recharge area, or changes in local drainage patterns. Given that most indirect impacts are beyond the authority of state and federal wetland regulatory programs, wetland protection can be provided by a watershed management plan under local implementation.

Impacts on wetlands were evaluated by comparing projected changes resulting from the alternatives proposed in this plan to the no-action alternative, as appropriate. These evaluations were based on consideration of the national seashore's fundamental resources and values, information concerning wetlands distribution and functional values, and professional experience.

The thresholds to determine wetlands impacts are defined as follows:

Negligible: The impact would result in no measurable or perceptible changes to wetlands.

Minor: The impact is slight but detectable and/or would result in small but measurable changes in wetlands and/or

wetlands hydrology; the effects would be localized.

Moderate: The impact is readily apparent and/or would result in easily detectable changes to wetlands and/or wetlands hydrology; the effects would be localized.

Major: The impact is severely adverse or exceptionally beneficial and/or would result in appreciable changes to wetlands and/or wetlands hydrology; the effects would be on a regional scale.

The USFWS's *National Wetland Inventory* (NWI) data were used to determine the likelihood of wetland impacts from the implementation of alternatives. It should be noted that most NWI data are obtained via aerial photographic interpretation with minimal ground-truthing; therefore, reference to the inventory is for planning-level information purposes only and should not be used for determining the actual location of any wetlands. Formal wetland delineations would need to be conducted before construction activities that might occur within or near a wetland.

Impacts of Implementing Alternative A (The No-Action Alternative)

Implementation of alternative A, the no-action alternative, would continue to have no impacts on wetlands at the Klondike Beach area and Titusville area. Therefore, these geographic areas are not discussed for this alternative. For the other geographic areas, long-term, negligible to minor, adverse impacts would occur because of continued maintenance activities and impervious surfaces (e.g., buildings, parking areas, roads) in areas near wetlands.

Playalinda Beach Area. Long-term, minor, adverse impacts on wetlands would continue from the implementation of alternative A within the Playalinda Beach area from continued maintenance and existing impervious surfaces. Alternative A would

also continue to have long-term minor beneficial impacts on wetlands due to restricted public access to the lands and waters south of State Route 402.

Apollo Beach Area. Implementation of alternative A would continue to have long-term, negligible, adverse impacts on wetlands because of surface runoff from impervious surfaces. Long-term negligible adverse impacts would remain with the continued operations of the current facilities (e.g., the fire cache) in the former beach operations area.

Eldora Hammock Area. The implementation of alternative A in the Eldora Hammock area would continue to have long-term, negligible, adverse impacts on wetlands because of surface runoff from impervious surfaces and continued maintenance activities. Long-term, minor, adverse impacts would continue from the presence of motorized watercraft in the slow-speed zones in Mosquito Lagoon by Eldora Hammock. Negligible to minor, adverse impacts from water quality degradation from potential pollutants (e.g., leaked gasoline) and increased turbidity would also be expected to continue.

Northern Mosquito Lagoon. According to the *National Wetlands Inventory*, the open water in Northern Mosquito Lagoon is classified as Estuarine Unconsolidated Bottom wetlands and the islands contain Estuarine Emergent, Estuarine Scrub-Shrub, Estuarine Unconsolidated Shore, and Estuarine Aquatic Bed wetlands (USFWS 2004). Implementation of alternative A would continue to have long-term, negligible, adverse impacts on wetlands because of potentially polluted surface runoff; increased turbidity; and shore erosion from the continued use of the boat launches, continued maintenance of the boat launches, and continued water activities including commercial harvesting and boat tours.

Oak Hill Area. Long-term, negligible to minor, adverse impacts on wetlands would continue in the Bill's Hill area from implementing alternative A from continued uncontrolled visitor access, exotic vegetation, and dumping in the area (due to the lack of management presence). Impacts would be expected to be greater over time (i.e., minor to moderate), particularly if exotic vegetation outcompetes native species in wetland areas.

In the Oak Hill area there would continue to be long-term, negligible, adverse impacts on wetlands because of impervious surfaces (e.g., visitor contact station, caretaker's house, maintenance shed, and concrete parking area at Seminole Rest), which would maintain the current amount of storm water runoff to wetland areas.

NPS/USFWS Joint Management Area.

Long-term, negligible to minor, adverse impacts on wetlands would continue under this alternative because of public boat access and the impervious surfaces of the boat launch ramp, parking area, dock, and structures in the boat access areas.

Long-term, negligible to minor, adverse impacts from public boat access to Eddy Creek would continue under alternative A in this area. According to the *National Wetlands Inventory*, Palustrine Forested, Scrub-Shrub, Emergent, Estuarine Scrub-Shrub, and Palustrine Unconsolidated Bottom wetlands are found throughout the Eddy Creek area (USFWS 2004). Negligible to minor, adverse impacts because of water quality degradation from potential pollutants (e.g., leaked gasoline) and increased turbidity would be expected to continue. Minor, adverse impacts would be expected from boats entering wetlands and destroying or altering vegetation or soils. Regular monitoring of the area by NPS staff would continue to ensure that visitors are not damaging wetlands adjoining Eddy Creek.

Long-term, negligible, adverse impacts on wetlands would continue with continuing maintenance of Bio Lab Road (a gravel road) and potential polluted surface runoff from the road. According to the *National Wetlands Inventory*, Bio Lab Road is surrounded by patches of Palustrine Emergent wetland that could be affected during roadway improvements or maintenance (USFWS 2004).

Alternative A would continue to have long-term minor beneficial impacts on wetlands because of restricted public access to the NASA tracking facility area.

No new impacts would be expected on wetlands from the implementation of alternative A in the manatee viewing area, Scrub Ridge Trail, Pine Flatwoods Trail, Sand Road/Trail, historic properties, or the NASA tracking facilities.

Merritt Island National Wildlife Refuge.

In the Merritt Island National Wildlife Refuge long-term, negligible, adverse impacts on wetlands would continue because of existing impervious surfaces at the South District maintenance area at Wilson's Corner, which would maintain the current amount of storm water runoff to wetland areas.

Cumulative Impacts. Cumulative impacts on wetlands were determined by combining the impacts of the alternatives proposed in this document with the impacts of other past, present, and reasonably foreseeable future actions. Past, present, and anticipated future projects that would contribute to impacts on wetlands include the following:

1. potential development and operation of a commercial vertical launch complex at Canaveral Air Force Station
2. construction of launch infrastructure at nearby Cape Canaveral Spaceport as part of U.S. Commercial Space Transportation Developments (report

- completed in January 2007; construction has not begun)
3. development of the International Space Research Park (ISRP) on the Kennedy Space Center (*Environmental Impact Statement* completed in 2004; construction has not begun)
 4. U.S. Army Corps of Engineers beach nourishment along New Smyrna Beach (ongoing)
 5. space shuttle launches from the NASA space shuttle landing facility will likely end in 2011; however, rockets and satellites would continue to be launched from Kennedy Space Center. No new construction is expected for rocket and satellite launches at this time.
 6. deployment and operation of evolved expendable launch vehicle systems at Cape Canaveral Air Station (*Environmental Impact Statement* completed in April 1998)
 7. continued preparations for and implementation of the Mars Science Laboratory mission at Cape Canaveral Air Station.
 8. mosquito control activities by St. Johns River Water Management District, Brevard County, and Volusia County (ongoing)

Refer to the “Cumulative Impacts” discussion at the beginning of this chapter for more information on all the cumulative actions impacting Canaveral National Seashore.

Development of a commercial vertical launch complex at the Canaveral Air Force Station would result in short- and long-term, minor to moderate, adverse impacts on wetlands. The development and operation of the complex would occur on approximately 200 acres of the Air Force Station (NASA 2008a). According to the *National Wetlands Inventory*, Site 1 contains small amounts of Palustrine Unconsolidated

Bottom, Palustrine Scrub Shrub, Palustrine Emergent, and Riverine wetlands (USFWS 2004). It is also bordered on the Atlantic side by Marine Unconsolidated Shore wetlands. Site 2 has relatively large amounts of Palustrine Emergent, Palustrine Scrub-Shrub, and Palustrine Unconsolidated Bottom wetlands throughout (USFWS 2004). Short-term, minor to moderate, adverse impacts on wetlands would be expected from construction activities and associated ground disturbances and increased storm water runoff. If construction occurs in a wetland, long-term, moderate, adverse impacts on wetlands would also be expected due to a permanent loss of wetland and an increase in impervious surfaces.

Construction of the proposed International Space Research Park would primarily disturb previously disturbed areas, citrus groves, and remnant wetlands, although a small portion of the project would disturb a previously undeveloped area. Construction activities would increase impervious surfaces and potential storm water runoff and siltation to wetlands. With mitigation, adverse impacts are expected to be short and long term, and negligible to minor (NASA 2004).

Although implementation of alternative A would not directly impact beach sediment, beach nourishment activities at New Smyrna Beach would be expected to have short-term, minor, adverse and long-term, minor, beneficial impacts. Short-term minor adverse impacts would occur during pipeline installation for beach sediment delivery. After initial construction activities have ceased and nourishment operations have begun, a long-term beneficial impact would be expected as sediment erosion from the beach would be reduced.

Mosquito control activities as part of ongoing beach maintenance would continue to result in short-term, minor adverse impacts on wetlands. Mosquito-control activities involve applying approved

larvicides on select marsh sites among the lagoon islands, so long-term cumulative impacts (e.g., toxicity) would not be expected.

Overall, the impacts by others described above would be long-term, minor, and adverse.

The impacts of other actions described above, together with the impacts of alternative B, would result in short- and long-term, negligible to moderate, adverse, and long-term, minor, beneficial cumulative impacts. Alternative A would contribute slightly to these cumulative impacts.

Conclusion. Long-term, negligible to minor, adverse impacts would continue from the implementation of alternative A because of continued maintenance activities and impervious surfaces (e.g., buildings, parking areas, roads) in areas near wetlands. Long-term, negligible to moderate, adverse impacts on wetlands would continue, particularly in the Bill's Hill area, because of continued uncontrolled visitor access, exotic vegetation, and dumping (due to lack of management presence).

The actions proposed in alternative A, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, adverse and long-term beneficial cumulative impacts on wetlands.

Impacts of Implementing Alternative B (The NPS Preferred Alternative)

Implementation of alternative B, the preferred alternative, would not impact wetlands at the Klondike Beach area or at the Titusville area. Therefore, these geographic areas are not discussed for this alternative. For the other geographic areas, long-term, negligible to minor, adverse impacts would occur because of continued maintenance activities and impervious

surfaces (e.g., buildings, parking areas, roads) in areas near wetlands.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis.

Playalinda Beach Area. The construction of a Playalinda Beach bike path could cause long-term, negligible to minor, adverse impacts on wetlands. If the bike path follows Route 402 and connects to Playalinda Beach in a general east-west direction, it would likely cross several wetlands, which could include Palustrine (Scrub-Shrub, Emergent, Aquatic Bed, and Unconsolidated Bottom), Lacustrine (Aquatic Bed and Unconsolidated Bottom), and Riverine (Unconsolidated Bottom) (USFWS 2004). If the bike path avoids all wetlands in the area, long-term, negligible, adverse impacts on wetlands would be expected because of increased impervious surfaces and storm water runoff into adjacent wetlands. However, if the bike path is situated within wetlands, long-term, minor, and adverse impacts on wetlands would be expected because of direct loss or permanent alteration of wetlands.

According to the *National Wetlands Inventory*, Marine Unconsolidated Shore and Marine Unconsolidated Bottom wetlands are along the Atlantic side of Playalinda Beach (USFWS 2004). Short-term, negligible, adverse impacts on wetlands would be expected from the replacing the restrooms at Playalinda Beach with more sustainable systems. Because these facilities would be on the beach, drainage would most likely flow east towards the wetlands along the Atlantic side of the beach. Long-term, adverse, impacts would only be expected if the amount of impervious surfaces increases from current conditions. These impacts would be negligible to minor.

No new impacts on wetlands would be expected from the implementation of alternative B within the Playalinda Beach lifeguard operations area.

Apollo Beach Area. Short- and long-term, negligible to minor, adverse impacts on wetlands would also be expected from additional improvements at Apollo Beach, including the reconfiguration of the national seashore entrance, sustainable restrooms, and the bike trails. The burial of power and telephone lines at Apollo Beach would not have impacts on wetlands. All construction activities would be expected to temporarily increase ground disturbances, resulting in potential increases in storm water runoff and siltation to nearby wetlands. Depending on the final design for the reconfiguration of the national seashore entrance and sustainable restrooms, impervious surfaces and surface runoff could increase, resulting in long-term, negligible to minor, adverse impacts. The bike trails, particularly if paved, would also be expected to increase impervious surfaces and storm water runoff.

Eldora Hammock Area. The burial of power and telephone lines at Eldora Hammock would have short-term, negligible to minor, adverse impacts on wetlands from an increase in runoff and siltation during construction activities. According to the *National Wetlands Inventory*, Estuarine Unconsolidated Bottom wetlands are along the Mosquito Lagoon coast of Eldora Hammock. Estuarine Scrub-Shrub wetlands are also along the coast and somewhat inland on Eldora Hammock (USFWS 2004). If power and telephone lines cross these wetlands, short-term, minor, adverse impacts on wetlands would be expected from the dredge or fill necessary to implement the action.

The extension of the Castle Windy Trail to include areas along Mosquito Lagoon would have long-term, negligible to minor, adverse impacts on wetlands. According to the *National Wetlands Inventory*, Estuarine

Unconsolidated Bottom, Scrub-Shrub, Emergent, and Aquatic Bed wetlands are present on the western edge of the barrier island along Mosquito Lagoon (USFWS 2004). The extension of the trail would have impacts because of increased surface runoff from the trail and permanent removal of vegetation. Minor, adverse impacts would be expected if the trail is extended into one of these wetland areas because of a direct loss or alteration of the wetland.

Long-term, minor, adverse impacts would continue from the presence of motorized watercraft in the slow-speed zones in Mosquito Lagoon by Eldora Hammock. According to the *National Wetlands Inventory*, Estuarine Unconsolidated Bottom wetlands are throughout this area, and Estuarine Unconsolidated Shore and Estuarine Scrub-Shrub wetlands are also present on islands adjoining the proposed slow-speed zone (USFWS 2004). Negligible to minor, adverse impacts from water quality degradation from potential pollutants (e.g., leaked gasoline) and increased turbidity would be expected. Long-term, minor, adverse impacts would be expected from boats entering areas with any emergent vegetation or disturb submerged aquatic vegetation within wetlands.

Northern Mosquito Lagoon. The relocation of the entrance area (gate/fee booth) to the national seashore boundary would be expected to have short- and long-term, negligible to minor, adverse impacts on wetlands. Construction activities would temporarily increase storm water runoff and potential sediment transport to nearby wetlands. New long-term impacts would only be expected if impervious surfaces are increased.

Long-term, negligible to minor beneficial impacts on wetlands would be expected from the phase out of the 24-hour ramp access to control access at night and enhance security.

Long-term, minor, beneficial impacts would result from (1) the establishment of a slow-speed zone for boats between Eldora State House, parking area #7, and the first island to the west, and (2) and from the establishment of a pole/troll or nonmotorized zone in locations containing oyster beds, fish spawning, and seagrass in Mosquito Lagoon, which would reduce pollution and turbidity. Water quality in wetland areas could improve because of the potential for fewer pollutants from leaked gasoline from motorboats. Additionally, the establishment of a pole/troll area would have a beneficial impact by reducing the amount of sediment disturbance, and the establishment of a slow-speed zone would be expected to reduce shoreline erosion.

Oak Hill Area. According to the *National Wetlands Inventory*, Palustrine Emergent and a small amount of Palustrine Forested wetlands are scattered throughout the Bill's Hill area (USFWS 2004). Short-term, negligible to minor, adverse impacts would be expected if parking areas, access roads, and trails are placed outside the wetlands because of increased surface runoff and siltation into nearby wetland areas. Development of access roads, parking areas, and trails would have short-term, minor, adverse impacts if construction occurs within the wetlands.

Long-term, negligible to minor, adverse impacts would be expected if these improvements are placed outside the wetlands because of increased impervious surfaces, removal of vegetation, and increased storm water runoff and siltation into wetland areas. Long-term, minor, adverse impacts would be expected if these improvements are placed within wetlands due to the placement of fill in the wetlands.

Long-term, negligible to minor, beneficial impacts on wetlands would be expected from the restoration of the Stuckey property to natural conditions because of an assumed decrease in impervious surfaces and increase

in native vegetation cover. Long-term, minor, beneficial impacts on wetlands would also be expected if wetlands in the Stuckey property are restored.

NPS/USFWS Joint Management Area. No new impacts on wetlands would be expected from the implementation of alternative B.

Merritt Island National Wildlife Refuge. If NPS administrative headquarters and maintenance functions are relocated to combined and expanded USFWS/NPS facilities near the UWFWS visitor center, construction of these facilities could have short- and long-term, negligible to minor, adverse impacts from ground disturbances from construction activities and a permanent increase in impervious surfaces. It is not specified where this facility might be located; therefore, the extent of impacts on nearby wetlands, if any, cannot be determined.

The relocation of maintenance functions from Wilson Corner to a new multiagency facility in the USFWS maintenance area would have either no impacts or short-term, negligible, beneficial impacts on wetlands in the Wilson's Corner maintenance area. It is assumed that disturbances associated with maintenance equipment in Wilson Corner would be reduced in this area; however, it is not specified what the future uses of the current maintenance area would include.

Cumulative Impacts. Cumulative impacts from the implementation of alternative B were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described alternative A) and the impacts of implementing alternative B. The cumulative impacts would likely be short and long term, negligible to moderate, adverse, and long term and beneficial. Alternative B is expected to contribute a small component to these impacts.

Conclusion. Short- and long-term, negligible to minor, adverse impacts on wetlands

would be expected from implementing alternative B. Smaller improvements, such as trailheads, a bike path, and parking areas, would create additional short- and long-term, negligible to minor, adverse impacts, depending on whether these improvements are placed within wetlands.

Long-term negligible adverse impacts would continue because of existing impervious surfaces in areas near wetlands. Long-term, minor, beneficial impacts on wetlands would be expected from increased security, controlled access, and the establishment of a slow-speed zone for boats and a pole/troll or nonmotorized zone in Mosquito Lagoon.

The actions proposed in alternative B, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate and adverse, and long-term, beneficial, cumulative impacts on wetlands.

Impacts of Implementing Alternative C

Implementation of alternative C would not impact wetlands at the Klondike Beach area or at the Titusville area. Therefore, these geographic areas are not discussed for this alternative. For the other geographic areas, short- and long-term, negligible to minor, adverse impacts on wetlands would be expected.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis.

Playalinda Beach Area. Depending on the location of the Playalinda Beach bike path, long-term, negligible to minor, adverse impacts on wetlands could occur. If the bike path follows Route 402 and connects to Playalinda Beach in a general east-west direction, it would likely cross several wetlands, which could include Palustrine

(Scrub-Shrub, Emergent, Aquatic Bed, and Unconsolidated Bottom), Lacustrine (Aquatic Bed and Unconsolidated Bottom), and Riverine (Unconsolidated Bottom) (USFWS 2004). If the bike path avoids all wetlands in the area, long-term, negligible, adverse impacts on wetlands would be expected because of increased impervious surfaces and storm water runoff into adjacent wetlands. However, if the bike path is situated within wetlands, long-term, minor, adverse impacts on wetlands would be expected because of a direct loss and permanent alteration of wetlands.

According to the *National Wetlands Inventory*, Marine Unconsolidated Shore and Marine Unconsolidated Bottom wetlands are along the Atlantic side of Playalinda Beach; and Palustrine Scrub-Shrub, Palustrine Emergent, Lacustrine, and Riverine wetlands are on the lagoon side of Playalinda Beach (USFWS 2004). Short-term, negligible, adverse impacts on wetlands would be expected from the replacement of the restrooms at Playalinda Beach with more sustainable systems and from construction activities related to relocating the lifeguard operations closer to the beach. Because these facilities would be on the beach, drainage would most likely flow east towards the wetlands along the Atlantic side of the beach. Long-term, adverse, impacts would only be expected if the amount of impervious surfaces increases from current conditions. These impacts would be negligible to minor.

Apollo Beach Area. Short- and long-term, negligible, adverse impacts on wetlands surrounding Turtle Mound and the Apollo Beach area would be expected from the construction or expansion of parking areas. Negligible adverse impacts on the Estuarine Unconsolidated Bottom wetlands in Mosquito Lagoon would be expected as a result of enlarging the parking area at Turtle Mound, because drainage from Turtle Mound would most likely enter Mosquito Lagoon. Short- and long-term, negligible,

adverse impacts would also be expected from the construction of an unpaved parking area and trail for equestrians. According to the *National Wetlands Inventory*, no wetlands are within or along the boundaries of these properties (USFWS 2004); however, negligible adverse impacts from increased runoff and siltation due to construction and vegetation removal would be expected.

Extension of the water and sewer lines to comfort stations and construction of exterior showers and a bike path at Apollo Beach would be expected to have short-term, negligible, adverse impacts on the Marine Unconsolidated Shore wetlands along the Atlantic Coast of the barrier island because of increased storm water runoff and siltation during construction (USFWS 2004).

The expansion of parking area #1 at Apollo Beach could have long-term, negligible, adverse impacts on the adjoining Marine Unconsolidated Shore and Marine Unconsolidated Bottom wetlands (USFWS 2004) because of increased impervious surfaces and storm water runoff into these wetlands.

Long-term, negligible, adverse impacts on wetlands would be expected from the construction of a bike path along Apollo Beach because of increased impervious surfaces and storm water runoff. According to the *National Wetlands Inventory*, (1) Marine Unconsolidated Shore and Marine Unconsolidated Bottom wetlands border most of the eastern shoreline of Apollo Beach along the Atlantic coastline, and (2) Estuarine Unconsolidated Bottom and islands of Estuarine Scrub-Shrub and Estuarine Emergent wetlands are west of the Apollo Beach barrier island in Mosquito Lagoon (USFWS 2004). Depending on where the bike path is placed, drainage from the bike path would either flow towards the Atlantic or the Mosquito Lagoon wetlands.

Eldora Hammock Area. According to the *National Wetlands Inventory*, Estuarine

Unconsolidated Bottom wetlands (the open water in Mosquito Lagoon) and Estuarine Scrub-Shrub wetlands border the Eldora Hammock area on the lagoon side (USFWS 2004). Alternative C would include external repairs of the marine science educational station, and demolition of the garage and construction of new facilities at the former Hebner property. Short- and long-term, negligible to minor, adverse impacts on wetlands would be expected as a result of these improvements from increased storm water runoff and siltation during construction activities (short term) and increased impervious surfaces and storm water runoff (long term).

The extension of water and sewer lines to Eldora Hammock would have short-term, negligible to minor, adverse impacts on wetlands from an increase in runoff and siltation during construction. According to the *National Wetlands Inventory*, there are Estuarine Scrub-Shrub wetlands along the coast and somewhat inland on Eldora Hammock (USFWS 2004). If water and sewer lines cross these wetlands, minor adverse impacts would be expected as a result of dredging or potential placement of fill in wetlands. Impacts would be expected to be minimized as a result of permitting and mitigation requirements.

According to the *National Wetlands Inventory*, Estuarine Scrub-Shrub, Estuarine Emergent and Estuarine Unconsolidated Bottom wetlands are in the Castle Windy area along the western edge of the barrier island in Mosquito Lagoon (USFWS 2004). Short-term, negligible, adverse impacts on wetlands surrounding Castle Windy would be expected from the construction of a parking area near or in area wetlands. Short-term, negligible to minor, adverse impacts would be expected from construction depending on the location of the parking area. Impacts, such as increased storm water runoff and siltation, would be minimized by permitting and mitigation requirements. Long-term, negligible to minor, adverse

impacts would be expected after construction depending on the exact siting of the parking area. Long-term impacts could include increased storm water runoff and siltation or permanent loss or alteration of wetlands.

Long-term, negligible, adverse impacts on wetlands would also be expected from the extension of Castle Windy Trail to include areas along the lagoon due to increased storm water runoff into adjoining wetland areas and permanent removal of vegetation. Long-term, minor, adverse impacts would be expected if the trail is constructed within a wetland because of a direct loss or alteration of the wetlands at Castle Windy.

Northern Mosquito Lagoon. Long-term, minor, adverse impacts on wetlands would be expected from implementing alternative C in the northern Mosquito Lagoon. According to the *National Wetlands Inventory*, the open water in northern Mosquito Lagoon is classified as Estuarine Unconsolidated Bottom wetlands, and the islands contain Estuarine Emergent, Estuarine Scrub-Shrub, Estuarine Unconsolidated Shore, and Estuarine Aquatic Bed wetlands (USFWS 2004). Paving the parking area at the boat launch across from parking area #5 would result in increased impervious surfaces and the potential for polluted surface runoff. Additionally, the commercial shuttle service from Apollo Beach could negatively affect water quality because pollutants such as gasoline could leak; however, if the pontoon boat is properly maintained, as anticipated, there should be minimal gas leakage into Mosquito Lagoon.

Long-term, minor, beneficial impacts on wetlands would be expected from the establishment of a slow-speed zone between Eldora State House, parking area #7, and the first island to the west. The slow-speed zone would reduce turbidity and shoreline erosion—a beneficial effect.

Oak Hill Area. According to the *National Wetlands Inventory*, Palustrine Emergent and a small amount of Palustrine Forested wetlands are scattered throughout the Bill's Hill and Stuckey property area (USFWS 2004). Short- and long-term, negligible to minor, adverse impacts would be expected if the new centralized visitor center/ administrative headquarters/ maintenance facilities, parking area, access road, and trails are placed outside the wetlands from increased surface runoff and siltation into these wetland areas. There would be short-term, negligible to minor, adverse impacts if construction occurs within wetlands.

There would be long-term, negligible to minor, adverse impacts if these facilities were placed outside wetlands because of increased impervious surfaces and runoff into nearby wetland areas. There would be long-term, minor, adverse impacts if these improvements are placed within the wetlands because of a direct loss and permanent alteration of wetlands.

Development of a marsh trail at Seminole Rest could have long-term, negligible, adverse impacts on wetlands if the trail is constructed outside these wetlands because of increased surface runoff into adjoining wetlands from permanent vegetation removal. Long-term, minor, adverse impacts would be expected if the trail is constructed within the wetland because of direct loss and alteration of wetland habitat.

NPS/USFWS Joint Management Area. There would be no new impacts on wetlands in this area from implementing alternative B.

Merritt Island National Wildlife Refuge. The implementation of alternative C (moving maintenance functions from Wilson's Creek to the Stuckey property, if acquired, or Bill's Hill) would be expected to have no new impacts on wetlands in the Merritt Island National Wildlife Refuge. It is assumed that disturbances associated with maintenance equipment in Wilson Corner

would be reduced in this area; however, it is not specified what the future uses of the current maintenance area would include.

Cumulative Impacts. Cumulative impacts on wetlands for alternative C were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative C. Cumulative impacts would likely be short and long term, negligible to moderate, and adverse, and long-term, moderate, and beneficial. This alternative's contribution to these cumulative impacts would be slight.

Conclusion. Short- and long-term, negligible to minor, adverse impacts on wetlands would be expected from implementing alternative C. The greatest potential short- and long-term adverse impacts would be from the construction of the visitor center/administrative headquarters and maintenance facilities at the Stuckey property (if acquired) or Bill's Hill area.

Additional short- and long-term, negligible to minor, adverse impacts would also be expected from construction of parking areas, trails, and smaller structures. Negligible adverse impacts would also continue because of existing impervious surfaces within or adjacent to wetland areas.

The actions proposed in alternative C, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, and adverse, and long-term, beneficial cumulative impacts on wetlands.

Impacts of Implementing Alternative D

Implementation of alternative D would have no impacts on wetlands in the Klondike Beach area or at the Titusville area. For the other geographical areas, short- and long-term, negligible to minor, adverse impacts on wetlands would be expected.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis.

Playalinda Beach Area. According to the *National Wetlands Inventory*, Marine Unconsolidated Shore and Marine Unconsolidated Bottom wetlands are along the Atlantic side of Playalinda Beach (USFWS 2004). Short-term, negligible, adverse impacts on wetlands would be expected from replacing the existing restrooms at Playalinda Beach with more sustainable systems. Because these facilities would be on the beach, drainage would most likely flow towards the wetlands along the Atlantic side of the beach. Long-term adverse impacts would only be expected if the amount of impervious surfaces increases from current conditions. These impacts would be negligible to minor.

No new impacts would be expected from the implementation of alternative D in the Playalinda Beach entrance station and lifeguard operations area.

Apollo Beach Area. Short-term, negligible, adverse impacts would also be expected from the construction of an unpaved parking area and trail for equestrians. Impacts might include increased siltation and runoff because of vegetation removal during construction. According to the *National Wetlands Inventory*, no wetlands are within or along the boundaries of this area (USFWS 2004). After construction, long-term, negligible, adverse impacts from increased impervious surfaces and storm water runoff would be expected.

Extension of the water and sewer lines to parking areas #1 and #2 at Apollo Beach and construction of exterior shower at parking area #2 would be expected to have short-term, negligible, adverse impacts on the Marine Unconsolidated Shore wetlands along the Atlantic Coast of the Apollo Beach

barrier island because of increased storm water runoff and siltation during construction. Construction of exterior showers at parking area #2 would be expected to have long-term, negligible, adverse impacts on wetlands because of increased impervious surfaces and storm water runoff into wetland areas.

Eldora Hammock Area. The extension of water and sewer lines to Eldora Hammock would have short-term, negligible to minor, adverse impacts on wetlands from an increase in runoff and siltation during construction. According to the *National Wetlands Inventory*, there are Estuarine Scrub-Shrub wetlands along the coast and somewhat inland on Eldora Hammock (USFWS 2004). If water and sewer lines cross these wetlands, minor adverse impacts would be expected as a result of dredging or potential placement of fill in wetlands. Impacts would be expected to be minimized as a result of permitting and mitigation requirements.

Northern Mosquito Lagoon. The relocation of the entrance area (gate-fee booth) to the national seashore boundary would be expected to have short- and long-term, negligible to minor, adverse impacts on wetlands. Construction activities would temporarily increase storm water runoff and potential sediment transport to nearby wetlands. New long-term adverse impacts would only be expected if impervious surfaces are increased.

Long-term, negligible to minor, beneficial impacts on wetlands would be expected from the phase out of the 24-hour ramp access to control access at night and enhance security.

Long-term, minor, beneficial impacts would result from the establishment of (1) a slow-speed zone for boats between Eldora State House, parking area #7, and the first island to the west, and (2) from the establishment of a pole/troll or nonmotorized zone in

locations containing oyster beds, fish spawning, and seagrass in Mosquito Lagoon from a reduction in pollution and turbidity. Water quality in wetland areas could improve with a decrease in potential pollutants from leaked gasoline from motorboats. Also, the establishment of a pole/troll zone would have a long-term, beneficial impact by reducing the amount of sediment disturbance, and the establishment of a slow-speed zone would be expected to reduce shoreline erosion.

Oak Hill Area. According to the *National Wetlands Inventory*, Palustrine Emergent and a small amount of Palustrine Forested wetlands are scattered throughout the Bill's Hill and Stuckey property area (USFWS 2004). Short-term impacts would be negligible and adverse if the parking areas, trails, and access roads are placed outside of the wetlands. Impacts could be from increased surface runoff and siltation into these wetland areas or from the placement of necessary fill. There would be short-term minor adverse impacts if construction occurs within the wetlands as a result of placement of fill necessary to accommodate project development. Also depending on location of parking areas access roads, and trails, long-term, negligible to minor adverse impacts would be expected from increased impervious surfaces, permanent removal of vegetation, and increased storm water runoff into these wetland areas or from a direct loss and permanent alteration of wetlands.

According to the *National Wetlands Inventory*, Seminole Rest contains Estuarine Emergent wetlands (USFWS 2004). Development of a marsh trail at Seminole Rest could have long-term, negligible to minor, adverse impacts on wetlands depending on the trail location. Impacts could range from increased surface runoff into adjoining wetlands due to vegetation removal to a direct loss and alteration of wetland habitat.

NPS/USFWS Joint Management Area.

There would be no new impacts on wetlands in this area resulting from implementation of alternative D.

Merritt Island National Wildlife Refuge.

The construction of a new multiagency maintenance facility would be expected to have short- and long-term, negligible to minor, adverse impacts because of ground disturbances from construction activities and a permanent increase in impervious surfaces. It is not specified where this new facility would be located; therefore, the extent of impacts on nearby wetlands, if any, cannot be determined.

The combination of maintenance functions with the USFWS maintenance area would have either no impacts or short-term, negligible, beneficial impacts on wetlands in the maintenance area at Wilson Corner. It is assumed that disturbances associated with maintenance equipment in this area would be reduced; however, it is not specified what the future uses of the current maintenance area would include.

Cumulative Impacts. Cumulative impacts on wetlands for alternative D were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative D. The adverse cumulative impacts would be short- and long-term, and negligible to minor. Beneficial cumulative impacts would be long term and moderate. This alternative's contribution to these cumulative impacts would be slight.

Conclusion. Short- and long-term, negligible to minor, adverse impacts on wetlands would be expected as a result of alternative D. The greatest potential short- and long-term adverse impacts would be from the construction activities in the Oak Hill area. Improvements such as parking areas, trailheads, and access, particularly if paved, could introduce a relatively large amount of

new impervious surfaces and permanent loss of vegetation to an area. Negligible adverse impacts would also continue from existing impervious surfaces near wetlands.

The actions proposed in alternative D, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, and adverse, and long-term beneficial cumulative impacts.

WATER RESOURCES

The impacts on water resources at Canaveral National Seashore are analyzed below for alternatives A, B, C, and D. A discussion is presented for each affected geographic area.

Methodology

Evaluation criteria for effects on water resources are based on water availability, quality, and use; existence of floodplains; and associated regulations. A proposed action would have substantial effects on water resources if it were to do one or more of the following:

- substantially reduce water availability or supply to existing users
- deplete groundwater basins
- exceed safe annual yield of water supply sources
- substantially adversely affect water quality
- endanger public health by creating or worsening health hazard conditions
- threaten or damage unique hydrologic characteristics
- violate established laws or regulations adopted to protect water resources

In addition to these parameters, the thresholds to determine water resource impacts are defined as follows:

Negligible: The impact would result in no measurable or perceptible changes to wetlands or water quality.

Minor: The impact is slight, but detectable, and would result in small but measurable changes in wetlands or water quality; the effects would be localized to one area.

Moderate: The impact is readily apparent and would result in easily detectable changes to wetlands or water quality; the effects would be localized.

Major: The impact is severely adverse or exceptionally beneficial and would result in appreciable changes to wetlands or water quality; the effects would be on a regional scale.

Impacts of Implementing Alternative A (The No-Action Alternative)

Implementation of alternative A, the no-action alternative, is not expected to impact water resources in the Titusville area, therefore this geographic area will not be discussed. Under the no-action alternative, ongoing activities at the national seashore would include maintenance of access roads and beaches. Maintenance of access roads is presumed to include filling potholes, resurfacing paved roads, clearing out drainage structures, or grading and adding gravel to gravel roads.

Playalinda Beach Area. Implementation of alternative A would not result in new impacts on water resources. Long-term, negligible to minor, adverse impacts on water resources would continue because of water quality impacts associated with runoff from the Playalinda Beach access roads and parking areas. There would continue to be no new impacts on water resources from water quality monitoring and restriction of

public access to lands and waters south of State Route 402.

Klondike Beach Area. Long-term beneficial impacts would continue from maintaining pristine beach conditions and allowing limited public access by permit only. These activities would continue to help to reduce the potential for pollutants associated with beach access and use to enter the Atlantic Ocean.

Apollo Beach Area. Long-term, negligible, adverse impacts on water resources would continue from nonpoint source pollution associated with litter. No new impacts would be expected from continued beach maintenance and water quality monitoring activities.

Long-term, minor, adverse impacts would continue because of the presence of automobiles at the national seashore. During rain, storm water could pick up pollutants, such as leaked oil or other vehicle-related materials on parking areas, and discharge them into nearby water bodies.

Maintenance of parking areas and trails could continue to have long-term, minor, adverse impacts associated with removal of vegetation or disturbance of soils, which could result in potential erosion and transport of suspended sediments and pollutants into adjacent water bodies during storms.

Eldora Hammock Area. Long-term, minor adverse impacts could continue from parking areas because vehicles could leak oil or other vehicle-related materials that could accumulate and then be transported to adjacent water bodies during storms. Maintenance of parking areas and trails could also have long-term, minor, adverse impacts associated with removal of vegetation or disturbance of soils, which could result in potential erosion and transport of suspended sediments and

pollutants into adjacent water bodies during storms.

Northern Mosquito Lagoon. Long-term, minor, adverse impacts on lagoon water quality could continue from the introduction of oil or other fluids from improperly maintained watercraft into lagoon waters. Short-term, minor, adverse impacts associated with increased turbidity could continue from the operation of watercraft in shallow waters.

Oak Hill Area. The potential for nonpoint source discharges to water bodies from leaked oil or other vehicle-related materials on parking areas would continue. During rains, storm water could continue to pick up pollutants and discharge them into nearby water bodies. This would continue to result in long-term, negligible to minor, adverse impacts.

NPS/USFWS Joint Management Area. Long-term, minor, adverse impacts would continue due to the presence of the parking area at central/southern Mosquito Lagoon. The potential for nonpoint source discharges to water bodies could occur from the accumulation of leaked oil or other vehicle-related materials on parking areas being discharged into nearby water bodies during rains.

The potential for long-term, minor, adverse impacts on lagoon water quality would continue from the introduction of oil or other fluids from improperly maintained watercraft into lagoon waters. The potential for short-term, minor, adverse impacts associated with increased turbidity from the operation of watercraft in shallow waters would also continue.

Construction of a nonmotorized launch area for canoes along the south end of Bio Lab Road by the U.S. Fish and Wildlife Service could result in erosion of exposed soils and transport of sediments to the adjacent water body. Impacts would be expected to be short

term and minor with the implementation of proper erosion and sediment control and storm water management practices during construction and until disturbed soils were stabilized.

Merritt Island National Wildlife Refuge. The potential for nonpoint source discharges to water bodies from leaked oil or other vehicle- or maintenance-related materials in maintenance areas would continue. During rains, storm water could pick up pollutants and discharge them into nearby water bodies. Impacts would be long term, minor, and adverse.

Cumulative Impacts. Cumulative impacts on water resources were determined by combining the impacts of the alternatives proposed in this document with the impacts of other past, present, and reasonably foreseeable future actions. Past, present, and anticipated future projects that would contribute to impacts on water resources include the following:

1. space shuttle launches from the NASA space shuttle landing facility will likely end in 2011; however, rockets and satellites would continue to be launched from Kennedy Space Center. No new construction is expected for rocket and satellite launches at this time
2. potential development and operation of a commercial vertical launch complex at Canaveral Air Force Station
3. construction of launch infrastructure at nearby Cape Canaveral Spaceport as part of U.S. Commercial Space Transportation Developments (report completed in January 2007; construction has not begun)
4. deployment and operation of evolved expendable launch vehicle systems at Cape Canaveral Air Station (*Environmental Impact Statement* EIS completed in April 1998)

5. continued preparations for and implementation of the Mars Science Laboratory mission at Cape Canaveral Air Station
6. development of the International Space Research Park (ISRP) on the Kennedy Space Center (environmental impact statement completed in 2004; construction has not begun)
7. U.S. Army Corps of Engineers periodic dredging activities along the Intracoastal Waterway (ongoing)
8. U.S. Army Corps of Engineers beach nourishment along New Smyrna Beach (ongoing)
9. mosquito control activities by St. Johns River Water Management District, Brevard County, and Volusia County (ongoing)

Refer to the “Cumulative Impacts” discussion at the beginning of this chapter for more information on all the cumulative actions impacting Canaveral National Seashore.

Projects that involve launches of space vehicles, including projects 1 through 6, use large quantities of water for cooling and other operational functions. These activities would likely continue to have a long-term, moderate, adverse impact on water supply. Water for these activities would be supplied by the city of Cocoa, which draws water from the Floridian Aquifer. Deposition of materials released during launches would temporarily increase acidity in nearby shallow surface waters. In addition, ocean splashdown of jettisoned launch components would occur, and fluid and propellants from these components could be released into sea waters. It is anticipated that these fluids would be quickly diluted and not impact water quality, but some soluble products would create localized, short-term, minor, adverse impacts on water quality. The closer a splashdown occurs to the coast, the greater the impact on turbidity and

shoreline erosion. Short-term, minor, adverse impacts on water quality could be expected on Mosquito Lagoon, depending on wind direction, from a launch exhaust cloud that could cause acid deposition (NASA 2008b).

Long-term, minor, adverse impacts on water resources would be expected from constructing the International Space Research Park; however, a storm water treatment and detention system would minimize impacts (NASA 2004). The proposed park would primarily disturb previously disturbed citrus groves and remnant wetlands. However, zones have been established to avoid impacts on existing wetlands and storm water ponds.

Dredging operations along the Intracoastal Waterway would continue to have short-term, minor, adverse impacts on water quality from the increase in turbidity and introduction of contaminants into water, depending on the method of dredging. Hydraulic dredging allows more mixing of sediment and water, potentially releasing contaminants from sediment into ocean waters (Jones-Lee and Lee 2005).

Short-term, moderate, and long-term, negligible, adverse impacts on water resources would continue from beach nourishment activities at New Smyrna Beach. Short-term, moderate, adverse impacts would continue to occur during pipeline installation for beach sediment delivery. During construction, turbidity levels and the potential for leaks from construction equipment would continue to increase. Once initial construction activities have been completed, impacts would be reduced to negligible.

Impacts from mosquito control activities would continue to result in short-term, minor, adverse impacts on water quality. Mosquito-control activities involve spraying a USEPA-approved insecticide using an ultra low-volume spray from trucks (Volusia County Government 2009). This insecticide

is only effective for 24 hours or less, so long-term impacts would not be expected.

Overall, the actions of past, present, and reasonably foreseeable future actions by others would be long-term, minor, and adverse.

The impacts of other actions described above, in combination with the impacts of alternative A, would likely result in short- and long-term, negligible to moderate, and adverse, and long-term beneficial cumulative impacts on water resources. Alternative A is expected to contribute a small component to these impacts.

Conclusion. Under the no-action alternative, no changes to current conditions on water resources would occur in Canaveral National Seashore. Water resources would remain as described in “Chapter 3: Affected Environment.” Maintenance activities on roads and parking areas would continue to result in long-term, negligible to minor, adverse impacts on water resources from erosion and sedimentation (i.e., soil transport to water sources and possible fuel leaks) associated with maintenance activities.

Long-term, minor, adverse impacts on lagoon water quality could also continue from oil or other fluids from improperly maintained watercraft being introduced into lagoon waters. Short-term, minor, adverse impacts associated with increased turbidity could occur as a result of the operation of watercraft in shallow waters. Long-term, beneficial impacts would be expected to continue from restricted public access to Turtle Mound and the lands south of the Eldora Hammock area.

The actions proposed in alternative A, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, and adverse, and long-term, beneficial cumulative impacts on water resources.

Impact of Implementing Alternative B (The NPS Preferred Alternative)

Implementation of alternative B, the preferred alternative, could result in short-term, negligible to moderate, adverse impacts and long-term, negligible to moderate, adverse impacts on water resources. Beneficial impacts would also be realized through revegetation and by the restoration of property to natural conditions.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no new impacts on water resources at Klondike Beach and no impacts at Titusville under this alternative.

Playalinda Beach Area. Long-term, minor, adverse impacts would occur from constructing restroom facilities and a bike path, resulting in increased storm water runoff and sedimentation from increased impervious surfaces.

Apollo Beach Area. Long-term, negligible, adverse impacts on water resources would be expected from increased recreational activities by increasing turbidity and potentially increasing shoreline erosion. Adverse impacts would be from temporary removal of vegetation and disturbance of soils, which could result in erosion of exposed soils and transport of sediments to adjacent water bodies in storm water runoff. Once regrowth of vegetation occurs, the amount of runoff would be expected to return to preconstruction levels. Long-term, minor, adverse impacts would occur from replacing restroom facilities resulting in increased storm water runoff and sedimentation from increased impervious surfaces. Short-term, minor, adverse impacts from burial of overhead powerlines would result from removal of vegetation and disturbance of soils, which could increase erosion and

associated sedimentation and storm water runoff.

Long-term beneficial impacts would result from planting foliage to screen facilities from visitor's views by reducing impervious surfaces and storm water runoff.

Eldora Hammock Area. Extension of the Castle Windy Trail would result in long-term, minor, adverse impacts on water resources by increasing impervious surfaces and storm water runoff. In addition, extension of this trail would result in the removal of vegetation and disturbance of underlying soils along the extended trail alignment. Soils exposed and disturbed during trail construction could be eroded and transported to adjacent water bodies during storms.

Northern Mosquito Lagoon. Impacts associated with increased turbidity or disturbance of bottom sediments resulting from watercraft use would be minimized with the establishment of a slow-speed zone for the area between the Eldora State House, Parking lot #7, and the first island to the west. Implementation of the pole/troll zone associated with alternative B would have a long-term beneficial impact on water resources by reducing the amount of sediment disturbance associated with watercraft use.

Oak Hill Area. Long-term beneficial impacts would occur from restoring the 10-acre Stuckey property to natural conditions. Vegetative growth would decrease impervious surfaces, allowing slower percolation of storm water into the ground.

Provision of parking at Bill's Hill would result in short- and long-term, minor, adverse impacts on water quality from increased impervious surfaces and storm water runoff.

Removal of vegetation and disturbance of soils associated with restoration of the Stuckey property; expansion of backcountry

hiking trails and marked trails and wayside exhibits in the Bill's Hill area; establishment of parking areas at designated trailheads could result in erosion of exposed soils and transport of sediments to adjacent water bodies. Impacts would likely be short term and minor with the implementation of proper erosion and sediment control and storm water management practices during construction and until disturbed soils were stabilized.

Restoration of citrus groves would result in long-term, minor, beneficial impacts because impervious surfaces would be decreased.

Establishment of a canoe/kayak landing and water trail would have long-term, negligible, adverse impacts from increased human use and possible siltation and pollution.

NPS/USFWS Joint Management Area. There would be no new impacts on water resources in this area from implementing alternative B.

Merritt Island National Wildlife Refuge. Short- and long-term, moderate adverse impacts would occur from possible construction of a new NPS administrative headquarters and maintenance facilities near the USFWS visitor center. Construction activities could result in increased impervious surfaces and storm water runoff. Removal of vegetation and disturbance of soils associated with the action could result in erosion of exposed soils and transport of sediments to adjacent water bodies in storm water runoff.

Cumulative Impacts. Cumulative impacts on water resources for alternative B were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative B. Adverse cumulative impacts would be short and long term and negligible to moderate. Long-term beneficial cumulative impacts would also be realized.

Alternative B would comprise a small portion of these overall cumulative impacts.

Conclusion. Implementation of alternative B could result in short- and long-term, negligible to moderate, adverse impacts on water resources. Beneficial impacts would also be realized through revegetation and by the restoration of property to its natural condition.

The actions proposed in alternative B, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, adverse, and long-term beneficial cumulative impacts on water resources. Alternative B would comprise a small portion of these overall cumulative impacts.

Impacts of Implementing Alternative C

Implementation of alternative C would result in short-term, negligible to moderate, adverse, and long-term, minor, adverse impacts on water resources. Beneficial impacts would also be realized by the restoration of property to its natural condition and through revegetation efforts.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no new impacts on water resources at Klondike Beach and no impacts at Titusville under this alternative.

Playalinda Beach Area. Long-term, minor, adverse impacts would be expected from construction of restrooms and a bike path because storm water runoff and impervious surfaces would increase.

Apollo Beach Area. Short- and long-term minor adverse impacts on water resources would be expected from redesigning parking area #1. Extension of water and sewer lines to all restroom facilities would provide

short-term, minor, adverse, and long-term, negligible impacts. Adverse impacts would be from temporary removal of vegetation and disturbance of soils, which could result in erosion of exposed soils and transport of sediments to adjacent water bodies in storm water runoff. Once regrowth of vegetation occurs, the amount of runoff would be expected to return to preconstruction levels.

Long-term beneficial impacts would result from planting foliage to screen facilities from visitor's views by reducing impervious surfaces and storm water runoff.

Long-term, minor, adverse impacts would occur from replacing the visitor information center with a larger structure, constructing an unpaved horse trailer parking area and primitive trail, and enlarging the parking area at Turtle Mound. Removal of vegetation and disturbance of soils associated with these actions could result in erosion of exposed soils and transport of sediments to adjacent water bodies in storm water runoff.

Long-term, minor, adverse impacts on lagoon waters would occur because recreational activities would contribute to an increase in turbidity and degradation of lagoon water quality resulting from potential leaks from watercraft. The commercial shuttle service could negatively affect water quality if the shuttle vessel was not properly maintained and pollutants such as oil or gasoline leaked from the vessel. Temporary increases in turbidity would also be expected from vessel operation in shallow waters. However, water quality would be monitored, and a slow-speed zone would minimize the potential for increased turbidity. Proper maintenance of the pontoon boat would be expected to minimize potential for oil and gas leakage.

Eldora Hammock Area. Extension of the Castle Windy Trail and construction of a small parking area would result in long-term, minor, adverse impacts on water resources by increasing impervious surfaces and storm

water runoff. In addition, extension of the trail and construction of the parking area would result in the removal of vegetation and disturbance of underlying soils. Soils exposed and disturbed during trail construction could be eroded and transported to adjacent water bodies during storms.

Expansion of the dock in the Eldora Hammock area would have short-term, minor, adverse impacts during construction because of increased turbidity; long-term impacts would be negligible.

There would be long-term, minor, adverse impacts on water resources from offering the Feller house and dock to commercial services due to increased use.

Northern Mosquito Lagoon. Impacts associated with increased turbidity or disturbance of bottom sediments resulting from watercraft use would be minimized with the establishment of a slow-speed zone for the area between the Eldora State House, Parking lot #7, and the first island to the west.

Oak Hill Area. Short- and long-term, minor, adverse impacts would be expected from implementing alternative C in the Oak Hill Area. Establishing a marsh trail would increase storm water runoff because of the hardened trail surfaces. Short-term degradation of water quality could result from conducting boat tours due to increased turbidity and the potential to introduce pollutants associated with vessel use.

Implementation of alternative C would have short-term, negligible, adverse impacts from centralizing administrative/visitor center, and maintenance functions at the headquarters/visitor center and maintenance facilities at the Stuckey property. Removal of vegetation and disturbance of soils associated with these actions could result in erosion of exposed soils and transport of sediments to adjacent water bodies in storm water runoff.

If construction of a parking area and new facilities occurs at Bill's Hill instead of the Stuckey area, short-term, moderate, and long-term, minor, adverse impacts would occur from increased impervious surfaces and storm water runoff.

Establishment of a canoe/kayak landing and water trail would have long-term, negligible, adverse impacts from increased human use and possible siltation and pollution.

NPS/USFWS Joint Management Area. There might be long-term negligible impacts from increasing turbidity and pollutants near the boat ramp from concession operations for boat rentals.

Merritt Island National Wildlife Refuge. There would be no new impacts on water resources at Wilson Corner from relocating maintenance functions to the Stuckey property or Bill's Hill area.

Cumulative Impacts. Cumulative impacts on water resources for alternative C were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative C. Short- and long-term, negligible to moderate, and adverse, and long-term beneficial cumulative impacts on water resources would be expected. Alternative C's contribution to these cumulative impacts would be slight.

Conclusion. Implementation of alternative C could result in short-term, negligible to moderate, adverse, and long-term, minor, adverse impacts. Beneficial impacts would also be realized by the restoration of property to its natural condition and through revegetation efforts.

The actions proposed in alternative C, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, adverse, and long-term beneficial

cumulative impacts. Alternative B would comprise a small portion of these overall cumulative impacts.

Impacts of Implementing Alternative D

Implementation of alternative D would result in short-term, negligible to minor, adverse, and long-term, negligible to moderate, adverse impacts on water resources. Beneficial impacts would also be realized by the restoration of property to its natural condition and through revegetation efforts.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no new impacts on water resources at Klondike Beach and no impacts at Titusville under this alternative.

Playalinda Beach Area. There would be long-term, negligible, adverse impacts on water resources from the construction of restroom facilities.

Apollo Beach Area. Alternative D would have long-term negligible impacts on water resources from increased recreational activities by increasing turbidity and potentially increasing shoreline erosion.

Short- and long-term minor adverse impacts on water resources would occur from establishing permanent restroom facilities by increasing impervious surfaces and storm water runoff potential.

Long-term, minor, adverse impacts would occur from constructing an unpaved horse trailer parking area and primitive trail. Removal of vegetation and disturbance of soils associated with these actions could result in erosion of exposed soils and transport of sediments to adjacent water bodies in storm water runoff.

Long-term beneficial impacts would result from planting foliage to screen facilities from visitor's views by reducing impervious surfaces and storm water runoff.

Eldora Hammock Area. Short- and long-term minor adverse impacts would be expected from construction of the trailer pads, because impervious surfaces and storm water runoff would be increased.

Northern Mosquito Lagoon. Impacts associated with increased turbidity or disturbance of bottom sediments resulting from watercraft use would be minimized with the establishment of a slow-speed zone for the area between the Eldora State House, Parking lot #7, and the first island to the west. Implementation of the pole/troll zone associated with alternative B would have a long-term beneficial impact on water resources by reducing the amount of sediment disturbance associated with watercraft use.

Oak Hill Area. Long-term, minor, adverse impacts would result from establishing a marsh trail at Seminole Rest and constructing a parking area and trail head at Seminole Rest by increasing impervious surfaces and storm water runoff and by reducing vegetation. Removal of vegetation and disturbance of soils associated with marsh trail construction; construction of a trailhead and parking area on the Stuckey property, if acquired; expansion of marked trails and wayside exhibits in the Bill's Hill area; establishment of parking areas at designated trailheads could result in erosion of exposed soils and transport of sediments to adjacent water bodies. Impacts would be expected to be short term and minor with the implementation of proper erosion and sediment control and storm water management practices.

Establishment of a canoe/kayak landing and water trail would have long-term, negligible, adverse impacts from increased human use and possible siltation and pollution.

Restoration of citrus groves to a natural state would result in long-term, minor, beneficial impacts because impervious surfaces would be decreased.

NPS/USFWS Joint Management Area.

There would be no new impacts on water resources in this area from implementing alternative D.

Merritt Island National Wildlife Refuge.

Short- and long-term, moderate, adverse impacts would occur from moving maintenance operations at Wilson's Corner to a new multiagency maintenance facility in the USFWS maintenance area adjacent to the visitor center. Construction activities would result in increased impervious surfaces and storm water runoff. Removal of vegetation and disturbance of soils associated with the action could result in erosion of exposed soils and transport of sediments to adjacent water bodies in storm water runoff.

Cumulative Impacts. Cumulative impacts on water resources for alternative D were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under water resources, alternative A) and the impacts of implementing alternative D. Cumulative impacts would be short and long term, negligible to moderate, and adverse, and long term and beneficial. Alternative D's contribution to these cumulative impacts is not expected to be large.

Conclusion. Implementation of alternative D could result in short-term, negligible to minor, adverse, and long-term, negligible to moderate, adverse impacts. Beneficial impacts would also be realized by the restoration of property to its natural condition and through revegetation efforts.

Impacts from the actions under alternative D, combined with the impacts from the other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate, adverse,

and long-term beneficial cumulative impacts on water resources. Alternative B would comprise a small portion of these overall cumulative impacts.

VEGETATION AND WILDLIFE

Because a discussion of potential impacts on wildlife necessarily involves discussion of wildlife habitat, which is primarily the vegetation communities within the national seashore, vegetation and wildlife are addressed together in this section.

Preliminary analysis of potential impacts on the vegetation and wildlife resources of the Canaveral National Seashore indicated that impacts could be associated with two primary activities—visitor use and further development of infrastructure.

NPS management policies dictate that, to the greatest extent possible, parks would inventory, monitor, and manage state- and locally listed species. In addition, the parks are to inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and manage them to maintain their natural distribution and abundance. The National Park Service considers how to protect and perpetuate federally, state-, or locally listed species during national seashore management, planning, and consultation with lead Federal and state agencies, as appropriate.

Methodology

The analysis of environmental consequences to vegetation and wildlife includes a discussion of the intensity, duration, and type of impact. *Intensity* of impact describes the degree, level, or strength of an impact as negligible, minor, moderate, or major. *Duration* of impact considers whether the impact would occur over the short term or long term. Unless otherwise noted, *short-term* impacts are those that, within a short

period of time—generally less than 5 years—would no longer be detectable as the resource or value returns to its pre-disturbance condition or appearance. *Long-term* impacts refer to a change in a resource or value that is expected to persist for 5 or more years. The *type* of impact refers to whether the impact on the resource or value would be *beneficial* (positive) or *adverse* (negative).

The thresholds to determine impacts on vegetation and wildlife are defined as follows:

Negligible: Impacts are barely detectable and would affect a minimal area of vegetation. Impacts on the plant and wildlife communities are not detectable.

Minor: Impacts are slight, but detectable, and would affect a small area of vegetation or few members of the wildlife community. The severity and timing of changes are not expected to be outside natural variability spatially or temporally. Key ecosystem processes and community structure are retained at the local level.

Moderate: Impacts are readily apparent and would affect a large area of vegetation and a large portion of the wildlife community. The severity and timing of changes are expected to be outside natural variability spatially and temporally; however, key ecosystem processes and community structure are retained at the landscape (regional) level.

Major: Impacts are severely adverse or exceptionally beneficial and would affect a substantial area of vegetation and the majority of the inhabiting wildlife community. The severity and timing of changes are expected to be outside natural variability both spatially and temporally. Key ecosystem processes and community structure might be disrupted. Habitat for wildlife species might be rendered nonfunctional at the landscape level.

Visitor use can impact vegetation and wildlife through a number of mechanisms. Obvious and direct impacts include *trampling* of vegetation when hiking off the trail or camping in nondesignated areas (i.e., dispersed camping, which is allowed by backcountry permit only). A single *trampling* event might impact one or more individuals of a species. *Repeated* trampling of the vegetation along a path or in a campsite, as well as removal of down and dead wood for campfires, can lead to changes in the vegetation at the population level, which results in *habitat alteration*. *Habitat alteration* can, in turn, further impact remaining populations by making the habitat less suitable for the species. Introduction or spread of invasive species can also result from visitor activities. Establishment of invasive species often results in change in both the plant and wildlife composition of the infested area. Visitors often unwittingly introduce or spread propagules (e.g., seeds or larvae) of invasive species during recreational activities.

Although the potential to disturb wildlife when hiking off the trail is apparent to most, even when hiking or bicycling on established trails or roads, visitors can disturb wildlife with loud or unusual noises, or even just the sight or scent of visitors. Disturbance of wildlife due to noises, sights, or scents associated with visitor use is referred to as sensory-based disturbance and applies primarily to the individual response level but can lead to population-level response if the disturbance is intense or prolonged. An example would be individual abandonment of a nest in response to a disturbance. If such a disturbance were to occur over a large area, or for a long period of time, individual nest abandonment could translate to population-level impacts. The impacts could be directly (i.e., nest abandonment) or indirectly (i.e., genetic bottlenecks) related to population declines. The “bottleneck effect” occurs when population numbers are insufficient to generate enough genetic

variability to sustain future generations of viable offspring.

Development of infrastructure can also impact vegetation and wildlife. The most obvious impact is the direct removal or loss of vegetation that serves as wildlife habitat (i.e., habitat loss). As an example, consider the development of a new road through an area of relatively native forest. The swath of vegetation removed to construct the road would represent habitat loss. That would not, however, be the only impact on the wildlife habitat. Opening the forest canopy where the road is constructed now creates an edge effect, with greater insolation of the forest edge and consequent changes in plant species composition. In some cases, this can cascade into changes in wildlife species utilization. Further, new use of this road would increase sensory-based disturbance to wildlife along the new road corridor. Obviously, the larger the corridor required for the road, the greater these impacts can be. Therefore, a trail would have far less impact than a road. The placement of a road or trail within the area of forest is also important. Roads or trails established through the middle of a habitat tend to fragment the habitat, making it less usable for some wildlife species. Alternatively, placing the road or trail close to another road or a natural habitat boundary (e.g., the shoreline) could lessen this impact. The more indirect impacts of infrastructure development described above are referred to as habitat degradation. Habitat loss and habitat degradation can impact a species at the individual or population level depending upon their extent.

To reduce repetitiveness, the discussions presented later in this chapter of impacts on vegetation and wildlife anticipated for each alternative would only briefly allude to the impacts detailed in the above paragraphs. Key words such as *trampling*, *habitat alteration*, *invasive species*, *sensory-based disturbance*, *habitat loss*, and *habitat degradation* refer the reader back to the

cause and effect descriptions provided above.

Available information describing vegetation communities and distribution, and the wildlife species that inhabit them, including published scientific papers, NPS, and USGS research reports, planning documents, state programs, national databases, and mapping efforts, and consultation with NPS specialists, was gathered, reviewed, and summarized. Impacts on vegetation and wildlife were evaluated by comparing projected changes resulting from the action alternatives (B, C, D) to the no-action alternative (A). The impacts of potential visitation increases have been factored into the analysis.

Federal Threatened and Endangered Species. NPS staff evaluated impacts on federally listed threatened and endangered species and provided an Endangered Species Act determination as defined in 50 CFR Section 402 and the Endangered Species Consultation Handbook (1998) for each alternative. Based on this analysis, anticipated impacts on the federally listed species that have the potential to occur within the national seashore are discussed in this chapter.

The impacts associated with visitor use and infrastructure development described above for vegetation and wildlife would also apply to federally listed species at Canaveral. Therefore, the reader is encouraged to refer to the above descriptions of activities leading to trampling, habitat alteration, sensory-based disturbance, habitat loss, and habitat degradation. These key words will be used in the alternative-specific impact analyses to remind the reader of, or refer the reader back to, the cause and effect descriptions of the nature of impacts and species responses to those impacts provided above.

Impacts on the addressed federally listed or candidate species were evaluated by comparing projected changes resulting from the

action alternative to existing conditions. These evaluations were based on documented occurrences of the species within the national seashore, the distribution of their preferred habitats within the national seashore, and the distribution of designated critical habitat. The impacts of potential visitation increases have been factored into the analysis.

Florida State-Listed Species. Plant and animal species listed by Florida as threatened, endangered, or species of concern that have the potential to occur within the national seashore were analyzed relative to the anticipated impacts of, and differences of those impacts among, the four alternatives.

Impacts associated with visitor use and infrastructure development described above for vegetation and wildlife would also apply to state-listed species. Therefore, the reader is encouraged to refer to the above descriptions of activities leading to trampling, habitat alteration, sensory-based disturbances, habitat loss, and habitat degradation.

Impacts of Implementing Alternative A (The No-Action Alternative)

Under alternative A, the no-action alternative, Canaveral National Seashore would continue under current management to preserve and enhance the natural and historic landscape features of the Florida's natural coastal barrier island system, with few modern facilities. Alternative A would have short- and long-term, negligible to minor adverse impacts, and short- and long-term, negligible to moderate beneficial impacts on vegetation and wildlife.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no impacts on

vegetation and wildlife at Titusville under this alternative.

Playalinda Beach Area. Implementation of alternative A would result in long-term minor adverse impacts on vegetation and wildlife due to maintenance of the access road, parking areas, and chemical toilets. Impacts on the vegetation and wildlife at the Playalinda Beach entrance station administrative complex and Playalinda Beach lifeguard operations area would also remain long term, minor, and adverse due to continued maintenance. By restricting public access in and around NASA tracking facilities, impacts on vegetation and wildlife would remain long-term negligible in these areas.

Klondike Beach Area. Impacts on vegetation and wildlife habitat would remain long term and negligible due to limited visitor access and dune restoration activities. Implementation of alternative A would continue to have long-term, negligible, adverse impacts on wildlife due to some interaction between humans and wildlife during current recreational opportunities. Boardwalk crossovers would continue to minimize long-term impact on wildlife habitat, including that of several federally listed species. The beach would continue to be closed at night, eliminating human disturbance of nesting turtles. Monitoring and protection would continue for terrestrial species of concern.

Apollo Beach Area. Implementation of alternative A would continue to have long-term negligible adverse impacts on vegetation from boardwalk crossovers and would minimize long-term loss of plant habitat in surrounding areas. Long-term minor adverse impacts on wildlife would occur due to some interaction between humans and wildlife during current recreational opportunities. Monitoring and protection would continue for special status species, which could reduce impacts on these species.

Continued use of the access road and five beach parking areas, the exterior shower facility at beach parking area #1, and chemical toilet facilities would have long-term, negligible adverse impacts on vegetation and wildlife due to continued visitor use. Impacts would remain long-term, minor, and adverse due to continued horseback riding and general maintenance on unpaved parking areas.

Under the no-action alternative, impacts on vegetation and wildlife at Turtle Mound would remain long-term, negligible, and adverse due to continued maintenance and protection of the mound from the public. Maintenance of the boardwalk trail and protection of the mound would result in long-term beneficial impacts as vegetation would be protected from trampling.

North District maintenance operations would continue to have long-term, negligible to minor adverse impacts due to continued maintenance and equipment repair shop activities.

Eldora Hammock Area. Continued visitor use of the Eldora Hammock area and the interpretive trails would result in short- and long-term, negligible to minor, adverse impacts on vegetation due to continued visitor use and trail maintenance, and short- and long-term minor adverse impacts on wildlife due to sensory-based disturbances at these locations.

The southern portion of the Eldora Hammock (Schultz house to the Gomez Grant Line) would continue to be protected and preserved. Impacts on vegetation would remain long term and negligible due to some traffic from shoreline boat access.

Northern Mosquito Lagoon. Public access to the launch ramp would remain available 24 hours per day. It is expected that long-term minor adverse impacts on vegetation and wildlife would continue due to

continued maintenance and unsupervised use after NPS public operating hours.

Impacts on wildlife from continued use of the paved boat access ramp, gravel parking area, and the canoe and kayak landing area would remain long term, minor, and adverse due to continued maintenance and visitor use of the gravel parking area and boat ramp into Mosquito Lagoon. Motorized boat traffic also could harm aquatic wildlife, such as manatee, and submerged vegetation due to contact by propellers. These impacts would be short and long term, negligible to moderate, and adverse.

The continued use of lagoon waters for water-based recreational opportunities would result in long-term, minor, adverse impacts on wildlife and vegetation from camping activities, shoreline access to boaters, unmonitored commercial harvesting, and maintenance, which could cause habitat destruction and alteration.

Oak Hill Area. Management of Seminole Rest would continue to have long-term, negligible to minor adverse impacts on vegetation and long-term negligible impacts on wildlife from maintenance and operational activities.

The Bill's Hill Area currently has very limited staff monitoring and no services at the site. The area would remain undeveloped in character. Impacts on vegetation and wildlife would remain long term, minor to moderate, and adverse due to continued unsupervised visitor access and maintenance of the site.

NPS/USFWS Joint Management Area. Adverse impacts on vegetation and wildlife would remain long-term, negligible to minor because of the continuation of current recreational activities, including boating, waterfowl hunting, and fishing.

Continued visitor use of the boat access areas, parking areas, and the pavilion would

result in long-term, minor, and adverse impacts on wildlife in the area due to sensory-based disturbances in these areas. A nonmotorized launch area for canoes, which is proposed along the south end of Bio Lab Road by the U.S. Fish and Wildlife Service, would cause some short-term moderate adverse impacts during construction, but only negligible impacts afterwards due to increased human interaction with wildlife within the area.

Impacts from the use of boat access areas and the Eddy Creek boat launch area would remain long-term, minor and adverse due to continuation of current activities.

The addition of new pole/troll areas by the U.S. Fish and Wildlife Service would have long-term beneficial impacts on aquatic vegetation and wildlife by protecting sensitive seagrass beds, which provide food and shelter to manatees, sea turtles, and many fish species.

Adverse impacts on vegetation and wildlife in the central/southern Mosquito Lagoon areas would remain long-term and minor to moderate due to continuation of boating, fishing, and waterfowl hunting activities. Addition of new pole/troll areas by USFWS would have long-term beneficial impacts on aquatic vegetation and wildlife by protecting sensitive seagrass beds.

Continued visitor use and national seashore maintenance at the Manatee viewing area and the Scrub Ridge interpretive trail would have long-term, negligible to minor, adverse impacts on wildlife habitats and vegetation due to visitor use and interaction, but beneficial impacts could accrue by the increase in positive environmental education.

Merritt Island National Wildlife Refuge. The implementation of alternative A does not entail changes of any maintenance activities and thus impacts on wildlife and vegetation would remain long term and

negligible due to continuation of current maintenance and operational activities.

Cumulative Impacts. Cumulative impacts were determined by combining the impacts of the alternatives proposed in this document with the impacts of other past, present, and reasonably foreseeable future actions. To do this, it was necessary to identify other such projects or actions at Canaveral National Seashore and in the surrounding areas (Merritt Island National Wildlife Refuge and NASA).

Past, present, and anticipated future projects near Canaveral National Seashore that would contribute to impacts on vegetation and wildlife include the following:

1. U.S. Army Corps of Engineers periodic dredging activities along the Intracoastal Waterway (ongoing)
2. U.S. Army Corps of Engineers beach nourishment along New Smyrna Beach (ongoing)
3. space shuttle launches from the NASA space shuttle landing facility will likely end in 2011; however, rockets and satellites would continue to be launched from Kennedy Space Center. No new construction is expected for rocket and satellite launches at this time
4. potential development and operation of a commercial vertical launch complex at Canaveral Air Force Station
5. construction of launch infrastructure at nearby Cape Canaveral Spaceport as part of U.S. Commercial Space Transportation Developments (report completed in January 2007; construction has not begun)
6. development of the International Space Research Park (ISRP) on the Kennedy Space Center
(*Environmental Impact Statement*)

- completed in 2004; construction has not begun)
7. deployment and operation of evolved expendable launch vehicle systems at Cape Canaveral Air Station (*Environmental Impact Statement* completed in April 1998)
 8. continued preparations for and implementation of the Mars Science Laboratory mission at Cape Canaveral Air Station
 9. mosquito control activities by St. John's River Water Management District, Brevard County, and Volusia County (ongoing)

Refer to the "Cumulative Impacts" discussion at the beginning of this chapter for more information on all the cumulative actions impacting Canaveral National Seashore.

The ongoing projects of U.S. Army Corps of Engineers periodic dredging would likely have short-term, negligible to moderate adverse impacts on the vegetation and wildlife because of habitat loss and individual death. Beach nourishment activities would have long-term adverse impacts on vegetation and wildlife by means of habitat and plant loss, and increased nutrients (e.g., invasive species outcompeting native species).

Approximately 70% of the national seashore's acreage is under the jurisdiction of the National Aeronautics and Space Administration. Space shuttle, satellite, and other space exploration vertical launch activities are scheduled throughout the year, though shuttle launches will end in 2010. NASA and KSC actions would have long- and short-term, negligible to moderate adverse impacts on vegetation and wildlife at Canaveral National Seashore. Projects that involve launches of space vehicles and other activities at the Kennedy Space Center, including projects 3 through 8, would likely have adverse impacts on wildlife and

vegetation by means of noise and water pollution. During a launch, wildlife in the vicinity of launch site would be temporarily disturbed due to noise, generally amounting to a startle effect. Launches would temporarily increase acidity (i.e., ocean splash-down of jettisoned launch components,) in nearby shallow surface waters and could damage or kill biota within the immediate vicinity of the launch pad (NASA 2006, 2008a).

Mosquito control activities would result in short-term minor adverse impacts on vegetation and wildlife. Mosquito control would involve applying approved larvicides on select marsh sites among the lagoon islands, so long-term cumulative impacts (e.g., toxicity), would not be expected.

The impacts of other actions described above, in combination with the impacts of alternative A, would likely result in short- and long-term, negligible to moderate adverse, and long-term beneficial cumulative impacts. Alternative A is expected to contribute a small component to these impacts.

Conclusion. Alternative A would have short- and long-term, negligible to minor adverse impacts, and short- and long-term, negligible to moderate beneficial impacts.

The actions proposed in alternative A, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate adverse, and long-term beneficial cumulative impacts.

Impacts of Implementing Alternative B (The NPS Preferred Alternative)

Under alternative B, the preferred alternative, Canaveral National Seashore would be managed to preserve and enhance the natural and historic landscape features of the Florida's natural coastal barrier island

system, with little modern facilities. Alternative B would have short- and long-term, negligible to moderate adverse impacts and short- and long-term, negligible to moderate beneficial impacts on vegetation and wildlife.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no new impacts on vegetation and wildlife in the Klondike Beach area and no impacts at Titusville under this alternative.

Playalinda Beach Area. The development of the bicycle path would have short-term minor adverse impacts on vegetation and wildlife due to vegetation clearing and sensory-based disturbances during construction activities. Replacing the high-maintenance chemical toilet facilities with a more efficient and sustainable system would decrease impacts due to diminished chances of chemical spills, thus providing long-term beneficial impacts on vegetation and wildlife. The construction of new restrooms would use a previously disturbed area, and impacts on existing vegetation and wildlife habitat would be short term, minor, and adverse due to trampling and habitat destruction.

Relocation of the administrative boardwalk dune crossover to accommodate ATV emergency access would result in short-term, minor, adverse impacts during installation, but long-term negligible impacts because the boardwalk would reduce trampling of vegetation and wildlife habitats.

Apollo Beach Area. The burying of power and telephone lines would have short-term minor adverse impacts on vegetation and wildlife due to some habitat destruction during construction. After construction some long-term, minor adverse impacts on vegetation could continue due to maintenance and upkeep of facilities. The replace-

ment of high-maintenance chemical toilet facilities with more efficient and sustainable system would have short-term minor adverse impacts on vegetation and wildlife during construction and long-term, minor beneficial impacts by reducing the risk of chemical spills.

The establishment of a bike path along seashore road would entail some permanent destruction of vegetation; however, adequate buffer area next to the road would provide most if not all of the space necessary for the bike path. Loss of vegetation (native grasses and possibly some palmetto) would be limited with minor loss or no loss to wildlife habitat.

Relocation of the fee booth and entrance gate towards the north boundary would have negligible impacts on vegetation and wildlife since these activities would not involve addition of new roads or parking areas.

Implementation of alternative B would result in short- and long-term minor adverse impacts on vegetation from replacement of the visitor information center, provided the new structure uses the same site. Construction activities could cause short-term, minor adverse effects on vegetation and short-term, negligible to minor, adverse impacts on wildlife due to habitat loss. Some minor beneficial impacts to vegetation and wildlife would be realized in the long-term from adding vegetation screening around the new facilities.

Eldora Hammock Area. Under alternative B, short- and long-term minor adverse impacts on vegetation and wildlife would be expected from the burial of overhead power and telephone lines due to some habitat destruction during construction. After construction, long-term minor adverse impacts on vegetation (e.g., trampling) could continue due to maintenance and upkeep of facilities.

Some habitat alteration would be expected with extending the Castle Windy Trail, but long-term adverse effects would be minor and impacts would be concentrated only along the trail.

The expansion of historic preservation and interpretation activities in the Eldora historic area would not affect vegetation and wildlife, because these activities would be confined to the Eldora State House building.

Northern Mosquito Lagoon. Under alternative B, phasing out 24-hour public access and transitioning to controlled entry would eventually reduce adverse impacts on vegetation and wildlife from long-term and minor to long term and negligible by diminishing trampling and sensory-based disturbances.

The entrance area (gate/fee booth) would be relocated north to the national seashore boundary to control public access to the launch area. Moving the entrance would have short-term minor adverse impacts on wildlife populations due to loss of habitat. However, the long-term adverse impacts on vegetation and wildlife are expected to decrease since the proposed controlled access to the boat ramp and relocation of the gate to the national seashore boundary would reduce unsupervised use.

The establishment of a nonmotorized or pole/troll zone to protect resources in the Shipyard Island area of the lagoon would have long-term beneficial impacts on aquatic vegetation and wildlife by protecting sensitive seagrass beds, which provide food and shelter to manatees, sea turtles, and many fish species. In addition, a slow-speed zone would be established for boats between the Eldora State House, parking area #7, and the first island to the west. This would help to protect the shoreline, decrease turbidity, and reduce adverse impacts on shore vegetation and wildlife habitats from long-term minor to long-term negligible.

Oak Hill Area. Management of Seminole Rest would continue to focus on protection and preservation of the archeological resources and the rehabilitated historic main house and caretaker's house. The impacts of alternative B would be the same as those described under alternative A.

The Stuckey property of approximately 10 acres would be purchased and restored to natural conditions, resulting in a net beneficial effect on wildlife and vegetation. Restoration of sites such as abandoned citrus groves to pre-disturbed conditions would have short-term minor adverse impacts on wildlife and vegetation due to habitat disturbance, but long-term beneficial impacts once restoration is complete.

Increased opportunities for dispersed backcountry hiking at the Bill's Hill area would cause some long-term negligible to minor adverse impacts on wildlife habitats through human disturbance. Although expanded interpretive opportunities via marked trails and wayside exhibits would be developed, this disturbance would be minor. Vegetation impacts would be concentrated along trails and there would be only a short-term moderate adverse impact during trail construction. Otherwise impacts would be long-term negligible to minor as a result of centralized anthropogenic activities.

Creating a canoe/kayak landing and water trail connection with the proposed USFWS canoe/kayak trail and developing additional routes through the mangrove islands would produce short-term, minor to moderate adverse impacts on vegetation and wildlife during the establishment of the trail system through sensitive environments (e.g., from cutting of limbs, removal of deadfalls). However, once trail systems are established, long-term adverse impacts would be negligible to minor due to human presence within wildlife habitats.

NPS/USFWS Joint Management Area. As in alternative A, addition of new pole/troll

areas by the U.S. Fish and Wildlife Service would have long-term beneficial impacts on aquatic vegetation and wildlife by protecting sensitive seagrass beds, which provide food and shelter to manatees, sea turtles, and many fish species.

As in alternative A, impacts from the use of boat access areas and the Eddy Creek boat launch area would remain long-term, minor and adverse due to continuation of current activities.

The management of lands north of Haulover Canal would continue to support USFWS lead management direction and recreational activities for this area. The removal of feral hogs and maintenance of a healthy deer population north of Haulover Canal would have long-term beneficial impacts on vegetation and wildlife by reducing habitat destruction for other species.

The impacts of alternative B would be the same as those described under alternative A for the manatee viewing area, the Scrub Ridge and Pine Flatwoods interpretive trails, and lands south of Haulover Canal.

Merritt Island National Wildlife Refuge. Construction of a possible new multiagency facility near the USFWS visitor center could have short- and long-term, negligible to minor adverse impacts on vegetation and wildlife due to disturbances from construction and on-going maintenance activities. Impacts from the relocation of the NPS South District maintenance base of operations at Wilson Corner into a new multiagency facility in the USFWS maintenance area would be short-term, negligible to minor due to sensory-based disturbances.

Cumulative Impacts. Cumulative impacts on vegetation and wildlife for alternative B were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative B. The adverse cumulative

impacts would be short- and long-term, negligible to moderate. Long-term beneficial cumulative impacts would also be realized. Alternative B is expected to contribute a relatively small component to these cumulative impacts.

Conclusion. Alternative B would have short- and long-term, negligible to moderate adverse impacts, and short- and long-term beneficial impacts.

The actions proposed in alternative B, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate adverse and long-term beneficial cumulative impacts.

Impacts of Implementing Alternative C

Under alternative C, Canaveral National Seashore would be managed as a place where visitors would explore and experience a wide range of opportunities designed to provide an in-depth understanding of the natural and cultural history of eastern coastal Florida. When visitors enter the national seashore, they would be presented with a menu of choices for alternative modes of access to land- and water-based natural and cultural features, recreational opportunities, and educational pursuits. Alternative C would have short- and long-term, negligible to moderate adverse, and long-term beneficial impacts on vegetation and wildlife.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no new impacts on vegetation and wildlife in the Klondike Beach area and no impacts at Titusville under this alternative.

Playalinda Beach Area. The development of the bicycle path would have short-term,

minor, adverse impacts on vegetation and wildlife due to trampling and habitat alteration during construction activities. Replacing the high-maintenance chemical toilet facilities with a more efficient and sustainable system would have long-term beneficial impacts due to diminished chances of chemical spills. The construction of new restrooms would use a previously disturbed area, and impacts on existing vegetation and wildlife habitat would be short-term, minor, and adverse.

Relocating lifeguard operations closer to the beach and conversion of existing structures to a small satellite maintenance staging area would result in long-term negligible adverse impacts on existing vegetation and wildlife due to some habitat alteration, trampling, and sensory-based disturbances.

Apollo Beach Area. Short-term minor adverse impacts on vegetation and wildlife habitat would be expected from reconfiguring and expanding the parking area, establishing permanent restroom facilities, and providing unpaved parking for horse trailers, resulting in some habitat destruction during construction. After construction, long-term minor adverse impacts on vegetation would continue due to maintenance and upkeep of facilities.

The establishment of a bike path along the seashore road would entail some permanent destruction of vegetation; however, adequate buffer area next to the road would provide most, if not all, of the space necessary for the bike path. Loss of vegetation (native grasses and possibly some palmetto) would be minor with no loss to wildlife habitat.

Expansion of the parking area and construction of shade structures at Turtle Mound would involve some permanent habitat destruction during construction; short-term, minor to moderate adverse impacts on wildlife would be expected. After construction some long-term minor adverse impacts

on wildlife could continue due to maintenance and upkeep and increased public use. Expanded environmental education opportunities would potentially decrease adverse impacts on wildlife through increased public environmental awareness.

North District maintenance operations would, with the exception of a small satellite maintenance staging area, be relocated from Apollo Beach and consolidated in a centralized maintenance facility at Bill's Hill area or the Stuckey Property, if acquired. Reduction or elimination of the Apollo Beach maintenance facility would provide on-site benefit to wildlife and vegetation.

Eldora Hammock Area. In the Eldora historic area, improvements to the existing interpretive trails, the addition of interconnecting foot trails, and the extension of sewer and water service would result in short-term minor adverse impacts on wildlife and vegetation during construction and long-term negligible adverse impacts after construction is completed due to habitat alteration, trampling, and sensory-based disturbances. The expansion of historic preservation and interpretation activities in the Eldora historic area would not affect vegetation and wildlife because these activities would be confined to the Eldora State House building.

Construction of a small parking area at the Castle Windy interpretive trail and extension of the trail along the shoreline of the lagoon would involve some habitat destruction, but long-term adverse effects would be minor and impacts would be concentrated only along the trail. Connecting lands south of Eldora Hammock with the Joint Management Area allowing limited access via designated foot trails would have negligible to minor impacts due to reduced vegetation trampling.

The expansion and repair of the Marine Science Educational Station and the former Hebner property would result in short- and

long-term minor adverse impacts on vegetation and wildlife during and after construction. The effects produced include habitat loss, trampling, and sensory-based disturbances from construction, maintenance, and continued visitor use.

Long-term, negligible, adverse impacts on vegetation and wildlife would occur at the former Feller and Schultz properties because of ongoing activities and the possible addition of new visitor services in these areas.

Northern Mosquito Lagoon. The NPS staff would continue to maintain 24-hour public access to the boat launch ramp resulting in long-term minor adverse impacts on vegetation and wildlife due to continued maintenance and unsupervised use after NPS public operating hours. Impacts to vegetation and wildlife from implementation of alternative C would be the same as those described under alternative A.

The paved, boat access ramp and kayak launching area across from Apollo Beach parking area #5, the undelineated gravel parking area, and the canoe and kayak landing area accessing Mosquito Lagoon from the Eldora Hammock area would continue to be maintained. In addition, the parking area would be paved and slightly enlarged, which would cause short-term, negligible to minor adverse impacts to vegetation and wildlife from minimal habitat loss. Impacts on vegetation and wildlife would remain long-term, minor, and adverse due to continued maintenance and visitor use of the parking area and boat ramp. Motorized boat traffic could harm aquatic wildlife (e.g., manatee).

Under alternative C, impacts on wildlife and vegetation in lagoon waters would remain long-term, minor adverse due to camping activities, shoreline access by boaters, unmonitored commercial harvesting, and maintenance.

Establishment of a slow-speed zone would reduce adverse impacts on vegetation and wildlife by reducing noise disturbances for terrestrial wildlife and improving shoreline habitat. Also, slower propeller speeds would reduce turbidity and improve aquatic wildlife habitat.

Oak Hill Area. Management of Seminole Rest would continue to focus on protection and preservation of the archeological resources and the rehabilitated historic main house and caretaker's house.

Interpretive and educational programs would be expanded and key features would be rehabilitated to reflect historic conditions associated with their period of significance. This would impact some existing vegetation, but no long-term impacts are expected. A marsh trail would be added to the site, and educational programs would be initiated. There would be some moderate habitat destruction during the construction of the trail, but once complete the impacts on wildlife would be long-term, minor, and adverse due to increased human-wildlife interaction.

The concrete parking area and gravel overflow area accommodating 10 vehicles might be expanded. If so, there would be moderate short-term impacts on vegetation and wildlife, and negligible to minor, long-term impacts on wildlife.

The Stuckey Property of approximately 10 acres would be purchased and a centralized visitor center, administrative headquarters, and maintenance facility would be constructed on this site. The construction of the new facility could entail some destruction of vegetation and wildlife habitats in areas of the property that remain undisturbed, resulting in short-term, minor to moderate adverse impacts and long-term, moderate adverse impacts, depending on the number and type of recreational functions added in future years.

If funding is not available to purchase the Stuckey Property, construction of the new facilities would proceed at another previously disturbed location in the Bill's Hill area. The construction of the new facility at Bill's Hill would have similar short- and long-term impacts depending on the amount of disturbed and undisturbed land.

For the Bill's Hill area that would not be used for a new facility, increased opportunities for dispersed backcountry hiking and equestrian use would cause long-term, negligible to minor adverse impacts on wildlife habitat due to human disturbance and sensory-based disruption of wildlife behaviors. Although expanded interpretive opportunities would be developed with the addition of trail markers and wayside exhibits, the short- and long-term impacts would be negligible to minor.

The addition of a canoe/kayak landing and water trail connection along the west side of the Intracoastal Waterway along with creation of routes through sensitive mangrove areas would produce short-term minor adverse impacts during the establishment of these systems and long-term, negligible to minor adverse impacts due to human presence within wildlife habitats.

NPS/USFWS Joint Management Area. Under alternative C, the potential addition of new pole/troll areas by the U.S. Fish and Wildlife Service in the central/southern Mosquito Lagoon areas would have long-term beneficial impacts on aquatic vegetation and wildlife by protecting sensitive seagrass beds, which provide food and shelter to manatees, sea turtles, and many fish species.

If concession facilities are established at the Eddy Creek boat launch ramp for rental of canoes and kayaks, increased use of the shoreline in that area would result in short- and long-term minor impacts on terrestrial and aquatic vegetation.

Merritt Island National Wildlife Refuge. The NPS South District maintenance base of operations at Wilson Corner would be relocated and consolidated into a new multiagency facility at the Stuckey property, if acquired, or in the Bill's Hill area. This would have long-term beneficial impacts on vegetation and wildlife at Wilson Corner due to reduced human traffic.

Cumulative Impacts. Cumulative impacts on vegetation and wildlife for alternative C were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative C. The adverse cumulative impacts would be short- and long-term, negligible to moderate. Long-term beneficial cumulative impacts would also be realized. Alternative C's contribution to cumulative impacts would not likely be large.

Conclusion. The actions proposed in alternative C would have short- and long-term, negligible to moderate adverse impacts, and long-term beneficial impacts on vegetation and wildlife.

The actions proposed in alternative C, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate adverse and long-term beneficial cumulative impacts on vegetation and wildlife.

Impacts of Implementing Alternative D

Under alternative D, Canaveral National Seashore management would focus on enhancing the existing investment in lands, resources, and facilities. The national seashore would be managed to promote outdoor recreational and interpretive educational opportunities that are consistent with preservation of the natural and cultural resources. A limited level of facility development would improve efficiencies in

NPS administration and operations and enhance visitor amenities. Coordination with land-managing partners would be increased to provide additional educational opportunities and programs for visitors and enhanced monitoring of the Mosquito Lagoon resources. Alternative D would have short- and long-term, negligible to moderate adverse and short- and long-term beneficial impacts on vegetation and wildlife.

The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no new impacts on vegetation and wildlife in the Klondike Beach area and no impacts at Titusville under this alternative.

Playalinda Beach Area. Operations at Playalinda Beach, the entrance station, and areas of restricted public use due to NASA activities would remain unchanged from previous management practices. Impacts for alternative D would be the same as those described under alternative A in these areas. Replacing the high-maintenance chemical toilet facilities with a more efficient and sustainable system would decrease impacts due to diminished chances for chemical spills, thus providing long-term beneficial impacts to vegetation and wildlife.

The possible removal of the existing structures at the lifeguard operations area would cause short- and long-term, negligible to minor, adverse impacts on existing vegetation and wildlife habitat due to habitat alteration and degradation. Relocating the boardwalk dune crossover for emergency access for ATV vehicles would result in short-term minor adverse impacts during installation, but long-term negligible impacts because the boardwalk would reduce trampling of vegetation and wildlife habitats.

Apollo Beach Area. Impacts for alternative D would be remain the same as those described under alternative A for operations

at Apollo Beach, the entrance station, Turtle Mound, and the beach operations area.

Access to Apollo Beach would be modified to accommodate horse trailers by constructing an unpaved parking area and trail connection resulting in some habitat destruction during construction. After construction, long-term minor adverse impacts on vegetation would continue due to maintenance and upkeep of facilities. Provision for convenient visitor access to beach areas via designated dune crossovers would continue.

Short-term minor adverse impacts on vegetation and wildlife habitat would be expected during construction of permanent restroom facilities causing some habitat destruction and sensory-based disturbances. After construction, some long-term, negligible to minor adverse impacts on vegetation (e.g., trampling) would be expected due to maintenance and upkeep of facilities.

Eldora Hammock Area. Access to the Eldora Hammock area, operations at the Eldora Hammock and Castle Windy interpretive trails, the former Schultz property, and lands south of Eldora Hammock would remain unchanged from previous management practices. Impacts for alternative D would be the same as those described under alternative A for these areas.

In the Eldora historic area, the possible extension of sewer and water service would result in short-term minor adverse impacts on wildlife and vegetation during construction and long-term negligible adverse impacts after construction due to habitat alteration, trampling, and sensory-based disturbances. The expansion of historic preservation and interpretation activities in the Eldora historic area would not affect vegetation and wildlife, as these activities would be confined to the Eldora State House building.

The construction of additional trailer pads at the former Hebner Property and the exten-

sion of utility lines would cause short-term moderate adverse impacts on vegetation during construction due to habitat alteration and trampling and long-term negligible adverse impacts after construction from maintenance activities and use by NPS personnel and visitors.

Northern Mosquito Lagoon. Under alternative D, phasing out 24-hour public access and transitioning to controlled entry would eventually reduce adverse impacts on vegetation and wildlife from long-term minor to long-term negligible by diminishing trampling and sensory-based disturbances. Controlled entry would benefit wildlife and vegetation by reducing unmonitored public use of the area.

Relocation of the entrance area (gate/fee booth) north to the national seashore boundary would have short-term minor adverse impacts on wildlife populations due to loss of habitat. However, the long-term adverse impacts on vegetation and wildlife are expected to decrease since the proposed controlled access to the boat ramp and relocation of the gate to the national seashore boundary would reduce unsupervised use.

The establishment of a nonmotorized or pole/troll zone to protect resources in the lagoon would have long-term beneficial impacts on aquatic vegetation and wildlife by protecting sensitive seagrass beds, which provide food and shelter to manatees, sea turtles, and many fish species.

In addition, a slow-speed zone would be established for boats between the Eldora State House, parking area #7, and the first island to the west. This would help to protect the shoreline, decrease turbidity, and reduce adverse impacts on shore vegetation and wildlife habitats from long-term minor to long-term negligible.

Oak Hill Area. Management of Seminole Rest would continue to focus on protection

and preservation of the archeological resources and the rehabilitated historic main house and caretaker's house.

A marsh trail would be added to the site and educational programs would be initiated. There would be short-term minor to moderate impacts on vegetation and wildlife due to habitat destruction during the construction of the trail, but once completed impacts would be long-term minor adverse due to habitat alteration and sensory-based disruption of wildlife behaviors.

Under alternative D, the Stuckey property would be purchased, and a trailhead and parking area would be constructed, resulting in short-term minor to moderate adverse impacts on vegetation and wildlife due to habitat destruction and sensory-based disturbance. Long-term adverse impacts would be negligible to minor due to visitor use and NPS maintenance activities.

Increased opportunities for dispersed backcountry hiking and horseback riding at the Bill's Hill area would cause some long-term negligible to minor adverse impacts on wildlife habitats through human disturbance. Although expanded interpretive opportunities via marked trails and wayside exhibits would be developed, this disturbance would be minor. Vegetation impacts would be concentrated along trails and there would be only a short-term moderate adverse impact during trail construction. However, restoration of sites such as abandoned citrus groves to pre-disturbed conditions would have short-term minor adverse impacts on wildlife and vegetation due to habitat disturbance, but long-term beneficial impacts once completed. Otherwise impacts would be long-term negligible to minor as a result of centralized anthropogenic activities.

Creating a canoe/kayak landing and water trail connection with the proposed USFWS canoe/kayak trail and developing additional routes through the mangrove islands would

produce short-term, minor to moderate adverse impacts on vegetation and wildlife during the establishment of the trail system through sensitive environments (e.g., from cutting of limbs, removal of deadfalls). However, once trail systems are established, long-term adverse impacts would be negligible to minor due to human presence within wildlife habitats.

NPS/USFWS Joint Management Area.

Adverse impacts on vegetation and wildlife in the central/southern Mosquito Lagoon areas would remain long-term, negligible to minor due to continuation of boating, fishing, and waterfowl hunting activities. Addition of new pole/troll areas by USFWS would have long-term beneficial impacts on aquatic vegetation and wildlife by protecting sensitive seagrass beds.

The impacts on vegetation and wildlife for alternative D would be the same as those described under alternative A for all other locations in the NPS/USFWS Joint Management Area.

Merritt Island National Wildlife Refuge.

NPS South District maintenance base of operations at Wilson Corner would be relocated and consolidated into a new multiagency facility in the USFWS maintenance area. This would have short-term, negligible to minor impacts due to sensory-based disturbances and long-term beneficial impacts on vegetation and wildlife due to reduced human traffic.

Cumulative Impacts. Cumulative impacts on vegetation and wildlife for alternative D were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative D. Adverse cumulative impacts would be short- and long-term, negligible to moderate. The beneficial cumulative impacts would be short- and long-term, negligible to moderate. Alternative D is

expected to contribute a small component to these impacts.

Conclusion. Alternative D would have short- and long-term, negligible to moderate adverse impacts, and short- and long-term, negligible to moderate beneficial impacts.

The actions proposed in alternative D, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to moderate adverse, and short- and long-term, negligible to moderate beneficial cumulative impacts. Alternative D would not be expected to contribute an appreciable amount to these cumulative impacts.

SOUNDSCAPES AND NOISE

Potential impacts on the soundscape at Canaveral National Seashore are presented for alternatives A, B, C, and D. A discussion of the impacts of noise from proposed activities, as they affect the visitor experience, is provided for the affected geographical areas.

Methodology

Evaluation criteria for effects on the soundscape are based on context, time, and intensity. Together, these determine the level of impact for an action or activity.

Negligible: Natural sounds exist but might be affected by human-caused sources, but the effects would be at or below the level of detection, or changes would be so miniscule they would not be of any perceptible consequence to wildlife or the visitor experience.

Minor: There would be detectable noise (i.e., from human-caused sources) in the natural sound environment, but the effects would be small, local, and of little

consequence to wildlife or the visitor experience.

Moderate: Although natural sounds would predominate, human-caused noise would be readily detectable, affecting the behavior of wildlife or visitors in a large area.

Major: Natural sounds would be impacted by human-caused noise frequently and for extended periods of time. The change in the natural sound environment would be obvious and would affect the health of wildlife or visitors and cause a considerable, highly noticeable change in the behavior of wildlife or visitors.

Clearing, grading, excavation, building activities, and demolition from construction activities can cause an increase in noise that is well above the ambient level. A variety of sounds come from graders, pavers, trucks, welders, and other work processes. Construction equipment usually exceeds the ambient sound levels by 20 to 25 A-weighted decibels (dBA) in an urban environment and up to 30 to 35 dBA in a quiet suburban area.

Under alternatives B, C, and D, a short-term increase in noise levels could originate from construction equipment and vehicular traffic. Noise from construction activities would vary depending on the type of construction being done, the area of national seashore the construction would occur in, and the distance from the source of the noise. Construction activities would include demolition, grading, paving, and building. Populations that could be impacted by construction noise include adjacent residents, NPS personnel, national seashore visitors, and visitors to one of the nearby wildlife refuges or recreation areas.

To predict how these activities would affect people, noise from the proposed construction was estimated. For example, building construction usually involves several pieces of equipment (e.g., saws and haul trucks) that can be used simultaneously.

Cumulative noise from the construction equipment was estimated to determine the total effect of noise from building activities at a given distance. Examples of expected construction noise during daytime hours could include the following:

- It is anticipated that people who are 50 feet from construction activities would experience noise levels of approximately 88 dBA.
- It is anticipated that people who are 250 feet from construction activities would experience noise levels of approximately 75 dBA.
- It is anticipated that people who are 500 feet from construction activities would experience noise levels of approximately 69 dBA.
- It is anticipated that people who are 1,000 feet from construction activities would experience noise levels of approximately 63 dBA.

Impacts of Implementing Alternative A (The No-Action Alternative)

Under the no-action alternative, no changes would occur within the national seashore. Conditions would remain as described in “Chapter 3, Affected Environment.” Some beach areas would continue to have high-density use and overcrowding at times. Noise related to increasing visitation — such as motor vehicles on roads, motorboats in Mosquito Lagoon, and noise created by the visitors themselves — would be expected to increase in these beach areas. Long-term, minor, adverse impacts on the natural sounds from recreational activities, increasing visitation, and maintenance activities (such as paving and grading) would be expected to continue under alternative A.

No changes to the existing conditions (i.e., no new impacts) at the Playalinda, Klondike, and Apollo Beach areas; Eldora Hammock area; Northern Mosquito Lagoon; NPS/

USFWS Joint Management Area; or Merritt Island National Wildlife Refuge are proposed under alternative A. There would be no impacts at the Titusville area under alternative A. Long-term, minor, adverse impacts on the soundscape from recreational activities, increasing visitation, and maintenance (such as paving and grading) would be expected to continue under alternative A in these areas. The soundscapes in these areas would continue to be monitored.

Oak Hill Area. Long-term, minor, adverse impacts on the soundscape from increasing visitation, maintenance activities (such as building maintenance/ repairs, paving, and grading) would be expected to continue under alternative A.

Cumulative Impacts. Cumulative impacts were determined by combining the impacts of the alternatives proposed in this document with the impacts of other past, present and reasonably foreseeable future actions. Past, present, and anticipated projects that would contribute to impacts on the soundscape include the following:

1. space shuttle launches from the NASA space shuttle landing facility will likely end in 2011; however, rockets and satellites would continue to be launched from Kennedy Space Center. No new construction is expected for rocket and satellite launches at this time
2. potential development and operation of a commercial vertical launch complex at Canaveral Air Force Station
3. construction of launch infrastructure at nearby Cape Canaveral Spaceport as part of U.S. Commercial Space Transportation Developments (report completed in January 2007; construction has not begun)
4. deployment and operation of evolved expendable launch vehicle systems at Cape Canaveral Air Station

(*Environmental Impact Statement* completed in April 1998)

5. continued preparations for and implementation of the Mars Science Laboratory mission at Cape Canaveral Air Station
6. development of the International Space Research Park (ISRP) on the Kennedy Space Center (*Environmental Impact Statement* completed in 2004; construction has not begun)
7. U.S. Army Corps of Engineers periodic dredging activities along the Intracoastal Waterway (ongoing)
8. U.S. Army Corps of Engineers beach nourishment along New Smyrna Beach (ongoing)
9. mosquito control activities by St. John's River Water Management District, Brevard County, and Volusia County (ongoing)

Refer to the "Cumulative Impacts" discussion at the beginning of this chapter for more information on all the cumulative actions impacting Canaveral National Seashore.

Approximately 70% of the national seashore's acreage is under NASA jurisdiction. Space shuttle, satellite, and other space vertical launch activities are scheduled throughout the year, though shuttle launches will end in 2010. The space shuttle landing facility, a 3-mile paved runway, is in the southwestern section of the national seashore. Between 1990 and 2001, there were approximately 16 satellite launches per year, and about 7 space shuttle launches (NASA 2008a). Launches from the space shuttle landing facility are therefore infrequent, and the noise produced by the launch, while higher than the ambient noise level, is localized and short term. These disruptions would have less impact on the soundscape once space shuttles are no longer launched at Kennedy Space Center because noise from rocket and satellite launches is much less than that of space

shuttle launches. Temporary closure of multiple areas of the seashore in advance of a launch would continue to occur under all alternatives. Therefore, long-term, intermittent, negligible to minor, adverse impacts on the Canaveral National Seashore soundscape from NASA launch activities are expected to continue under all four alternatives.

Short-term, minor to moderate, adverse impacts on the soundscape would be expected if projects 2 through 6 were constructed. Long-term impacts from proposed launches under these projects would be expected to be similar to those discussed above for launches from the NASA space shuttle landing facility, depending on the number of launches proposed.

Long-term intermittent negligible to minor adverse impacts on the soundscape would be expected for projects 7 through 9.

Overall, the impacts of past, present, and reasonably foreseeable actions by others would be negligible to moderate and short-term.

The impacts of the actions described above, in combination with the impacts of implementing alternative A, would result in short- and long-term, minor, adverse cumulative impacts. Alternative A is expected to contribute a small component to these impacts.

Conclusion. Long-term, minor, adverse impacts on the soundscape from recreational activities, increasing visitation, and maintenance activities (such as paving and grading) would be expected to continue under alternative A.

Impacts from the actions under alternative A combined with the impacts from the other past, present, and reasonable foreseeable actions discussed above are expected to be short- and long-term, minor, and adverse.

The cumulative impacts of implementing alternative A are not expected to substantially increase negative effects on the soundscape.

Impacts of Implementing Alternative B (The NPS Preferred Alternative)

Implementation of alternative B, the preferred alternative, could result in short-term, minor to moderate, adverse impacts, and long-term, minor, adverse impacts on the soundscape.

Impacts on the soundscape for each individual area analyzed under alternative B are provided below. The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no additional impacts on soundscapes at Klondike Beach and no impacts at Titusville under this alternative.

Playalinda Beach Area. Proposed noise-producing activities under alternative B would include the creating a bicycle path, replacing the chemical toilets, possibly removing lifeguard structures in the lifeguard operations area, relocating the lifeguard operations, and relocating the administrative boardwalk dune crossover in the lifeguard operations area. Although the bicycle path would be constructed in the right-of-way/buffer along the side of the road, some construction activities (such as grading and paving) could be required. Short-term, minor to moderate, adverse impacts on the soundscape from construction activities and increased construction vehicle traffic would be expected under alternative B.

Apollo Beach Area. Proposed noise-producing activities under alternative B include creating bicycle trails, replacing the chemical toilets, removing the overhead power and telephone lines and placing them

underground, relocating the entrance station, and reconfiguring or redesigning the North District maintenance complex. Although the bicycle trails would be constructed in the right-of-way/buffer along the side of the road, some construction activities (such as grading and paving) could be required. Short-term, minor to moderate, adverse impacts on the soundscape from construction activities and increased construction traffic would be expected under alternative B.

Expanding pontoon boat tours would have minor, long-term, adverse impacts on the soundscape due to increased boat noise and human activities.

Eldora Hammock Area. Proposed noise-producing activities under alternative B include removing overhead power and telephone lines and placing them underground and extending the Castle Windy interpretive trail. Short-term, minor to moderate, adverse impacts on the soundscape from construction activities and increased traffic from construction vehicles would be expected under alternative B in this area.

Northern Mosquito Lagoon. Proposed noise-producing activities under alternative B include relocating the boat access entrance area (gate and fee booth) and establishing a slow-speed zone for boats. Short-term, minor, adverse impacts on the soundscape from relocating the boat access entrance area would be expected under alternative B. Long-term, minor beneficial impacts on the soundscape would be expected from establishing a slow-speed zone or pole/troll zone for boats under alternative B.

Long-term, minor, beneficial adverse impacts on the soundscape would be expected under alternative D from phasing out 24-hour public access to provide for controlled access at night and establishing a slow-speed zone for boats.

Oak Hill Area. Proposed noise-producing activities under alternative B include restoring the Stuckey property, if acquired; expanding interpretive and hiking opportunities; establishing a canoe/kayak landing and water trail connection; and providing access and parking for designated trailheads for hiking in the Bill's Hill area. Short-term, minor to moderate, adverse impacts on the soundscape from construction activities and increased traffic from construction vehicles would be expected under alternative B. Long-term, minor, adverse impacts on the soundscape in the Bill's Hill area from increasing visitation and boat noise from the administrative and limited shuttle/interpretive boat tours would be expected under alternative B.

NPS/USFWS Joint Management Area. Impacts for alternative B would be the same as those described under alternative A.

Merritt Island National Wildlife Refuge. If a new multiagency facility were to be built, the relocation of the NPS South District maintenance operations at Wilson's Corner to that facility would result in no changes to the soundscape in this location because it is likely that the buildings at Wilson's Corner would continue to be used as a satellite maintenance facility.

Cumulative Impacts. Cumulative impacts on the soundscape for alternative B were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative B. The adverse cumulative impacts would be short and long term, and minor, while beneficial cumulative impacts would be long-term and minor. Alternative B would be expected to contribute a relatively small component to these cumulative impacts.

Conclusion. Implementation of alternative B could have short-term, minor to moderate, adverse impacts, and long-term, minor,

adverse impacts on the soundscape. Long-term, minor, beneficial impacts on the soundscape would also be expected from establishing a slow-speed zone for boats in Northern Mosquito Lagoon.

Impacts from the actions under alternative B combined with the impacts from the other past, present, and reasonably foreseeable actions discussed above would be short and long term, minor, and adverse, and long term, minor, and beneficial. Implementation of alternative B is not expected to substantially increase any negative effects on the soundscape.

Impacts of Implementing Alternative C

Implementation of alternative C would likely result in short-term, minor to moderate, adverse impacts, and long-term, minor, adverse impacts on the soundscape.

Impacts on the soundscape for each individual area analyzed under alternative C are provided below. The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no additional impacts on soundscapes at Klondike Beach and no impacts at Titusville under this alternative.

Playalinda Beach Area. Proposed noise-producing activities under alternative C include creating a bicycle path, replacing the chemical toilets, relocating the lifeguard operations area, and converting the lifeguard structures to a small satellite maintenance staging area. The impacts of constructing the bicycle path would be the same as described under alternative B. Short-term, moderate, adverse impacts on the soundscape from the other construction activities described above and increased traffic from construction vehicles would be expected under alternative C.

Apollo Beach Area. Proposed noise-producing activities under alternative C include redesigning parking area #1, creating unpaved parking for horse trailers and a primitive trail to boardwalk access for horses, creating a bicycle path, replacing the chemical toilets, adding showers, connecting water and sewer lines, reconfiguring the Apollo Beach entrance station, relocating maintenance facilities, expanding the public pontoon boat tours, and constructing a pavilion and parking for larger vehicles at Turtle Mound. Constructing the bicycle path would have the same impacts as described for alternative B. Short-term, minor to moderate, adverse impacts on the soundscape from activities listed above and increased construction vehicle traffic would be expected under alternative C.

Eldora Hammock Area. Proposed noise-producing activities under alternative C include the creation and expansion of trails, the expansion of the dock, and the extension of sewer and water service in the Eldora historic area; creation of a small parking area, expansion of interpretive programs, and extension of the Castle Windy interpretive trail; repair of facilities and expansion of the types of uses at the marine science educational station; removal of the garage and replacement of facilities at the former Hebner property; provision of new water-based recreational opportunities at the former Feller property; and creation of trails in the lands south of Eldora Hammock. Short-term, minor to moderate, adverse impacts on the soundscape from construction activities and increased construction vehicle traffic would be expected under alternative C.

Northern Mosquito Lagoon. Proposed noise-producing activities under alternative C include the paving and minimal expansion of the parking area at the boat access area, expanding interpretive water tours from Apollo Beach, and the possibly adding a water-based commercial shuttle service. Short-term, minor, adverse impacts on the

soundscape from construction activities and increased construction vehicle traffic would be expected under alternative C. Long-term, minor, adverse impacts on the soundscape would occur from the expansion of interpretive water tours. Additional impacts would be expected if the shuttle service was added. Long-term minor beneficial impacts would be expected from establishing a slow-speed zone for boats under alternative C.

Oak Hill Area. Proposed noise-producing activities under alternative C include creating a marsh trail, providing enhanced recreational opportunities (hiking trails, camping, canoe/kayak launching, equestrian use), creating access and parking at designated trailheads for hiking and horseback riding, expanding interpretive opportunities via marked trails and wayside exhibits, connecting the area with the USFWS canoe/kayak trail in the Bill's Hill area, and constructing a centralized visitor center/administrative headquarters and maintenance facility at the Stuckey property, if acquired, or the Bill's Hill area.

The preferred location of this centralized complex is the Stuckey property, which is a small segment next to Bill's Hill. If funding is not available to purchase the Stuckey site, the complex would be constructed at Bill's Hill. Short-term, moderate, adverse impacts on the soundscape from construction activities and increased construction vehicle traffic would be expected under alternative C. Long-term, minor, adverse impacts on the soundscape would be expected from limited boat tours, recreational activities, increasing visitation, and scheduled maintenance activities (such as paving and grading).

NPS/USFWS Joint Management Area. Impacts for alternative C would be the same as those described under alternative A with the additional potential for increased noise impacts from educational programs and the addition of concession rental activities. Long-term impacts for the other proposed

projects would be the same as those described under alternative A.

Merritt Island National Wildlife Refuge. Alternative C would result in reduced long-term impacts on the soundscape at the South District maintenance area from relocating the maintenance functions and short-term, minor impacts during relocation of the maintenance functions to the Stuckey property, if acquired, or Bills' Hill area.

Cumulative Impacts. Cumulative impacts on the soundscape for alternative C were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative C. The adverse cumulative impacts would be short and long term, and minor, while beneficial cumulative impacts would be long term and minor. Impacts of alternative C would comprise a relatively small portion of the overall cumulative effects.

Conclusion. Implementation of alternative C could result in short-term, minor to moderate, adverse impacts and long-term, minor, adverse impacts on the soundscape.

Impacts from the actions under alternative C, combined with the impacts from the other past, present, and reasonable foreseeable actions discussed above, would be short and long term, minor, and adverse, and long term, minor, and beneficial. Implementation of alternative C would not be expected to substantially increase any negative effects on the soundscape.

Impacts of Implementing Alternative D

Implementation of alternative D would likely result in short-term, minor to moderate, adverse impacts, and long-term, minor, adverse impacts on the soundscape.

Impacts on the soundscape for each individual area analyzed under alternative D are provided below. The following site-specific impacts do not repeat the continuing impacts that are described in alternative A; however, all relevant impacts are considered in the final analysis. There would be no additional impacts on soundscapes at Klondike Beach and no impacts at Titusville under this alternative.

Playalinda Beach Area. Proposed noise-producing activities under alternative D include replacing the chemical toilets, relocating the lifeguard operations functions, relocating the administrative boardwalk dune crossover, and possibly demolishing lifeguard structures. These activities would have minor, short-term, adverse impacts on the soundscape from construction and increased construction vehicle traffic.

Apollo Beach Area. Proposed noise-producing activities under alternative D include creating unpaved parking for horse trailers and a primitive trail to boardwalk access, replacing the chemical toilets, extending water and sewer connections, and reconfiguring or redesigning the North District maintenance complex. Short-term, minor to moderate, adverse impacts on the soundscape from construction activities and increased construction vehicle traffic would be expected under alternative D.

Eldora Hammock Area. Proposed noise-producing activities under alternative D include possible extension of sewer and water service in the Eldora historic area and construction of trailer pads and possible extension of utility lines at the former Hebner property. Short-term, minor, adverse impacts on the soundscape from construction activities and increased construction vehicle traffic would be expected under alternative D.

Northern Mosquito Lagoon. Proposed noise-producing activities under alternative

D include the relocation of the entrance area (gate/fee booth) and enhanced opportunities for canoeing and kayaking. Short-term, minor to moderate, adverse impacts on the soundscape from construction activities and increased construction vehicle traffic would be expected under alternative D. Long-term, minor, beneficial adverse impacts on the soundscape would be expected under alternative D from phasing out 24-hour public access to provide for controlled access at night and establishing a slow-speed or pole/troll zone for boats.

Oak Hill Area. Proposed noise-producing activities under alternative D include creating a self-guided interpretive marsh trail at Seminole Rest, purchasing the Stuckey property and constructing a trailhead and parking area there, enhancing opportunities for dispersed recreation (including canoe/ kayaking, hiking, and horseback riding trails), and establishing a canoe/kayak landing and water trail connection with the proposed USFWS canoe/kayak trail in the Bill's Hill area. Short-term, minor to moderate, adverse impacts on the soundscape from construction activities and increased construction vehicle traffic would be expected under alternative D. Long-term impacts would be the same as those described under alternative A.

NPS/USFWS Joint Management Area. Proposed noise-producing activities under alternative D include expansion of environmental education and public programs in the boat access areas. Impacts for alternative D would be the same as those described under alternative A, with the additional potential for increased noise impacts from educational programs in the area.

Merritt Island National Wildlife Refuge. The relocation of the NPS South District maintenance operations at Wilson's Corner to a new multiagency facility in the USFWS maintenance area adjacent to the visitor center would result in no changes to the

soundscape in this location because it is likely that the buildings at Wilson's Corner would continue to be used as a satellite maintenance facility.

Cumulative Impacts. Cumulative impacts on the soundscape for alternative D were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative D. The adverse cumulative impacts would be short and long term and minor. Beneficial cumulative impacts would be long term and minor. Alternative D is expected to contribute a small component to these impacts.

Conclusion. Implementation of alternative D could result in short-term, minor to moderate, adverse impacts and long-term, minor, adverse impacts on the soundscape. Long-term, minor, beneficial impacts would be expected from phasing out of 24-hour public access to provide for controlled access at night and establishing a slow-speed zone for boats in northern Mosquito Lagoon.

Impacts from the actions under alternative D, combined with the impacts from the other past, present, and reasonably foreseeable actions discussed above, would be short and long term, minor, and adverse, and long term, minor, and beneficial. Implementation of alternative D would not be expected to substantially increase any negative effects on the soundscape.

AIR QUALITY

Potential impacts on air quality at Canaveral National Seashore are presented for alternatives A, B, C, and D. A discussion of the air quality impacts from proposed activities is provided for the affected geographical areas.

Methodology

Evaluation criteria for impacts on air quality are based on federal and state regulations that establish and maintain air quality parameters. As described in the "Chapter 3: Affected Environment," these include the Clean Air Act amendments and state (FDEP) regulations. A proposed action would have a substantial impact on air quality if it were to do one or more of the following:

- Violate established laws or regulations adopted to protect air quality
- Exceed the *de minimis* thresholds established by the Clean Air Act or state (FDEP) regulations.

The thresholds to determine the severity of impacts are defined as follows:

Negligible: The impact would result in no measureable or perceptible changes in air emissions, air quality, or visibility.

Minor: The impact is slight, but detectable, and would result in small but measurable changes in air emissions, air quality, or visibility. The impacts would be localized to a small area.

Moderate: The impact is readily apparent and would result in easily detectable changes in air emissions, air quality, or visibility. The impacts would be localized.

Major: The impact is severely adverse or exceptionally beneficial and would result in exceeding the significant impact thresholds established in federal and state regulations on prevention of significant deterioration of air quality. The impacts would be regionally important.

To predict how the proposed activities would affect populations, criteria pollutants were estimated for the long-term increases in vehicular traffic that would result from implementing alternatives B, C, and D.

Activities, such as demolition of existing structures, grading, excavation, soil

recontouring, building construction, and parking area construction, can result in the release of particulate matter into the air. In addition, construction equipment (e.g., scrapers, graders, backhoes) powered by internal combustion engines contribute directly to air emissions of criteria pollutants including nitrogen oxides (NO_x), sulfur dioxide (SO₂), volatile organic compounds (VOCs), and particulate matter equal to 10 microns or 2.5 microns in diameter (PM₁₀ or PM_{2.5}, respectively). The largest structure proposed for construction is the new multi-agency facility at the Playalinda Beach maintenance area. This structure would be approximately 3,500 square feet, with additional outbuildings. Construction of this size would be consistent with general construction provisions of the state implementation plan and would not be considered substantial.

Construction of additional access roads and parking areas proposed under alternatives B, C, and D would not generate substantial levels of emissions. The U.S. Environmental Protection Agency has developed regulations limiting the emissions of off-road construction equipment, and the construction activities would be reviewed to ensure they do not exceed *de minimis* emission limits.

Impacts of Implementing Alternative A (The No-Action Alternative)

Under the no-action alternative, no major construction projects would be undertaken that would generate vehicle and equipment exhaust as well as particulate (dust) emissions from excavation and construction activities. Conditions would remain as described in “Chapter 3, Affected Environment.” Some beach areas could be expected to continue to have high-density use and overcrowding at times. Subsequently, increasing visitation and use of motor vehicles on roads and motor boats on waterways continue to affect air quality. Long-term, minor, adverse impacts on the

air quality from recreational activities, increasing visitation, and maintenance activities would be expected to continue under alternative A.

Cumulative Impacts. Cumulative impacts were determined by combining the impacts of the alternatives proposed in this document with the impacts of other past, present and reasonably foreseeable future actions. Past, present, and anticipated projects that would contribute to impacts on air quality include the following:

1. space shuttle launches from the NASA space shuttle landing facility will likely end in 2011; however, rockets and satellites would continue to be launched from Kennedy Space Center. No new construction is expected for rocket and satellite launches at this time
2. potential development and operation of a commercial vertical launch complex at Canaveral Air Force Station
3. construction of launch infrastructure at nearby Cape Canaveral Spaceport as part of U.S. Commercial Space Transportation Developments (report completed in January 2007; construction has not begun)
4. deployment and operation of evolved expendable launch vehicle systems at Cape Canaveral Air Station (*Environmental Impact Statement* completed in April 1998)
5. continued preparations for and implementation of the Mars Science Laboratory mission at Cape Canaveral Air Station.
6. development of the International Space Research Park (ISRP) on the Kennedy Space Center (*Environmental Impact Statement* completed in 2004; construction has not begun)
7. U.S. Army Corps of Engineers periodic dredging activities along the Intracoastal Waterway (ongoing)

8. U.S. Army Corps of Engineers beach nourishment along New Smyrna Beach (ongoing)
9. mosquito control activities by St. John's River Water Management District, Brevard and Volusia County (ongoing)

Refer to the "Cumulative Impacts" discussion at the beginning of this chapter for more information on all the cumulative actions impacting Canaveral National Seashore.

Continued and future launch activities, operation of the vertical launch complex, deployment of the evolved expendable launch vehicle systems, and implementation of the Mars Science Laboratory mission, would result in short-term, minor, adverse impacts on air quality. Launch activities would result in long-term, negligible, adverse impacts on air quality.

Construction of launch infrastructure at nearby Cape Canaveral Spaceport as part of U.S. commercial space transportation developments and construction of the International Space Research Park would result in temporary, short-term, impacts on air quality during construction. These construction activities, in conjunction with implementation of alternative A, would not result in substantial, long-term, cumulative impacts.

U.S. Army Corps of Engineers beach nourishment activities along New Smyrna Beach and periodic dredging activities along the Intercoastal Waterway, and USFWS/county mosquito control activities would continue to have short-term increases in air emissions, but, in conjunction with implementation of alternative A, would not result in substantial, long-term, air quality impacts.

Overall, the impacts of past, present, and reasonably foreseeable actions by others would be short-term, negligible, and adverse.

The impacts of actions described above, in combination with the impacts of alternative A, would likely result in short- and long-term, negligible to minor, adverse cumulative impacts on air quality. Alternative A is expected to contribute a small component to these impacts.

Conclusion. Long-term, minor, adverse impacts on the air quality from recreational activities, increasing visitation, and maintenance activities would be expected to continue under alternative A.

Impacts from the actions under alternative A, combined with the impacts from the other past, present, and reasonably foreseeable actions discussed above, are expected to be short- and long-term, minor, adverse cumulative impacts. Impacts from the actions under alternative A would contribute slightly to these cumulative effects.

Impacts of Implementing Alternative B (The NPS Preferred Alternative)

Implementation of alternative B, the preferred alternative, could result in short- and long-term, minor, adverse impacts on air quality at Canaveral National Seashore. Some localized beneficial impacts would be expected because of the availability of alternative transportation.

Impacts on the air quality for each geographical area analyzed under alternative B are provided below. There would be no additional impacts on air quality at Klondike Beach and no impacts at Titusville under this alternative.

Playalinda Beach Area. Short-term emissions would be expected from the construction of the bike path, installation of new chemical toilets, potential removal of lifeguard structures in the lifeguard operations area, and the relocation of the boardwalk dune crossover in the lifeguard operations area due to increased vehicular

activity and emissions from ground-disturbing activities during construction. Emissions would also be expected to increase because of increasing visitation, maintenance activities, and recreational activities. However, this short- and long-term increase in emissions would not be expected to result in an exceedance of the national NAAQS standards.

Apollo Beach Area. Emissions would increase during replacement of the restrooms, burial of the powerlines, and reconfiguration of the North District maintenance complex. The construction projects would generate total suspended particulate and PM₁₀ emissions as fugitive dust from ground-disturbing activities, in addition to the emissions of all criteria pollutants from the combustion of fuels in construction equipment resulting in short-term, minor, adverse impacts on air quality. However, this short-term increase in emissions would not be expected to result in an exceedance of the national (NAAQS) standards.

Long-term emissions in the area would likely result in long-term, beneficial impacts on air quality because of the availability of alternative transportation shuttle services and establishment of a bike path. Minor, long-term, adverse impacts on air quality could also result from an increase in pontoon boat traffic.

Eldora Hammock Area. Short-term emissions would increase from the removal of existing overhead power and telephone lines and burying them underground, and the extension of the Castle Windy interpretive trail because of increased construction vehicle traffic and construction activities. Construction of the Castle Windy Trail extension would result in short-term increases in fugitive dust emissions. Long-term emissions would be expected to increase because of increasing visitation, maintenance activities, and recreational activities. However, these short- and long-

term adverse impacts on air quality would not be expected to result in an exceedance of the national (NAAQS) standards.

Northern Mosquito Lagoon. Short-term emissions would increase from the relocation of the entrance area. Establishing a slow-speed zone for boats would result in an increase in short-term emissions, because motorboats would remain longer in the area between the Eldora State House, parking lot #7, and the first island to the west. Long-term emissions would be expected to increase because of greater visitation, maintenance activities, and recreational activities. These short- and long-term adverse impacts on air quality would not be expected to result in an exceedance of the national (NAAQS) standards.

Oak Hill Area. Short-term emissions due to fugitive dust and diesel exhaust would increase from restoration of the Stuckey property, if acquired, expansion of interpretive opportunities, establishment of a canoe/kayak landing and water trail connection, and construction of access and parking for designated trailheads for hiking in the Bill's Hill area. Long-term emissions would be expected to increase from increasing visitation, maintenance activities, and recreational activities. However, this short- and long-term increase in emissions would not be expected to result in an exceedance of the national (NAAQS) standards.

NPS/USFWS Joint Management Area. There would be no new impacts on air quality in this area.

Merritt Island National Wildlife Refuge. Short-term emissions from release of fugitive dust and diesel exhaust emissions would be expected from the construction of new multiagency facility, if it were to be constructed. Long-term, minor, adverse impacts on air quality would be expected from increasing visitation, maintenance activities, and recreational activities.

However, this short- and long-term increase in emissions would not be expected to result in an exceedance of the national (NAAQS) standards.

Cumulative Impacts. Cumulative impacts on air quality for alternative B were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described in alternative A) and the impacts of implementing alternative B. Cumulative impacts would be short and long term, minor, and adverse, and long term and beneficial. Impacts of alternative B would comprise a relatively small portion of the overall cumulative effects.

Conclusion. Implementation of alternative B could result in an increase in short- and long-term emissions. Short-term emissions would result from construction activities, including demolition, as well as the vehicle emissions associated with those activities. Long-term emissions would be expected as a result of additional recreational activities proposed under alternative B, increasing visitation, and maintenance activities. However, these short- and long-term increases in emissions would not be expected to result in an exceedance of the national (NAAQS) standards. Therefore, implementation of alternative B would result in minor adverse impacts on air quality. Some localized beneficial impacts are also expected because of the availability of alternative transportation, such as shuttle buses and bicycles.

The actions proposed under alternative B combined with the impacts from the other past, present, and reasonably foreseeable actions discussed above, are expected to result in short- and long-term, minor, adverse, and long-term, negligible, beneficial impacts on air quality. Impacts from the actions under alternative B would contribute slightly to these cumulative effects

Impacts of Implementing Alternative C

Implementation of alternative C could result in short-term, minor to moderate, and long-term, minor, adverse impacts on air quality. Long-term beneficial impacts would likely occur, as well.

Impacts on the air quality for each geographical area analyzed under alternative C are provided below. There would be no additional impacts on air quality at Klondike Beach and no impacts at Titusville under this alternative.

Playalinda Beach Area. Short-term emissions would be expected from the construction of the bike path, installation of new chemical toilets, relocating the operations in the lifeguard operations area closer to the beach, and converting existing structure to a small satellite maintenance staging area from increased vehicular activity and emissions from ground-disturbing activities during construction. Long-term emissions would be expected to increase because of increasing visitation, maintenance activities, and recreational activities. However, this short- and long-term increase in emissions would not be expected to result in an exceedance of the national (NAAQS) standards.

Apollo Beach Area. Construction activities associated with redesigning parking area #1, providing unpaved parking for horse trailers and a primitive trail access for horses, creating a bicycle path, replacing the restrooms, installing water and sewer connections, and the addition of a pavilion and parking for larger vehicles at Turtle Mound would result in short-term, minor to moderate adverse impacts on air quality. However, the short-term increase in emissions from diesel exhaust and fugitive dust would not be expected to result in an exceedance of the national (NAAQS) standards.

Some long-term reduction in emissions would be anticipated if alternative transpor-

tation is established; therefore, long-term beneficial impacts are expected.

Eldora Hammock Area. Short-term increases in emissions due to construction would be expected from the expansion of the trail system, and extension of sewer and water service in the Eldora historic area; addition of a small parking area and expansion of the Castle Windy trail; removal of the garage and replacement with facilities for expanded research or dorm facilities at the former Hebner property; and creation of trails in the lands south of Eldora Hammock. These activities would likely result in short-term, minor, impacts on air quality due to diesel exhaust and fugitive dust emissions. Expansion of the dock in the historic area would result in a negligible increase in emissions from the addition of the interpretive boat tour stop. Long-term emissions would be expected to increase with more visitation, maintenance activities, and recreational activities. However, this short- and long-term increase in emissions would not be expected to result in an exceedance of the national (NAAQS) standards.

Northern Mosquito Lagoon. An increase in short-term emissions would result from the paving and expansion of the parking area at the boat access area, establishment of a slow-speed zone for boats, expansion of interpretive water tours from Apollo Beach, and the possible addition of a water-based commercial shuttle service. Paving the parking area would result in a temporary increase in emissions from off-gassing of paving materials and diesel exhaust from construction equipment. Establishing a slow-speed zone for boats would result in an increase in short-term emissions, because motorboats would remain longer in the area between the Eldora State House, parking lot #7, and the first island to the west. Additional impacts would be expected if the shuttle service was added. Long-term emissions would be expected to increase because of greater visitation, maintenance activities, and recreational activities.

However, these short- and long-term adverse impacts on air quality would not be expected to result in an exceedance of the national (NAAQS) standards.

Oak Hill Area. An increase in short-term emissions would result from the creation of a marsh trail, possible expansion of the gravel overflow parking area in Seminole Rest, provision of enhanced recreational opportunities (hiking trails, camping, canoe/kayak launching, equestrian use), the creation of access and parking at designated trailheads for hiking and horseback riding, expanded interpretive opportunities via marked trails and wayside exhibits, and the connection of the area with the USFWS canoe/kayak trail in the Bill's Hill area.

Some emissions would be expected from construction of new visitor center/ headquarters/maintenance facilities at the Stuckey property or at the Bill's Hill area, leading to short-term, moderate, impacts on air quality from the ground disturbance and heavy equipment activities during construction. The construction projects would generate total suspended particulate and fugitive dust from ground-disturbing activities, in addition to the emissions from the combustion of fuels in construction equipment. Long-term emissions would be expected to increase because of increasing visitation, maintenance, and recreational activities. However, these short- and long-term increases in emissions would not be expected to result in an exceedance of the national (NAAQS) standards.

NPS/USFWS Joint Management Area. There would be no new impacts on air quality in this area.

Merritt Island National Wildlife Refuge. There would be no new impacts on air quality in this area after maintenance functions move to the Stuckey property (or Bill's Hill) because the structures would likely continue to be used by USFWS staff.

Cumulative Impacts. Cumulative impacts from the implementation of alternative C were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative C. The adverse cumulative impacts would be short and long term and minor to moderate. Some long-term beneficial cumulative impacts would also be realized. Impacts from the actions under alternative C would contribute slightly to these cumulative effects.

Conclusion. Implementation of alternative C could result in short- and long-term emissions; however, this short- and long-term increase in emissions would not be expected to result in an exceedance of the national (NAAQS) standards. Implementation of alternative C would be expected to result in short-term, minor to moderate, adverse impacts and long-term, minor, adverse impacts on air quality. Some localized beneficial impacts are also expected because of the availability of alternative transportation, such as shuttle buses and bicycles.

Impacts from the actions under alternative C, combined with the impacts from the other past, present, and reasonably foreseeable actions discussed above, would be short and long term and minor to moderate. Some long-term beneficial cumulative impacts would also be realized. Impacts from the actions under alternative C would contribute slightly to these cumulative effects.

Impacts of Implementing Alternative D

Implementation of alternative D could result in short- and long-term, minor, adverse impacts on air quality.

Impacts on the air quality for each geographical area analyzed under alternative D are provided below. There would be no

additional impacts on air quality at Klondike Beach and no impacts at Titusville under this alternative.

Playalinda Beach Area. Short-term emissions would be expected from relocation of the lifeguard operations functions, the possible demolition of existing lifeguard structures, and relocating the boardwalk dune crossover. These emissions would result in short-term, minor impacts on air quality because of diesel exhaust from construction vehicles and fugitive dust emissions from ground-disturbing activities. Long-term emissions would be expected to increase from increasing visitation, maintenance activities, and recreational activities. However, this short- and long-term increase in emissions would not be expected to result in an exceedance of the national (NAAQS) standards.

Apollo Beach Area. Construction activities associated with providing unpaved parking for horse trailers and a primitive trail connection to the administrative boardwalk, installing water and sewer connections, and reconfiguring or redesigning the North District maintenance complex would likely result in short-term, minor, adverse impacts on air quality. Long-term emissions would be expected to increase because of increasing visitation, maintenance activities, and recreational activities. However, short- and long-term increases in emissions would not be expected to result in an exceedance of the national (NAAQS) standards.

Eldora Hammock Area. Under alternative D, short-term, minor adverse air quality impacts would occur because of diesel exhaust and fugitive dust emissions generated during extension of sewer and water service, and construction of additional trailer pads, as well as improvement of the garage and extension of utility lines at the former Hebner Property.

Northern Mosquito Lagoon. Short-term emissions would result from the relocation

of the entrance area (gate/fee booth) and establishment of a slow-speed zone for boats. Establishing a slow-speed zone for boats would result in an increase in short-term emissions because motorboats would remain longer in the area between the Eldora State House, parking lot #7, and the first island to the west. Long-term emissions would be expected to increase due to increasing visitation, maintenance activities, and recreation activities. However, these short- and long-term minor adverse impacts on air quality would not be expected to result in an exceedance of the national (NAAQS) standards.

Oak Hill Area. Short-term emissions would result from the creation of a self-guided interpretive trail at Seminole Rest; construction of a trailhead and parking area at the Stuckey property; and providing parking for designated trailheads and active restoration in the Bill's Hill area. These construction activities would result in short-term minor adverse impacts on air quality due to fugitive dust and diesel exhaust emissions. Long-term emissions would be expected to increase due to increasing visitation, maintenance activities, and recreation activities. However, these short- and long-term impacts on air quality would be minor and would not be expected to result in an exceedance of the national (NAAQS) standards.

NPS/USFWS Joint Management Area. There would be no new impacts on air quality in this area.

Merritt Island National Wildlife Refuge. Construction of a new multiagency maintenance facility would result in short-term emissions of fugitive dust and diesel exhaust. Long-term emissions would be expected to increase due to increasing maintenance activities. However, this short- and long-term increase in emissions would not be expected to result in an exceedance of the national (NAAQS) standards.

Cumulative Impacts. Cumulative impacts from implementing alternative D were determined by combining the impacts of past, present, and reasonably foreseeable future actions (as described under alternative A) and the impacts of implementing alternative D. The adverse cumulative impacts would be short and long term and minor. Alternative D is expected to contribute a small component to these impacts.

Conclusion. Implementation of alternative D could result in short- and long-term, minor, adverse impacts on the air quality at the national seashore.

Impacts from the actions under alternative D combined with the impacts from the other past, present, and reasonably foreseeable actions discussed above, would be short and long term and minor. Alternative D is expected to contribute a small component to these impacts.

IMPACTS ON CULTURAL RESOURCES

METHODOLOGY

In this document, impacts on cultural resources are described in terms that are consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). These impact analyses are intended, however, to also comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the National Historic Preservation Act (36 CFR Part 800, *Protection of Historic Properties*), impacts on cultural resources were also identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected National Register eligible or listed cultural resources; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternatives 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 that there is an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision Making* (Director's Order 12) also call for a discussion of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g., reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under the National Environmental Policy Act only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Cultural resources are nonrenewable resources, and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

Potential impacts are described in terms of type, context (are the effects site-specific, local, or even regional), duration (are the effects short-term (less than one year), long-term (one to five years), or permanent), and intensity (negligible, minor, moderate, or major).

A Section 106 summary is included in the impact analysis sections for the action alternatives. The Section 106 summary is an assessment of the effect of the undertaking (implementation of the alternative) based upon the criterion of effect and criteria of adverse effect found in the advisory council's regulations.

IMPACTS ON ARCHEOLOGICAL RESOURCES

Negligible: Impact is at the lowest level of detection. Impacts would be measurable but with no perceptible consequences. For

purposes of Section 106, the determination of effect would be no adverse effect.

Minor: Disturbance of a site(s) results in little loss of integrity. The determination of effect for Section 106 would be no adverse effect.

Moderate: Site(s) is disturbed but not obliterated. The determination of effect for Section 106 would be adverse effect.

Major: Site(s) is obliterated. The determination of effect for Section 106 would be adverse effect.

Impacts of Implementing Alternative A (The No-Action Alternative)

Analysis. Under alternative A, known archeological resources in Canaveral National Seashore would continue to be protected and preserved. Archeological resources would continue to be surveyed, inventoried, and evaluated to determine their eligibility for listing in the National Register—subject to funding and staffing limitations. Continued inventory and monitoring would provide long-term, negligible to minor, beneficial impacts. All ground-disturbing activities would be preceded by site-specific archeological surveys and, where appropriate, subsurface testing to determine the existence of archeological resources and how best to preserve them. Known archeological resources would be avoided whenever possible, and few, if any, impacts would be anticipated. If, however, National Register listed or eligible archeological resources could not be avoided, an appropriate mitigation strategy would be developed in consultation with the Florida state historic preservation officer. If previously undiscovered archeological resources were uncovered during construction, all work in the immediate vicinity of the discovery would be stopped until the resources could be identified and documented and an appropriate mitigation strategy was developed in consultation with the Florida state historic preservation officer.

Archeological resources adjacent to or easily accessible from trails, roads, and developed

areas could be vulnerable to surface disturbance, inadvertent damage, and vandalism. A loss of surface archeological materials, alteration of artifact distribution, and a reduction of contextual evidence could result. This would provide for long-term, negligible to minor, adverse impacts on archeological resources. However, continued ranger patrols and emphasis on visitor education would help discourage vandalism and inadvertent destruction of cultural features, and any impacts, although long term or permanent, would be expected to be minor and minimal if any.

Cumulative Effects. In the past, human activities (e.g., vandalism, looting, foot and vehicular traffic, and backcountry camping) and natural processes (e.g., animal burrowing, vegetative growth, weathering, erosion, and fire) have resulted in the loss or disturbance of archeological resources. Some of these activities and processes have continued to the present and would likely continue if alternative A were implemented. Digging mosquito ditches and creating impoundments have severely damaged many sites along the Mosquito Lagoon shoreline. Storms and high water are eroding many lagoon sites; feral hogs and armadillos have dug into middens and mounds, causing changes to its stratigraphy. Several of the island middens, located on high ground, have been traditionally used by local residents as backcountry campsites. Shipwreck sites are extremely vulnerable to vandalism and the forces of nature. The above actions would constitute long-term, minor, adverse impacts on archeological resources. Despite a number of these impacts, which can be severe, recent archeological investigations have found the vast majority of sites to be in stable condition.

Water levels in the vicinity of the national seashore have varied greatly over the past several thousand years. Some prehistoric archeological sites may be submerged or occur in the swampy and marshy environs of the national seashore, particularly older Archaic sites that were occupied when the sea level was lower than it is today.

One of the greatest impacts on the national seashore's archeological resources to date appears to have been the work of antiquarians and early "avocational" archeologists who carried out extensive "explorations" but left little data. Many of the artifact collections resulting from these early efforts were divided among repositories across the United States, further complicating the situation. Even post-World War II investigators have relied heavily on surface collections and trenching of shell middens and burial mounds. These methods have often resulted in highly biased samples.

Much of the national seashore has not been comprehensively surveyed and inventoried for archeological resources, and resource monitoring and protection programs have been sporadic and insufficient because of limited staffing and funding levels. Thus, decisions about site development and permitted activities have sometimes been made that, in hindsight, may have resulted in the loss or disturbance to an unknown number of archeological sites in the national seashore. This lack of survey and inventory has led to some long-term, minor, adverse impacts on archeological resources.

Ongoing and expanded archeological site monitoring programs would be initiated, and efforts would be undertaken to minimize or mitigate potential impacts from human activities and natural causes providing for some long term negligible to moderate beneficial impacts. However, an unknown number of archeological sites in the national seashore would continue to be adversely impacted by human activities and natural processes.

Other past, present, and reasonably foreseeable future undertakings in the national seashore and its surrounding area would generally be expected to contribute to minor long-term, adverse impacts on archeological resources. When combined with the actions proposed in this alternative, these other actions would be expected to have minor adverse cumulative impacts. However, the impacts on such resources associated with

alternative A would constitute a relatively small component of any overall cumulative impact.

Conclusion. Overall there would be long-term, negligible to minor, adverse impacts on archeological resources. Cumulative impacts on archeological resources under this alternative would be expected to be adverse, minor, and long term; however, this alternative's contribution to these effects would constitute a relatively small component of any overall cumulative impact.

Impacts of Implementing Alternative B (The NPS Preferred Alternative)

Analysis. Implementation of alternative B would have the same general impacts on archeological resources as those listed under alternative A.

In addition, although actions under this alternative, such as development of bike trails and marked trails and wayside exhibits in the Bill's Hill area, could impact archeological resources, strategies as outlined under alternative A would be implemented to avoid, preserve, or mitigate such impacts. Thus few, if any, additional adverse impacts on archeological resources would be anticipated under alternative B. Similar to alternative A, the adverse impacts would be minor and long term; however, there would be long-term, negligible to minor, beneficial impacts from continued inventory and monitoring.

Cumulative Effects. Implementation of alternative B would have the same general cumulative adverse effects on archeological resources as those listed under alternative A.

Conclusion. Overall, impacts of alternative B on archeological resources in the national seashore would be long term, minor, and adverse, and long term, negligible to minor, and beneficial. Cumulative impacts on archeological resources under alternative B would be expected to be adverse, long term, and minor; however, this alternative's

contribution to these effects would constitute a relatively small component of any overall cumulative impact.

Section 106 Summary. For alternative B there would be no adverse effects on archeological resources in the national seashore.

Impacts of Implementing Alternative C

Analysis. Implementation of alternative C would have the same general impacts on archeological resources as those listed under alternative A.

Additional actions under alternative C could potentially impact an unknown number of archeological resources in the national seashore. These actions include development of (1) bike paths, (2) new or larger parking areas at some locations, (3) trails throughout the Eldora State House landscape, lands south of the boat launch to the Gomez Grant line, and the Bill's Hill area as well as a marsh trail at Seminole Rest, and (4) construction of a visitor center, headquarters, and maintenance facility on the Stuckey property. However, strategies as outlined under alternative A would be implemented to avoid, preserve, or mitigate impacts on archeological resources from such development to the extent possible, and few, if any, additional impacts would be anticipated. Few additional adverse impacts on archeological resources would be anticipated under alternative C. Similar to alternative A, the adverse impacts would be minor and long term; however, there would be negligible to minor beneficial impacts from continued inventory and monitoring.

Cumulative Effects. Implementation of alternative C would have the same general cumulative adverse effects on archeological resources as those listed under alternative A

Conclusion. Overall, impacts of alternative C on archeological resources in the national seashore would be long term, minor, and adverse, and long term, negligible to minor, and beneficial. Cumulative impacts under alternative C on archeological resources

would be expected to be adverse; however, this alternative's contribution to these effects would constitute a relatively small component of any overall cumulative impact.

Section 106 Summary. For alternative C there would be no adverse effects on archeological resources in the national seashore.

Impacts of Implementing Alternative D

Analysis. Implementation of alternative D would have the same general impacts on archeological resources as those listed under alternative A.

Additional actions under alternative D could potentially impact an unknown number of archeological resources in the national seashore. These actions include construction of (1) a speed lane for fee collection at the Playalinda Beach entrance station, (2) new or larger parking areas at some locations, (3) trails and wayside exhibits in the Bill's Hill area as well as a marsh trail at Seminole Rest, and (4) development of trailhead and parking at the Stuckey property. However, strategies as outlined under alternative A would be implemented to avoid, preserve, or mitigate impacts on archeological resources from such development to the extent possible. The few anticipated adverse impacts, if any, would be adverse, long term, and minor. There would be beneficial, long-term, negligible to minor impacts from continued inventory and monitoring.

Cumulative Effects. Implementation of alternative D would have the same general cumulative adverse effects on archeological resources as those listed under alternative A.

Conclusion. Overall, impacts of alternative D on archeological resources in the national seashore would be long term, minor, and adverse, and long term, negligible to minor, and beneficial. Cumulative impacts under this alternative would also be expected to be adverse, minor, and long term; however, this alternative's contribution to these effects

would constitute a relatively small component of any overall cumulative impact.

Section 106 Summary. For alternative D there would be no adverse effects on archeological resources in the national seashore.

IMPACTS ON HISTORIC STRUCTURES

Negligible: Impacts would be at the lowest levels of detection—barely perceptible and measurable. For purposes of Section 106, the determination of effect would be no adverse effect.

Minor: Impacts would affect character-defining features but would not diminish the overall integrity of the building or structure. For purposes of Section 106, the determination of effect would be no adverse effect.

Moderate: Impacts would alter a character-defining feature(s), diminishing the overall integrity of the building or structure to the extent that its National Register eligibility could be jeopardized. For purposes of Section 106, the determination of effect would be adverse effect.

Major: Impacts would alter character-defining features, diminishing the integrity of the building or structure to the extent that it would no longer be eligible to be listed on the National Register. For purposes of Section 106, the determination of effect would be adverse effect.

Impacts of Implementing Alternative A (The No-Action Alternative)

Analysis. Under alternative A historic structures in the national seashore that are listed in or eligible for listing in the National Register of Historic Places would continue to be protected and preserved. Additionally, subject to staffing and funding limitations, prehistoric/ historic structures would continue to be surveyed, inventoried, and evaluated to determine their eligibility for listing in the National Register. Continued

survey and inventory would provide for a long-term, negligible to minor, beneficial impact. To appropriately preserve and protect National Register-listed or -eligible historic structures (i.e., Eldora State House, Schultz house, and the Seminole Rest main and caretaker's houses), all stabilization, preservation, and rehabilitation efforts, as well as daily, cyclical, and seasonal maintenance, would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995). Any materials removed during rehabilitation efforts would be evaluated to determine their value to the national seashore's museum collections and/or for their comparative use in future preservation work at the sites. Stabilization, preservation, and rehabilitation would have *no adverse effect* on historic structures. These actions would result in minor, long term, and beneficial impacts.

Nevertheless, some adverse impacts on historic fabric in historic structures could result from climatic conditions and other natural processes as well as anticipated increases in visitation levels and continuing use for residential, administrative, and interpretive activities. However, these impacts would be minimized to the extent possible by continued law enforcement activities and public education efforts as well as preservation treatment and regular cyclic maintenance as NPS funding and personnel permit. These impacts would not affect the integrity of the structure.

Cumulative Effects. In the past, historic structures in the national seashore have been adversely affected by a variety of human activities such as modern development, routine wear and tear, lack of systematic cyclic maintenance and preservation treatment, and vandalism, and by natural processes such as weathering and pest infestations. Some of these activities and processes have continued to the present and would likely continue if alternative A were implemented.

Other past, present, and reasonably foreseeable future undertakings in the

seashore and its surrounding area would generally be expected to contribute long-term, minor, adverse impacts on historic structures. When combined with the actions proposed in this alternative, these other actions would be expected to have adverse cumulative impacts. The impacts on such resources associated with alternative A, however, would constitute a relatively small component of any overall cumulative impact.

Conclusion. Overall, impacts on historic structures under alternative A would be beneficial or adverse, negligible to minor, and long term. Cumulative impacts on historic structures; under this alternative would be expected to be adverse; however, this alternative's contribution to these effects would constitute a relatively small component of any overall cumulative impact.

Impacts of Implementing Alternative B (The NPS Preferred Alternative)

Analysis. Implementation of alternative B would have the same general impacts on historic structures as those listed under alternative A.

Cumulative Effects. Implementation of alternative B would have the same general cumulative adverse effects on historic structures as those listed under alternative A.

Conclusion. Overall, impacts on historic structures under alternative B would be beneficial or adverse, negligible to minor, and long term. Cumulative impacts on historic structures under alternative B would be expected to be adverse; however, this alternative's contribution to these effects would constitute a relatively small component of any overall cumulative impact.

Section 106 Summary. For alternative B there would be no adverse effects on historic structures in the national seashore.

Impacts of Implementing Alternative C

Analysis. Implementation of alternative C would have the same general impacts on historic structures as those listed under alternative A.

Cumulative Effects. Implementation of alternative C would have the same general cumulative adverse effects on historic structures as those listed under alternative A.

Conclusion. Overall, impacts on historic structures under alternative C would be beneficial or adverse, negligible to minor, and long term. Cumulative impacts under alternative C on historic structures would be expected to be minor and adverse; however, this alternative's contribution to these effects would constitute a relatively small component of any overall cumulative impact.

Section 106 Summary. For alternative C there would be no adverse effects on historic structures in the national seashore.

Impacts of Implementing Alternative D

Analysis. Implementation of alternative D would generally have the same impacts on historic structures as those listed under alternative A.

Cumulative Effects. Implementation of alternative D would have the same general cumulative adverse effects on historic structures as those listed under alternative A.

Conclusion. Overall, impacts on archeological resources under alternative D would be beneficial or adverse, negligible to minor, and long term. Cumulative impacts under this alternative on historic structures would be expected to be adverse; however, this alternative's contribution to these effects would constitute a relatively small component of any overall cumulative impact.

Section 106 Summary. For alternative D there would be no adverse effects on historic structures in the national seashore.

IMPACTS ON CULTURAL LANDSCAPES

Negligible: Impacts would be at the lowest levels of detection — barely perceptible and measurable. For purposes of Section 106, the determination of effect would be no adverse effect.

Minor: Impacts would affect character-defining features or patterns but would not diminish the overall integrity of the landscape. For purposes of Section 106, the determination of effect would be no adverse effect.

Moderate: Impacts would alter character-defining features or patterns, diminishing the overall integrity of the landscape to the extent that its National Register eligibility would be jeopardized. For purposes of Section 106, the determination of effect would be adverse effect.

Major: Impacts would alter character-defining features or patterns, diminishing the overall integrity of the landscape to the extent that it would no longer be eligible to be listed in the National Register. For purposes of Section 106, the determination of effect would be adverse effect.

Impacts of Implementing Alternative A (The No-Action Alternative)

Analysis. Although comprehensive cultural landscape studies have not been conducted for Canaveral National Seashore and the national seashore's cultural landscape inventory has not been completed, a preliminary assessment identified four cultural landscapes – Eldora Historic District, Haulover Canal, Indian River Citrus Landscape, and Seminole Rest — which may have potential for listing in the National Register of Historic Places. Currently, the national seashore plans to conduct a cultural

landscape survey of Seminole Rest and the Eldora historic area.

Under alternative A, as funding and staffing permit, cultural landscapes would continue to be surveyed, inventoried, and evaluated to determine their eligibility for listing in the National Register. This would provide for a long term minor to moderate beneficial impact. To appropriately preserve and protect cultural landscapes, all stabilization, preservation, and rehabilitation efforts, as well as daily, cyclical, and seasonal maintenance, would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995). Stabilization, preservation, and rehabilitation would have a minor long term beneficial impact on cultural landscapes.

Careful design would ensure that new or expanded facilities in the national seashore would minimally affect the scale and visual relationships among landscape features. In addition, the topography, vegetation, circulation features, and land use patterns of cultural landscapes would remain largely unaltered. Few, if any, adverse impacts would be anticipated.

Nevertheless, some long term negligible to minor adverse impacts on elements of identified cultural landscapes, such as vegetation, land use, building and settlement patterns, and views and vistas, could result from climatic changes and other natural processes as well as anticipated increases in visitation levels and encroaching residential and commercial development. However, as funding and staffing permit, these impacts would be minimized to the extent possible by continued law enforcement activities and public education efforts as well as preservation treatment and regular cyclic maintenance. The impacts would not affect the integrity of the cultural landscape.

Cumulative Effects. In the past, cultural landscapes in the national seashore have been subjected to minor adverse affects because of a variety of human activities, including modern development, inadvertent disturb-

ance, vandalism, and lack of systematic preservation treatment, and also by natural processes such as erosion, weathering, and pest infestations. Some of these activities and processes have continued to the present and would likely continue if alternative A were implemented.

Other past, present, and reasonably foreseeable future undertakings in the national seashore and its surrounding area, would generally be expected to contribute long term negligible to moderate adverse impacts to cultural landscapes. When combined with the actions proposed in this alternative, these other actions would be expected to have adverse cumulative impacts. However, the impacts on such resources associated with alternative A would constitute a relatively small component of any overall cumulative impact.

Conclusion. Overall, impacts on cultural landscapes under alternative A would be beneficial or adverse, negligible to minor, and long term. Cumulative impacts on cultural landscapes under this alternative would be expected to be minor to moderately adverse; however, this alternative's contribution to these effects would constitute a relatively small component of any overall cumulative impact.

Impacts of Implementing Alternative B (The NPS Preferred Alternative)

Analysis. Implementation of alternative B would have the same general impacts on cultural landscapes as those listed under alternative A.

Some additional actions under alternative B, however, such as (1) removal and burial of overhead power and telephone lines along the Apollo Beach and Eldora Hammock access roads and parking areas and (2) protection and preservation of key elements of the Eldora State House cultural landscape would have some long term minor beneficial impacts on the national seashore's cultural landscapes

in addition to those impacts described in alternative A.

Cumulative Effects. Implementation of alternative B would have the same general adverse cumulative impacts on cultural landscapes as those listed under alternative A. However, actions under alternative B would have some additional long term minor beneficial impacts on the national seashore's cultural landscapes compared to alternative A.

Conclusion. Overall, impacts on cultural landscapes under alternative B would be beneficial or adverse, negligible to minor, and long term. Cumulative impacts on cultural landscapes under this alternative would be expected to be long term, minor, and adverse; however, this alternative's contribution to these effects would constitute a relatively small beneficial offset of any overall cumulative impact.

Section 106 Summary. For alternative B there would be no adverse effects on cultural landscapes in the national seashore.

Impacts of Implementing Alternative C

Analysis. Implementation of alternative C would have the same general impacts on cultural landscapes in the national seashore as those listed under alternative A.

In addition, actions under alternative C, such as (1) incorporation/improvement of interpretive/access trails throughout the Eldora State House landscape and (2) extension of a foot trail to connect the Eldora State House with the Schultz house, could potentially be a minor, long-term, adverse, impact on identified cultural landscapes in the national seashore. However, careful design would ensure that new or expanded developments would minimally affect the scale and visual relationships among landscape features. Also, the topography, vegetation, circulation features, and land use patterns of cultural landscapes would remain largely unaltered.

Few, if any, additional adverse impacts would be anticipated.

Cumulative Effects. Implementation of alternative C would have the same general cumulative, long-term, minor, adverse impacts on cultural landscapes as those listed under alternative B. However, actions under alternative C would have few, if any, additional adverse impacts on the cultural landscapes compared to alternative A.

Conclusion. Overall, impacts on cultural landscapes under alternative C would be beneficial or adverse, negligible to minor, and long term. Cumulative impacts under alternative C on cultural landscapes would be expected to be adverse; however, this alternative's contribution to these effects would constitute a relatively small component of any overall cumulative impact.

Section 106 Summary. For alternative C there would be no adverse effects on cultural landscapes in the national seashore.

Impacts of Implementing Alternative D

Analysis. Implementation of alternative D would have the same general impacts on cultural landscapes in the national seashore as those listed under alternative A.

Additional actions under alternative D would result in greater protection and preservation of key elements of the Eldora State House cultural landscape. This would provide for additional minor, beneficial, long-term impacts on cultural landscapes in the national seashore.

Cumulative Effects. Implementation of alternative D would have the same general cumulative minor long term adverse impacts on cultural landscapes as those listed under alternative A. Also, actions under alternative D would have long term minor beneficial impacts on the Eldora State House cultural landscape.

Conclusion. Overall, impacts on cultural landscapes under alternative D would be beneficial or adverse, negligible to minor, and long term. Cumulative impacts under this alternative on cultural landscapes would be expected to be minor, long term, and adverse; however, this alternative's contribution to these effects would constitute a relatively small beneficial offset of any overall cumulative impact.

Section 106 Summary. For alternative D there would be no adverse effects on cultural landscapes in the national seashore.

IMPACTS ON ETHNOGRAPHIC RESOURCES

Ethnographic Resources

Potential impacts on ethnographic resources are described in terms of context (are the effects site-specific, local, or even regional?); duration (are the effects short-term—lasting less than five years; long-term—lasting 5 to 20 years; or permanent?); and intensity (is the degree or severity of effect negligible, minor, moderate, or major?).

The thresholds to determine impacts on ethnographic resources are defined as follows.

Negligible: Impacts would be at the lowest levels of detection and barely perceptible. Impacts would neither alter resource conditions, such as traditional access or site preservation, nor alter the relationship between the resource and the associated group's body of practices and beliefs. For purposes of Section 106, the determination of effect would be no adverse effect.

Minor: Impacts would be slight but noticeable and would neither appreciably alter conditions, such as traditional access or site preservation, nor alter the relationship between the resource and the associated group's body of beliefs and practices. For purposes of Section 106, the determination of effect would be no adverse effect.

Moderate: Impacts would be apparent and would alter resource conditions or interfere with traditional access, site preservation, or the relationship between the resource and the associated group's beliefs and practices, even though the group's practices and beliefs would survive. For purposes of Section 106, the determination of effect would be adverse effect.

Major: Impacts would alter resource conditions. Proposed actions would block or greatly affect traditional access, site preservation, or the relationship between the resource and the associated group's body of beliefs and practices to the extent that the survival of a group's beliefs and/or practices would be jeopardized. For purposes of Section 106, the determination of effect would be adverse effect.

Traditional Cultural Properties

A traditional cultural property is "eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community ("National Register Bulletin, Guidelines for Evaluating and Documenting Traditional Cultural Properties").

To date, no traditional cultural properties (ethnographic resources eligible for inclusion in the National Register because of their association with cultural practices or beliefs of a living community) have been identified for Canaveral National Seashore.

Impacts of Implementing Alternative A (The No-Action Alternative)

Analysis. Comprehensive ethnographic studies, such as an ethnographic overview and assessment, have not been conducted but should be done for the national seashore area. However, various studies have identified

cultural resources in the vicinity with ethnographic importance, including the late 19th and early 20th century African American communities of Clifton and Allenhurst that thrived to the north and south of the New Haulover Canal, respectively. Shiloh, a white ethnic enclave north of the Haulover area, was also settled during the post-Civil War era. The continued study and evaluation of these potential ethnographic resources would be a long term, minor, beneficial impact.

Under alternative A, the National Park Service would continue to consult with affiliated Indian tribes and groups to identify, learn about, and develop strategies for preserving and providing access to ethnographic resources and sites of cultural significance to affiliated tribes. This would provide for a long term beneficial, negligible to minor impact to any potential ethnographic resources. The National Park Service would also continue to encourage archeologists, anthropologists, and researchers to consult with the tribes and groups regarding areas of interest that could be included in research efforts and promote ethnographic involvement in excavations and anthropological research.

Overall, impacts from implementing alternative A would be beneficial, negligible to minor, and long term.

Cumulative Effects. In the past, cultural ethnographic resources and sites of cultural importance in the national seashore were likely subjected to minor to moderate adverse impacts by a variety of human activities, such as modern development, exploration, inadvertent disturbance, and vandalism, and by natural processes such as erosion and weathering. Some of these activities and processes have continued to the present and would likely continue for the long term if alternative A were implemented.

Other past, present, and reasonably foreseeable future undertakings in the national seashore and its surrounding area would generally be expected to contribute adverse impacts to potential ethnographic resources. When combined with the actions proposed in

this alternative, these other actions would be expected to have long-term, minor to moderate, adverse cumulative impacts. The beneficial and adverse impacts on such resources associated with alternative A, however, would constitute a relatively small component of any overall cumulative impact.

Conclusion. Overall, the impacts of alternative A on ethnographic resources and sites of cultural importance in the national seashore would be beneficial, negligible to minor and long term. Cumulative effects on ethnographic resources under this alternative would be expected to be adverse; however, this alternative's contribution to these effects would be a relatively small beneficial offset of any overall cumulative effect.

Section 106 Summary. For alternative A there would be no adverse effects on potential ethnographic resources in the national seashore.

Impacts of Implementing Alternative B (The NPS Preferred Alternative)

Analysis. Implementation of alternative B would have the same general impacts on ethnographic resources as those described under alternative A. Overall, impacts from implementing alternative B would be beneficial, minor, and long term.

Cumulative Effects. Implementation of alternative B would have the same general cumulative adverse and beneficial impacts on ethnographic resources as those listed under alternative A.

Conclusion. Overall, the impacts of alternative B on ethnographic resources and sites of cultural importance in the national seashore would be beneficial, minor, and long term. Cumulative effects impacts on ethnographic resources would be expected to be long term, minor to moderate, and adverse; however, this alternative's contribution to these effects would be a relatively small

beneficial offset of any overall cumulative effect.

Section 106 Summary. For alternative B there would be no adverse effects on potential ethnographic resources in the national seashore.

Impacts of Implementing Alternative C

Analysis. Implementation of alternative C would have the same general impacts on ethnographic resources as those listed under alternative A. They would be beneficial, minor, and long term.

In addition, actions under this alternative, such as the development of additional trails, could negatively impact ethnographic resources or access to them, strategies as outlined under alternative A would be implemented to avoid, preserve, or mitigate such impacts. Thus, few, if any, additional adverse impacts on ethnographic resources would be anticipated under alternative C.

Overall, impacts on ethnographic resources from implementing alternative C would be beneficial, negligible to minor, and long term.

Cumulative Effects. Implementation of alternative C would have the same general cumulative adverse effects on ethnographic resources as those listed under alternative A.

Conclusion. Overall, the impacts of alternative C on ethnographic resources and sites of cultural importance in the national seashore would be beneficial, negligible to minor, and long term. Cumulative impacts on ethnographic resources under this alternative would be long term, minor to moderate, and adverse; however, this alternative's contribution to these effects would be a relatively small beneficial offset of any overall cumulative effect.

Section 106 Summary. For alternative C there would be no adverse effects on potential ethnographic resources in the national seashore.

Impacts of Implementing Alternative D

Analysis. Implementation of alternative D would have the same general impacts on ethnographic resources as those listed under alternative A. They would be beneficial, negligible to minor, and long term.

Although additional actions (compared to alternative A) under this alternative, such as the development of additional trails in the Bill's Hill area and a marsh trail at Seminole Rest, could impact ethnographic resources or access to them, strategies as outlined under alternative A would be implemented to avoid, preserve or mitigate such impacts. Thus, few, if any, additional adverse impacts on ethnographic resources would be anticipated under alternative D.

Overall, impacts on ethnographic resources from implementing alternative D would be beneficial, negligible to minor, and long term.

Cumulative Effects. Implementation of alternative D would have the same general cumulative adverse effects on ethnographic resources as those listed under alternative A.

Conclusion. Overall, the impacts of alternative D on any potential ethnographic resources and sites of cultural importance in the national seashore would be beneficial, negligible to minor, and long term. Cumulative impacts in this alternative on ethnographic resources would be e long term, minor to moderate, and adverse; however, this alternative's contribution to these effects would be a relatively small beneficial offset of any overall cumulative effect.

Section 106 Summary. For alternative D there would be no adverse effects on potential ethnographic resources in the national seashore.

IMPACTS ON THE VISITOR EXPERIENCE

METHODOLOGY

This impact topic includes various aspects of visitor use at the Canaveral National Seashore, including the effects on visitor opportunities to experience the national seashore's fundamental resources and values within their natural and cultural settings; opportunities for recreational activities; and opportunities for orientation, interpretation, and education. The analysis is based on how visitor experiences would change with the way management zones were applied in the alternatives and what contributes or detracts from desirable visitor opportunities. The analysis is primarily qualitative rather than quantitative due to the conceptual nature of the alternatives.

The thresholds to determine impacts on the visitor experience are defined as follows.

Negligible: Visitors would likely be unaware of any effects associated with implementation of the alternative. There would be no noticeable change in visitor use and experience or in any defined indicators of visitor satisfaction or behavior.

Minor: Changes in visitor use and/or experience would be detectable, although the changes would be small. Visitors would be aware of the effects associated with the alternative, but the changes would not appreciably alter critical characteristics of the visitor experience or levels of use.

Moderate: Changes in critical characteristics of the visitor experience would be readily apparent, or the number of visitors engaging in an activity or in the use of the national seashore, would be substantially altered. Visitor satisfaction would change as a result of the alternative.

Major: Changes in multiple critical characteristics of the desired experience would be readily apparent. Participation

in desired experiences or in visitation would be considerably changed, and would result in substantial changes in the defined indicators of visitor satisfaction or behavior.

IMPACTS OF IMPLEMENTING ALTERNATIVE A (THE NO-ACTION ALTERNATIVE)

Analysis

Visitor opportunities under alternative A, the no-action alternative, would remain essentially unchanged. Many visitors come to Canaveral National Seashore because of the wide range of outdoor recreational opportunities available, including lagoon and surf fishing, boating, canoeing, surfing, sunbathing, swimming, hiking, and back-country camping. Visitors are also attracted to the wide variety of wildlife viewing opportunities and interpretive and educational programs highlighting the natural and cultural features of the national seashore. Visitors would continue to access these resources by personal vehicle, as a pedestrian, or by boat. There would be no effect on the variety of available visitor opportunities.

During the past 10 years, the trend in annual visitation is slightly down, perhaps due to the economy, terrorism threats, or gas prices. However, as the population grows in the local and Orlando metropolitan area, it is anticipated that visitation would likely increase slightly. Visitation would continue to fluctuate seasonally, rising in the spring and summer and peaking on summer holiday weekends. Visitation would continue to be primarily local and regional.

As visitation increases, there would be corresponding inconveniences for visitors wishing to access certain areas of the national seashore, especially the more

remote beaches found in the north end where there are a limited number of parking spaces. National seashore areas would continue to be closed when parking areas are filled. High-density use and overcrowding might occur in other areas of the national seashore where access is not limited by the capacity of the infrastructure.

Some visitors might be disappointed with the continued lack of conveniences provided at beach access areas, such as fresh water for showers or to simply rinse off, changing stations, and shaded picnic areas.

Projected visitor use levels would result in long-term, minor, adverse effects on the visitor experience.

Cumulative Effects

The context for potential cumulative effects under this impact topic includes the Merritt Island National Wildlife Refuge, John F. Kennedy Space Center, the Intracoastal Waterway, and Canaveral National Seashore. Other past, present, and reasonably foreseeable actions that would affect visitor experience include the following:

Merritt Island National Wildlife Refuge. Various visitor opportunities are available within the Merritt Island National Wildlife Refuge (the refuge). The refuge includes the southern third of the Canaveral National Seashore as well as areas adjacent to the national seashore's western boundary. Visitors have outstanding wildlife viewing, waterfowl hunting, fishing, and boating opportunities. The refuge's visitor information center and the Sandler Education Pavilion at Dummit Cove also provide opportunities for orientation to area resources as well as interpretive and educational programs. The U.S. Fish and Wildlife Service is also considering implementing a number of visitor use enhancements, such as additional interpretive trails, canoe/kayak trails and launch sites, wildlife observation towers, a bike trail

connection between Titusville and the refuge, and interpretive tram service using existing roadways or a portion of the Kennedy Space Center railway. These past, present, and potentially future activities provide a long-term, major, beneficial effect on the visitor experience.

The recently designated pole/troll areas within portions of Mosquito Lagoon are intended to protect seagrass beds and nursery habitat, which in turn would improve the fishery within the lagoon. This would provide a long-term moderate to major benefit for fisherman, although some visitors may perceive these restrictions as an adverse effect on their lagoon boating activities.

Kennedy Space Center. Occasionally, the southern portion of the national seashore including Playalinda Beach, Klondike Beach, and the southern end of Apollo Beach, are closed to the public during the countdown period before space shuttle launches/landings at the Kennedy Space Center. Generally, these are short lived, although some closures continue for several days or longer and can have a profound impact on the visitation and public use programs. Therefore these activities generate intermittent minor to moderate adverse effects on the visitor experience.

There would always be the potential for future temporary and possibly permanent closures of national seashore areas between the north NASA boundary and the southern boundary of the national seashore depending on the changing needs of the space program. The National Aeronautics and Space Administration is considering the addition of commercially built and operated vertical launch facility. At this time, the location has not been finalized.

Intracoastal Waterway. Maintenance dredging of the Intracoastal Waterway by the Army Corp of Engineers within Mosquito Lagoon would continue to improve boating access to and from national seashore waters. Spoil islands, created from

dredged material, parallel the route and support water bird colonies during nesting season, providing wildlife viewing opportunities and visitor use other than during the nesting season. Thus, ongoing dredging operations would continue to provide long-term, localized, visitor benefits of minor intensity.

Canaveral National Seashore. During the past 30 years, the national seashore has developed a number of enhancements to improve visitor access and enjoyment of national seashore features. These include improving beach access; establishing boat ramps; establishing backcountry campsites; providing orientation panels, interpretive trails, waysides, and a visitor contact facility; providing interpretive and educational programs; and rehabilitating and providing access into a number of historic structures. These efforts represent a major long-term beneficial effect on the visitor experience.

The impact of all of these above actions by others in combination with the actions under this alternative on the visitor experience would result in long-term, major, beneficial cumulative effect from the efforts of a number of agencies to provide many different visitor opportunities in the area as well as intermittent minor to major adverse cumulative effect from space center-mandated closures. The contribution of alternative A relative to these cumulative impacts is expected to be a small increment.

Conclusion

Visitors seem satisfied overall with most current opportunities in the national seashore. Maintaining the current level of access and range of visitor opportunities would have no effect on the existing visitor experience. For visitors who would prefer additional improvements in recreation-oriented facilities and boundary markers, or greater access to the Apollo Beach area, continuing the current range of visitor opportunities would result in a long-term, minor adverse impact. Projected increases in visitor use levels would result in a long-term,

minor adverse effect on the visitor experience resulting from inconvenience and crowding. Cumulative impacts on the visitor experience under alternative A would be long term, major, and beneficial, as well as intermittently minor to major and adverse.

IMPACTS OF IMPLEMENTING ALTERNATIVE B (THE NPS PREFERRED ALTERNATIVE)

Analysis

Visitor opportunities under alternative B would be greatly expanded over those offered under alternative A. This includes enhanced interpretive and educational programs, new and improved land- and water-based trail systems, and the possibility of concession-operated weekend shuttle bus service to Apollo Beach. These changes would have a positive impact on visitors wanting to participate in a greater variety of activities and/or wanting greater access to national seashore's features. These improvements would also provide visitors with more opportunities to come into contact with national seashore resources and staff, which would likely increase their knowledge of and appreciation for the area.

Establishing a new visitor contact area within the Playalinda Beach ranger station in the southern portion of the national seashore would allow a greater number of visitors to interact with NPS staff, to learn about national seashore resources, to participate in interpretive and education programs, and to discover the many different recreational opportunities available in the area.

Expanding interpretive and educational programs at Castle Windy, the Eldora historic area, and Seminole Rest would provide a greater variety of learning opportunities for visitors.

Developing bike trail connections between the national seashore and the communities of New Smyrna Beach and Titusville would

introduce a new recreational opportunity, enhance visitor access to national seashore features, and potentially reduce traffic levels on local and national seashore roads.

Providing a concession-operated peak-season weekend shuttle service in to the Apollo Beach area and encouraging the Volusia County's Public Transit System (Votran) to extend bus service into the area could reduce traffic volumes on state route A1A in New Smyrna Beach and on the Apollo Beach Road while also enhancing visitor access to national seashore features.

Developing trailhead parking and interpretive hiking trails in the Bill's Hill area, expanding hiking trail opportunities at Castle Windy, and developing canoe/kayak trails in Mosquito Lagoon would expand the range of recreational opportunities available to visitors.

Redesigning the Apollo Beach entrance station to provide for a vehicle turnaround would enhance visitor safety. Replacing the restroom facilities with more sustainable facilities would enhance visitor convenience. Removing overhead utility lines and placing them underground would enhance scenic views.

The sum effect of the enhancements described above would be substantial, readily apparent, and would likely increase visitor enjoyment of and appreciation for national seashore resources.

Overall visitation is assumed to increase more than under alternative A because of the greater variety of visitor opportunities provided under alternative B. The average length of stay might increase if there is more to do at Canaveral National Seashore. The likelihood of crowding during peak weekends would be high, and the national seashore might be at this peak visitation for longer periods or more weekends during the summer. Visitation, while still primarily local and regional, might attract visitors from farther away.

Increased crowding during the peak weekends could lead to resource degradation and decreased quality of visitor experiences.

Noise levels and conflicts in visitor use might increase as the variety of visitor uses increases. These conflicts would likely reduce the quality of some visitors' experiences.

Projected visitor use levels would result in long-term, minor, adverse effects on the visitor experience.

Under adaptive management, if monitoring revealed desired conditions for carrying capacity were not being achieved under alternative B, corrective management actions such as education, dispersing use, or limiting the total number of visitors in certain areas of the national seashore would be implemented. The potential beneficial effects of these actions on visitor use and experience, from reducing overcrowded conditions, could range from negligible to minor and be short term. However, other visitors could view these restrictions as a negative, resulting in up to minor adverse effects on visitor use and experience that could be short term.

Cumulative Effects

Other past, present, and reasonably foreseeable actions that would cumulatively affect visitor opportunities are presented under alternative A—including those at the Merritt Island National Wildlife Refuge, closures of Kennedy Space Center areas before and after launches, maintaining the dredging of the Intracoastal Waterway, and past additions to the national seashore to enhance visitor experiences.

The impact of the refuge-, NPS-, and Intracoastal Waterway-related actions in combination with the actions under this alternative would result in long-term, major beneficial cumulative effects; space center-related activities, combined with actions under this alternative, would have intermittent, minor to major, adverse

cumulative effects on visitor experience in the region. The contribution of alternative B relative to both these cumulative impacts is expected to be substantial.

Conclusion

The impacts of alternative B would be long term and moderately beneficial for visitors looking for additional recreational opportunities in Canaveral National Seashore. However, there would be some long-term, minor, adverse impacts related to crowding and noise as a result of increased visitation. Depending on future adaptive management direction, additional short-term minor to moderate adverse impacts could be expected. Cumulative impacts on the visitor experience under alternative B would be long term, major, and beneficial as well as intermittent, minor to major, and adverse.

IMPACTS OF IMPLEMENTING ALTERNATIVE C

Analysis

Visitor opportunities under alternative C would be greatly expanded over those offered under alternative A. This includes enhanced interpretive and educational programs, new and improved land- and water-based trail systems, and the possibility of concession-operated activities (shuttle boat tours and recreational equipment rentals). These changes would have a positive impact on visitors wanting to participate in a greater variety of activities or wanting greater access to the national seashore's more remote areas. This would also provide visitors with increased opportunities to come into contact with national seashore resources and staff, which would likely increase their knowledge of and appreciation for the area.

Providing a new centralized visitor center in the Bill's Hill area and establishing a new visitor contact area in the Playalinda Beach ranger station in the southern portion of the

national seashore would allow more visitors to interact with NPS staff, to learn about seashore resources, to participate in interpretive and education programs, and to discover the many different recreational opportunities available in the area.

Expanding interpretive and educational programs at Turtle Mound, Castle Windy, the Eldora historic area, Seminole Rest, Eddy Creek, Haulover Canal (manatee viewing area), and various historic properties in the Joint Management area would provide a greater variety of learning opportunities for visitors.

Providing a water-based shuttle service in Mosquito Lagoon would enhance visitor access to national seashore features and provide an alternative means of experiencing a broader range of resources.

Developing bike trail connections between the national seashore and the communities of New Smyrna Beach and Titusville would introduce a new recreational opportunity, enhance visitor access to national seashore features, and potentially reduce traffic levels on local and national seashore roads.

The range of recreational opportunities available to national seashore visitors would expand with the development of trailhead parking and interpretive, hiking, and horseback riding trails in the Bill's Hill area; expanded hiking trail opportunities into the Eldora Hammock area, Castle Windy, Seminole Rest, and the Joint Management Area; and canoe/kayak trails in Mosquito Lagoon.

Recreational equipment (canoe, kayaks, etc.) rental services provided at the Apollo Beach visitor information center, the Eldora Hammock area, Seminole Rest, Eddy Creek, and the new visitor center at Bill's Hill would provide additional opportunities for visitors to experience national seashore resources.

Expanding some parking areas and redesigning others to accommodate oversized vehicles and redesigning the Apollo Beach

entrance station to provide for a safe vehicle turnaround would allow more visitors to safely experience national seashore features. Replacing the restroom facilities with more sustainable facilities, providing shade shelters, and adding exterior showers at the visitor center would enhance visitor convenience.

The sum effect of the enhancements described above would provide multiple changes, be readily apparent, and would substantially increase visitor enjoyment of and appreciation for national seashore resources.

Overall visitation is assumed to increase more than under alternative A because of the greater variety of visitor opportunities provided under alternative C. The average length of stay might increase if there is more to do at Canaveral National Seashore. The likelihood of crowding during peak weekends would be high, and the national seashore might be at this peak visitation for longer periods or more weekends during the summer. Visitation, while still primarily local and regional, might attract visitors from farther away.

Increased crowding during the peak weekends could lead to resource degradation and decreased quality of visitor experiences.

Noise levels and conflicts in visitor use might increase as the variety of visitor uses increases. These conflicts would likely reduce the quality of some visitors' experiences.

Projected visitor use levels would result in long-term, minor, adverse effects on the visitor experience.

Under adaptive management, if monitoring revealed desired conditions for carrying capacity were not being achieved under Alternative C, corrective management actions such as education, dispersing use, or limiting the total number of visitors in certain areas of the seashore would be implemented. The potential beneficial

effects of these actions on visitor use and experience, from reducing overcrowded conditions, could range from negligible to minor and be short term. However, other visitors could view these restrictions as a negative, resulting in up to minor adverse effects on visitor use and experience that could be short term.

Cumulative Effects

Other past, present, and reasonably foreseeable actions that would cumulatively affect visitor opportunities are presented under alternative A — including activities at the Merritt Island National Wildlife Refuge, closures of Kennedy Space Center areas before and after launches, maintaining the dredging of the Intracoastal Waterway, and past additions to the national seashore to enhance visitor experiences.

The impact of these other refuge-, NPS- and Intracoastal Waterway-related actions, in combination with the actions under this alternative, would result in long-term, major, beneficial cumulative effects; space center-related activities, in combination with actions in this alternative, could result in intermittent, minor to major, adverse cumulative effects on visitor experience in the region. The contribution of alternative C relative to both these cumulative impacts is expected to be substantial.

Conclusion

The impacts of alternative C would be long term, major, and beneficial for visitors looking for additional recreational opportunities in Canaveral National Seashore. However, there would be some long-term, minor, adverse impacts related to crowding and noise as a result of increased visitation. Depending on future adaptive management direction, additional short-term minor to moderate adverse impacts could be expected. Cumulative impacts on the visitor experience under alternative C would be

long term, major, and beneficial as well as intermittent, minor to major, and adverse.

IMPACTS OF IMPLEMENTING ALTERNATIVE D

Analysis

Visitor opportunities under alternative D would be greatly expanded over those offered under alternative A. This includes enhanced interpretive and educational programs, new and improved land- and water-based trail systems, and the possibility of concession-operated recreational equipment rental service at Apollo Beach. These changes would have a positive impact on visitors wanting to participate in a greater variety of activities or wanting greater access to the national seashore's more remote areas. This would also provide visitors with increased opportunities to come into contact with national seashore resources and staff, which would likely increase their knowledge of and appreciation for the area.

Establishing a new visitor contact area in the Playalinda Beach ranger station in the southern portion of the national seashore, would allow more visitors to interact with NPS staff, to learn about national seashore resources, to participate in interpretive and education programs, and to discover the many different recreational opportunities available in the area.

Expanding interpretive and educational programs in the Eldora historic area, Seminole Rest, Eddy Creek, Haulover Canal (manatee viewing area), and various historic properties in the Joint Management Area would provide a greater variety of learning opportunities for visitors.

Developing trailhead parking and interpretive, hiking, and horseback riding trails in the Bill's Hill area, as well as canoe/kayak trails in Mosquito Lagoon, would expand the range of recreational opportunities available to national seashore visitors.

Recreational equipment (canoe, kayaks, etc.) rental services provided at the Apollo Beach visitor information center would provide additional opportunities for visitors to experience national seashore resources.

Redesigning the Apollo Beach entrance station to provide for a vehicle turnaround would enhance visitor safety. Providing an unpaved parking area for horse trailers at Apollo Beach would enhance access. Replacing the restroom facilities with more sustainable facilities and providing exterior showers at a number of locations would enhance visitor convenience.

The sum effect of all the enhancements described above would be substantial and readily apparent, and would likely increase visitor enjoyment of and appreciation for national seashore resources.

Overall visitation is assumed to increase more than under alternative A because of the greater variety of visitor opportunities provided under this alternative. The average length of stay might increase if there is more to do at Canaveral National Seashore. The likelihood of crowding during peak weekends would be high, and the national seashore might be at this peak visitation for longer periods or more weekends during the summer. Visitation, while still primarily local and regional, might attract new visitors from farther away.

Increased crowding during the peak weekends could lead to resource degradation and decreased quality of visitor experiences.

Noise levels and conflicts in visitor use might increase as the variety of visitor uses increases. These conflicts would likely reduce the quality of some visitors' experiences.

Projected visitor use levels would result in long-term, minor, adverse effects on the visitor experience.

Under adaptive management, if monitoring revealed desired conditions for carrying

capacity were not being achieved under alternative D, corrective management actions such as education, dispersing use, or limiting the total number of visitors in certain areas of the seashore would be implemented. The potential beneficial effects of these actions on visitor use and experience, from reducing overcrowded conditions, could range from negligible to minor and be short term. However, some visitors could view these restrictions as a negative, resulting in up to minor adverse effects on visitor use and experience that could be short term.

Cumulative Effects

Other past, present, and reasonably foreseeable actions that would cumulatively affect visitor opportunities are presented under alternative A — including activities at the Merritt Island National Wildlife Refuge, closures of Kennedy Space Center areas before and after launches, maintaining the dredging of the Intracoastal Waterway, and past additions to the national seashore to enhance visitor experiences.

The impact of the refuge-, NPS-, and Intracoastal Waterway-related activities, in combination with the actions under this alternative, would result in long-term, major, beneficial cumulative effects; space center-related activities, in combination with actions in this alternative, would result in intermittent, minor to major, adverse cumulative effects on visitor experience in the region. The contribution of alternative D relative to both these cumulative impacts is expected to be substantial.

Conclusion

The impacts of alternative D would be long term and moderately beneficial for visitors looking for additional opportunities in Canaveral National Seashore. However, there would be some long-term, minor, adverse impacts related to crowding and noise as a result of increased visitation. Depending on future adaptive management direction, additional short-term minor to moderate adverse impacts could be expected. Cumulative impacts on the visitor experience under alternative D would be long term, major, and beneficial as well as intermittent, minor to major, and adverse.

IMPACTS ON NATIONAL SEASHORE OPERATIONS

METHODOLOGY

This impact topic refers to the ability of NPS staff to protect and preserve national seashore resources and to provide opportunities for effective and enjoyable visitor experiences. It also addresses the effectiveness and efficiency with which NPS staff is able to perform such tasks. Information about national seashore operations was compiled from various sources, especially Canaveral National Seashore managers and other NPS staff. The analysis is qualitative rather than quantitative because of the conceptual nature of the alternatives. Consequently, professional judgment was used to reach reasonable conclusions as to the intensity, duration, and type of potential impact.

The thresholds to determine impacts on national seashore operations are defined as follows.

Negligible: Effects on national seashore operations would be at or below the level of detection.

Minor: Effects on national seashore operations would be small but detectable. The change would be noticeable to staff but probably not to the public.

Moderate: Effects on national seashore operations would be readily apparent to staff and possibly to the public.

Major: Effects on national seashore operations would be substantial, widespread, and apparent to staff and the public.

IMPACTS OF IMPLEMENTING ALTERNATIVE A (THE NO-ACTION ALTERNATIVE)

Analysis

Under alternative A, national seashore operations would be conducted much as they are now. The main NPS administrative

space would continue to be in a leased structure in Titusville, with district operational support located in structures at Apollo Beach, Playalinda Beach, and Seminole Rest. National seashore operations would continue to address (1) resource protection and management demands (e.g., inventory and monitoring of resources conditions, applied research, and prescribed fire programs); (2) visitor-related operational demands (e.g., interpretive services and patrols); and (3) facility management demands (e.g., visitor information centers, historic and modern structures, docks, ramps, roads, trails, parking areas, and utilities).

Additional staffing needs (4 FTE) have been identified and authorized to fully support the national seashore's operations, although current funding levels do not support this level of staffing. Until funding levels allow a fully staffed operation, the national seashore would be unable to fully achieve desired conditions in program areas such as resource protection, visitor services, and cyclic maintenance. Therefore, the no-action alternative would have continuing long-term, minor to moderate, adverse impacts on national seashore operations.

Cumulative Effects

The national seashore preserves and manages the natural setting and recreational opportunities surrounded by and/or in coordination with the Merritt Island National Wildlife Refuge, the John F. Kennedy Space Center, and the Saint Johns Water Management District. Also, the communities of Titusville, Oak Hill, and New Smyrna Beach continue to grow. The policies and decisions of these communities in relationship to transportation, economic, recreational, and growth management can influence and/or impact the management of the national seashore.

Interacting and coordinating with all these entities/organizations require NPS managers to participate in civic engagement, community problem-solving, and monitoring, and in providing input and technical assistance. All these efforts require NPS staff time and funds.

Overall, the impacts of other past, present, and reasonably foreseeable actions just described would continue to be long term, minor, and adverse on national seashore operations.

The impacts of proposed actions of this alternative on national seashore operations, combined with the actions of other past, present, and reasonably foreseeable actions of others, would have a minor, long-term, adverse cumulative impact on the national seashore operations and staff. The contribution this alternative to these cumulative impacts would be negligible.

Conclusion

Alternative A would likely continue to have a long-term, minor to moderate, adverse impact on national seashore operations. There would continue to be a long-term, minor, adverse cumulative impact on operations resulting from increased demands on national seashore resources and the need for NPS managers to focus on local and regional issues. The contribution of alternative A to these cumulative impacts would be negligible.

IMPACTS OF IMPLEMENTING ALTERNATIVE B (THE NPS PREFERRED ALTERNATIVE)

Analysis

Under alternative B, the following actions would impact NPS operational responsibilities: (1) increasing the monitoring of resource conditions within Mosquito Lagoon and the Bill's Hill area would require

an increase in resource management and law enforcement efforts/staff; (2) expanding interpretive and educational programs at Apollo Beach, the Eldora historic area, Seminole Rest, and the Bill's Hill area would require an increase in interpretive staff; (3) establishing additional hiking and canoe/kayak trails would require an increase in the level of maintenance and resource monitoring staff; (4) establishing a new visitor contact center in the Playalinda Beach ranger station would require an increase in interpretive staff; (5) acquiring the 10-acre Stuckey property would require an increase in resource management and law enforcement staff; and (6) establishing shuttle service through either Volusia County Transit or a commercial vendor would require additional administrative staff.

An additional 10.5 NPS FTE employees would be required to support this increase in management activities. The increased staffing would have a moderate, long-term, adverse impact on the NPS operating budget. However, increased staffing for the actions listed above would have a moderate, long-term, beneficial impact on the operations and management needed to effectively support the protection of natural and cultural resources and visitor enjoyment.

NPS operational efficiencies would be enhanced by the following actions: (1) increasing the coordination effort with other land-managing partners would enhance the efficiency of the resource management program efforts; (2) reconfiguring the entrance area to Apollo Beach would enhance management of the area; (3) reconfiguring the Apollo Beach maintenance complex would improve operational efficiency; (4) replacing the existing chemical restroom facilities with a more sustainable system would reduce cyclic maintenance needs; (5) possibly relocating the lifeguard operations to the Eddy Creek area would improve response time for tending to emergency situations on Playalinda Beach; and (6) possibly consolidating the NPS administrative and South District maintenance functions with the USFWS

maintenance operations would improve interagency communication and management of the area. Moderate, long-term, beneficial impacts on national seashore operations would result from the implementation of these enhanced efficiencies.

Cumulative Effects

The national seashore preserves and manages the natural setting and recreational opportunities surrounded by and/or in coordination with the Merritt Island National Wildlife Refuge, the John F. Kennedy Space Center, and the Saint Johns Water Management District. Also, the communities of Titusville, Oak Hill, and New Smyrna Beach continue to grow. The policies and decisions of these communities in relationship to transportation, economic, recreational, and growth management can influence and/or impact the management of the national seashore.

Interacting and coordinating with all these entities/organizations require NPS managers to participate in civic engagement, community problem-solving, and monitoring, and in providing input and technical assistance. All these efforts require NPS staff time and funds.

Overall, the impacts of other past, present, and reasonably foreseeable actions just described would continue to be long term, minor, and adverse on national seashore operations.

The impacts of proposed actions of this alternative on national seashore operations, combined with the actions of other past, present, and reasonably foreseeable actions of others, would have a minor, long-term, adverse cumulative impact on the national seashore operations and staff. The contribution of this alternative to these cumulative impacts would be noticeable beneficial offset.

Conclusion

Under alternative B impacts on national seashore operations would be long term, moderate, and both adverse and beneficial. Adverse impacts would result from an increasing management and operational responsibilities and increases in capital and operating costs. Beneficial impacts would result from operational efficiencies and resulting enhanced visitor services and programs. An increase of staff would ensure smooth and effective programs and services for visitors, which would be beneficial. Cumulative impacts on national seashore operations under alternative B would be long term, minor and adverse. Alternative B's contribution to these cumulative effects would be a noticeable beneficial offset.

IMPACTS OF IMPLEMENTING ALTERNATIVE C

Analysis

Under alternative C, the following actions would impact NPS operational responsibilities: (1) increasing the monitoring of resource conditions within Mosquito Lagoon and the Bill's Hill area would require an increase in resource management and law enforcement efforts/staff; (2) establishing a centralized visitor center/administrative headquarters and maintenance complex in the Bill's Hill area would increase facility maintenance responsibilities; (3) consolidating the maintenance operation in the Bill's Hill area would increase the travel time needed for maintenance staff to attend to maintenance needs at major beach use areas; (4) expanding interpretive and educational programs at Apollo Beach, Turtle Mound, Castle Windy, the Eldora historic area, Seminole Rest, Bill's Hill, Eddy Creek, Haulover Canal (manatee viewing area), and various historic properties in the Joint Management area would require an increase in interpretive staff; (5) establishing a new visitor contact center at the Playalinda Beach ranger station would require an increase in interpretive staff; (6) establishing additional

biking, hiking, horseback riding, and canoe/kayak trails would require an increase in the level of maintenance and resource monitoring; (7) establishing commercial shuttle/interpretive boat tours, sundry sales, and recreational equipment rental services would require additional administrative support; and (8) acquiring the 10-acre Stuckey property would require an increase in resource management and law enforcement efforts.

An additional 15.5 NPS FTE employees would be required to support this increase in management activities. The increased staffing would have a moderate, long-term, adverse impact on the NPS operating budget. However, increased staffing for the actions listed above would have a moderate, long-term, beneficial impact on the operations and management needed to effectively support the protection of natural and cultural resources and visitor enjoyment.

NPS operational efficiency would be enhanced by the following actions: (1) increasing the coordination effort with other land-managing partners would enhance the efficiency of the resource management program efforts; (2) reconfiguring the entrance area to Apollo Beach would enhance management of the area; (3) replacing the existing chemical restroom facilities with a more sustainable system would reduce cyclic maintenance needs; (4) relocating the lifeguard operations to the Eddy Creek area would improve response time for emergency situations on Playalinda Beach; and (5) consolidating NPS North and South district maintenance support functions in the Bill's Hill area would improve communication and coordination with staff and reduce duplication of supplies, materials, and equipment. Moderate to major, long-term, beneficial impacts on national seashore operations would result from the implementation of these enhanced efficiencies.

Cumulative Effects

The national seashore preserves and manages the natural setting and recreational opportunities surrounded by and/or in coordination with the Merritt Island National Wildlife Refuge, the John F. Kennedy Space Center, and the Saint Johns Water Management District. Also, the communities of Titusville, Oak Hill, and New Smyrna Beach continue to grow. The policies and decisions of these communities in relationship to transportation, economic, recreational, and growth management can influence and/or impact the management of the national seashore.

Interacting and coordinating with all these entities/organizations require NPS managers to participate in civic engagement, community problem-solving, and monitoring, and in providing input and technical assistance. All these efforts require NPS staff time and funds.

Overall, the impacts of other past, present, and reasonably foreseeable actions just described would continue to be long term, minor, and adverse on national seashore operations.

The impacts of proposed actions of this alternative on national seashore operations, combined with the actions of other past, present, and reasonably foreseeable actions of others, would have a minor, long-term, adverse cumulative impact on the national seashore operations and staff. The contribution of this alternative to these cumulative impacts would be noticeable beneficial offset.

Conclusion

Under alternative C impacts on national seashore operations would be long term, moderate, and both adverse and beneficial. Adverse impacts would result from an increasing management and operational responsibilities and increases in capital and operating costs. Beneficial impacts would

result from operational efficiencies and resulting enhanced visitor services and programs. An increase of staff would ensure smooth and effective programs and services for visitors, which would be beneficial. Cumulative impacts on national seashore operations under alternative C would be long term, minor and adverse. Alternative C's contribution to these cumulative effects would be a noticeable beneficial offset.

IMPACTS OF IMPLEMENTING ALTERNATIVE D

Analysis

Under alternative D, the following actions would impact NPS operational responsibilities: (1) increasing the monitoring of resource conditions within Mosquito Lagoon and the Bill's Hill area would require an increase in resource management and law enforcement efforts/staff; (2) expanding interpretive and educational programs at Apollo Beach, Eldora historic area, Seminole Rest, Bill's Hill, Eddy Creek, Haulover Canal (manatee viewing area), and various historic properties in the Joint Management Area would require an increase in interpretive staff; (3) establishing additional hiking, horseback riding, and canoe/kayak trails would require an increase in the level of maintenance and resource monitoring; (4) establishing a new visitor contact center in the Playalinda Beach ranger station would require an increase in interpretive staff; and (5) acquiring the 10-acre Stuckey property would require an increase in resource management and law enforcement efforts/staff.

An additional 12.5 NPS FTE employees would be required to support this increase in management activities. The increased staffing would have a moderate, long-term, adverse impact on the NPS operating budget. However, increased staffing for the actions listed above would have a moderate, long-term, beneficial impact on the operations and management needed to

effectively support the protection of natural and cultural resources and visitor enjoyment.

NPS operational efficiencies would be enhanced by the following actions: (1) increasing the coordination effort with other land-managing partners would enhance the efficiency of the resource management program; (2) reconfiguring the entrance area to Apollo Beach would enhance management of the area; (3) reconfiguring the Apollo Beach maintenance complex would improve operational efficiency; and (4) replacing the chemical restroom facilities with a more sustainable system would reduce cyclic maintenance needs; (5) relocating the lifeguard operations to the Eddy Creek area would improve response time for emergency situations on Playalinda Beach; and (6) consolidating the NPS South District maintenance functions with the USFWS maintenance complex would improve interagency communication and management of the area. Moderate, long-term, beneficial impacts on national seashore operations would result from the implementation of these enhanced efficiencies.

Cumulative Effects

The national seashore preserves and manages the natural setting and recreational opportunities surrounded by and/or in coordination with the Merritt Island National Wildlife Refuge, the John F. Kennedy Space Center, and the Saint Johns Water Management District. Also, the communities of Titusville, Oak Hill, and New Smyrna Beach continue to grow. The policies and decisions of these communities in relationship to transportation, economic, recreational, and growth management can influence and/or impact the management of the national seashore.

Interacting and coordinating with all these entities/organizations require NPS managers to participate in civic engagement, community problem-solving, and

monitoring, and in providing input and technical assistance. All these efforts require NPS staff time and funds.

Overall, the impacts of other past, present, and reasonably foreseeable actions just described would continue to be long term, minor, and adverse on national seashore operations.

The impacts of proposed actions of this alternative on national seashore operations, combined with the actions of other past, present, and reasonably foreseeable actions of others, would have a minor, long-term, adverse cumulative impact on the national seashore operations and staff. The contribution of this alternative to these cumulative impacts would be a noticeable beneficial offset.

Conclusion

Under alternative D impacts on national seashore operations would be long term, moderate, and both adverse and beneficial. Adverse impacts would result from an increasing management and operational responsibilities and increases in capital and operating costs. Beneficial impacts would result from operational efficiencies and resulting enhanced visitor services and programs. An increase of staff would ensure smooth and effective programs and services for visitors, which would be beneficial. Cumulative impacts on national seashore operations under alternative D would be long term, minor and adverse. Alternative D's contribution to these cumulative effects would be a noticeable beneficial offset.

IMPACTS ON REGIONAL SOCIOECONOMICS

METHODOLOGY

Socioeconomic impacts were determined based on applied logic, professional expertise, and professional judgment. The factors considered to identify and discuss potential impacts were economic data, historic visitor use data, expected future visitor use, and proposed developments within the national seashore by the National Park Service. A mostly qualitative analysis was completed at this time given the available data however, this is sufficient to compare the impacts of alternatives for decision-making purposes.

Potential impacts on the socioeconomic environment are described in terms of context, duration, and intensity. The definitions of those terms for the local and regional economy are described below.

Context

Local: These impacts affect businesses or individuals that are mostly in towns or communities adjacent to or near the national seashore's boundary, such as Cocoa, Titusville, Oak Hill, Edgewater, and New Smyrna Beach.

Regional: These impacts affect businesses or individuals mostly within Brevard and Volusia counties. Local impacts are part of the regional impacts.

Intensity Definitions

Negligible: The effects on socioeconomic conditions are below or just barely at the level of detection.

Minor: The effects on socioeconomic conditions are small but detectable, and only affect a small number of firms and/or a small portion of the population. The impact is slight and not detectable outside the affected area.

Moderate: The effects on socioeconomic conditions are readily apparent. Any effects result in changes to socioeconomic conditions on a local scale (e.g., a nearby town or community) within the affected area.

Major: The effects on socioeconomic conditions are readily apparent. Measurable changes in social or economic conditions at the county or two-county level occur. The impact is severely adverse or exceptionally beneficial within the affected area.

Duration of Impact

Short term refers to a limited lifetime of three years (or less) that an impact would occur, or the time it takes for a contracted piece of work, services, or purchase of goods to be completed — e.g., building a visitor center has a short-term impact during which funds are expended beginning with design and construction and ending with opening the visitor center to the public. In some instances, a short-term impact could last longer than three years, but it would have a finite lifetime.

Long term refers to an open-ended or unlimited lifetime. Hiring NPS staff and providing annual operating funds is an on-going, long-term, open-ended commitment that would occur for the life of the national seashore, i.e., indefinitely.

IMPACTS OF IMPLEMENTING ALTERNATIVE A (THE NO-ACTION ALTERNATIVE)

Regional and Local Economy

Canaveral National Seashore is maintained as a unit of the national park system with deferred maintenance items corrected over the life of this plan. Only a short list of minor capital improvements would be completed — for example, retrofitting the Eldora State

House to make it handicapped accessible and rehabilitating impacted primary dune areas where social trails are present. These one-time costs would amount to \$10.3 million. The national seashore would continue to be a visitor attraction along the Atlantic Coast of Volusia and Brevard counties. The national seashore's emphasis on presenting an undeveloped character and uncrowded visitor experiences would remain unique along the Florida coast. NPS maintenance, operations, procedures, and programs would continue as they are now, and NPS staff would continue to react to problems as situations occur and personnel and funding allow. Current conditions and trends would continue, which may foretell some deterioration of national seashore resources and/or the visitor experience during the next 20 years. However, the National Park Service would continue to be a powerful draw for visitors, and the national seashore would remain open for visitors, providing the best visitor experience possible with available resources.

As time passes, the national seashore would continue to be important to the local and regional tourism industry. Visitation has shown a downward trend during the last few years, but turned up in 2007. Visitor use is likely to increase slightly over the long term. Many factors affect visitation (gas prices, state of the economy, etc.) and would affect out-of-region visitors (the ones most likely to stay for extended times in the region and spend money on food and drink, lodging, souvenirs, etc.) Population increases and better economic times tend to increase visitation to national parks. Local and regional visitor-related businesses and their employees would continue to benefit from tourism spending as visitors travel to and from the national seashore. Businesses and their employees in the local gateway towns and region who cater to national seashore visitors would continue experience negligible to minor, beneficial, economic impacts during the long term.

Costs of Implementing Alternative A

The no-action alternative proposes \$115,000 in capital improvements along with taking care of nearly \$6.24 million worth of deferred maintenance backlogged items, including about \$5.2 million for roads. Annual operations, maintenance, and leasing costs would bring the total annual operating costs to \$2.6 million. New construction expenditures would have a minor, beneficial, short-term impact on the regional economy. Operations and maintenance expenditures would have a minor, beneficial, long-term impact on the regional economy.

Cumulative Effects

The Kennedy Space Center is planning to allow private development of a vertical launch facility within its boundaries that would then be leased to a third party for commercial operation. The extent of the development is unknown at this time, but it could be substantial and provide jobs and income for the construction industry. The space center is also realigning its work program and changing the total workforce as it transitions from the space shuttle program to the constellation moon-landing program. This action would likely have long-term but unknown impacts on the local economies of Titusville and surrounding areas, including Volusia and Brevard counties.

Construction and development in the national seashore and in the space administration's boundaries would have major, short-term, beneficial socioeconomic impacts on the regional economy. Large workload changes would have long-term socioeconomic impacts on the region with unknown consequences. However, the contribution of alternative A to these cumulative impacts would be very small.

Conclusion

Over time, expenditures by visitors traveling to the national seashore would continue to have beneficial effects on the local and regional economies. These impacts would be

short and long term for most visitor-related businesses and their employees. The annual NPS operational expenditures would have a long-term and negligible to minor beneficial impact on the regional economy.

The deferred maintenance, rehabilitation, and other new work proposed under this alternative would provide one-time, short-term, minor, beneficial impacts on the regional economy. The impacts of other actions, together with the impacts of alternative A, would result in short- and long-term minor beneficial cumulative effects. The contribution of this alternative to these cumulative impacts would be very small.

IMPACTS OF IMPLEMENTING ALTERNATIVE B (THE NPS PREFERRED ALTERNATIVE)

Regional and Local Economy

The actions of alternative B would clear up a backlog of deferred maintenance, implement a series of capital improvements, conduct a series of studies, and put Canaveral National Seashore into a proactive mode of management for the 21st century. Some of the improvements would be burying overhead powerlines, possibly relocating maintenance functions to the USFWS maintenance area, and expanding interpretive opportunities and visitor access to national seashore resources. The national seashore's headquarters and administrative functions would be moved from leased space in Titusville to a multi-agency facility on the road to Playalinda Beach.

Additional planning efforts and studies for resource stewardship, fisheries management, archeological surveys, a user capacity study, etc., would also be part of the national seashore's new operations. The National Park Service would increase staffing levels by 10.5 full time positions and fiscal resources (including one-time costs of \$28.9 million) to maintain the national seashore and provide for the adequate protection of national

seashore resources and for safe and high-quality visitor experiences.

Increased capital expenditures and additional staff compared to the no-action alternative would result in improved facilities, better service for the public, improved visitor experiences, and better protection for national seashore resources. The national seashore would continue to be an important visitor attraction along the Atlantic Coast of Volusia and Brevard counties. Improved facilities and opportunities would result in improved visitor experiences and likely in repeat visitation, especially from people outside the region. The tourism industry thrives on repeat visitation, which is good for the local and regional businesses (sales and income) and their employees (jobs and earnings). These conditions would result in minor, beneficial, and long-term impacts on the local and regional economies.

Costs of Implementing Alternative B

Alternative B calls for more than \$26.9 million in capital improvements (including deferred maintenance) and an additional \$2 million for future planning and studies regarding various national seashore resources. This represents an additional \$18.6 million more in expenditures than in alternative A. Annual operational costs are estimated at \$3.3 million, approximately \$0.8 million more than alternative A. These maintenance, improvement, and research expenditures would have a minor, beneficial, and short-term impact on the regional economy. Operational expenditures would have a minor, beneficial, long-term impact on the regional economy.

This alternative also calls for increasing the NPS staff by 10.5 full time positions more than the current level of staffing under alternative A (annual increase in cost of approximately \$785,000) to continue current and proposed management programs. Although very important to the national seashore and staff (especially the new hires), these additions would have negligible, beneficial, long-term impacts on the regional economy.

Cumulative Effects

The Kennedy Space Center is planning to allow private development of a vertical launch facility within its boundaries that would then be leased to a third party for commercial operation. The extent of the development is unknown at this time, but it could be substantial and provide jobs and income for the construction industry. The space center is also realigning its work program and changing the total workforce as it transitions from the space shuttle program to the constellation moon-landing program. This action would likely have long-term but unknown impacts on the local economies of Titusville and surrounding areas, including Volusia and Brevard counties.

Construction and development in the national seashore and in the space administration's boundaries would have major, short-term, beneficial socioeconomic impacts on the regional economy. Large workload changes would have long-term socioeconomic impacts on the region with unknown consequences. However, the contribution of alternative B to these cumulative impacts would be very small.

Conclusion

Expenditures by visitors traveling to the national seashore would continue to have minor beneficial effects on the local and regional economy. These impacts would be long term on a local and regional basis for most visitor-related businesses and their employees. The deferred maintenance, rehabilitation, and additional new miscellaneous work proposed under this alternative would provide one-time, short-term, minor, beneficial impacts on the regional economy. The national seashore's annual expenditures and employee expenditures in the local and two-county regional economy would provide long-term, minor, beneficial impacts.

The impacts of NASA-related construction activity, together with the impacts of actions proposed in alternative B, would result in

short-term, moderate, beneficial cumulative effects, mostly for the construction industry. Likely changes in the space center workforce and the national seashore's small increase in its workforce would result in long-term impacts on the regional economy of unknown consequences. The contribution of alternative B to these cumulative impacts would be beneficial but very small.

IMPACTS OF IMPLEMENTING ALTERNATIVE C

Regional and Local Economy

Alternative C includes capital improvements that would be designed to manage the national seashore effectively while providing visitors with a range of cultural, educational, and recreational options as well as choices for various land- and water- based modes of travel. Besides completing the backlog of deferred maintenance, alternative C proposes many construction, demolition, and rehabilitation projects that would amount to a one-time cost of about \$43.1 million — for example, a new visitor center/headquarters facility and a centralized maintenance facility would be built in the Bill's Hill location to improve visitor services and national seashore operations. Bike paths, interpretive trails, and parking at trailheads would provide further access to national seashore resources for the public.

Additional planning efforts and studies (costing about \$2.0 million) for resource stewardship, fisheries management, archeological surveys, a user capacity study, etc., would aid in the proactive management of the national seashore. In addition, 11 full-time-equivalent permanent employees and 4.5 full-time-equivalent seasonal employees would be added to the NPS staff.

Increased capital expenditures and additional staff, compared to the no-action alternative, would result in improved facilities, better service for the public, improved visitor experiences, and better protection for resources. The national seashore would continue to be

an important visitor attraction along the Atlantic Coast of Volusia and Brevard counties. Improved facilities and opportunities would result in improved visitor experiences and likely in repeat visitation, especially from people outside the region. The tourism industry thrives on repeat visitation, which is good for the local and regional businesses (sales and income) and their employees (jobs and earnings). These conditions would result in minor, beneficial, and long-term impacts on the local and regional economies.

Costs of Implementing Alternative C

Nearly \$43.1 million in capital improvements and \$2 million for future planning and studies for various resources would be required in alternative C. Annual operational costs are estimated at \$3.6 million. These improvements and research expenditures would be a minor, beneficial, and short-term impact on the regional economy. Operational expenditures would be a minor, beneficial, and long-term impact on the regional economy.

This alternative also calls for increasing the NPS staff by 11 permanent full-time-equivalent employees and 9 seasonal workers (4.5 full-time-equivalent employees)—for an additional annual cost of about \$1,091,000—to continue current and proposed management programs. Alternative C has a total staffing level of 63.5 full-time-equivalent employees—15.5 full-time-equivalent employees higher than the no-action alternative. Although very important to the national seashore and staff (especially the new hires), these additions would have a negligible, beneficial, long-term impact on the regional economy.

Cumulative Effects

The Kennedy Space Center is planning to allow private development of a vertical launch facility within its boundaries that would then be leased to a third party for commercial operation. The extent of the development is

unknown at this time, but it could be substantial and provide jobs and income for the construction industry. The space center is also realigning its work program and changing the total workforce as it transitions from the space shuttle program to the constellation moon-landing program. This action would likely have long-term but unknown impacts on the local economies of Titusville and surrounding areas, including Volusia and Brevard counties.

Construction and development in the national seashore and in the space administration's boundaries would have major, short-term, beneficial socioeconomic impacts on the regional economy. Large workload changes would have long-term, socioeconomic impacts on the region. However, the contribution of alternative C to these cumulative impacts would be very small.

Conclusion

Expenditures by visitors traveling to the national seashore would continue to have minor beneficial effects on the local and regional economies. These impacts would be long term on a local and regional basis for most visitor-related businesses and their employees. The deferred maintenance, rehabilitation, and additional new miscellaneous work proposed under this alternative would provide one-time short-term, minor, beneficial impacts on the regional economy. The national seashore's annual expenditures and employee expenditures in the local and two-county regional economy would provide long-term, minor beneficial impacts.

The impacts of NASA-related construction activity, together with the impacts of actions proposed in alternative C, would result in short-term, moderate, beneficial cumulative effects, mostly for the construction industry. Likely changes in the space center workforce and the national seashore's small increase in its workforce would result in long-term impacts on the regional economy of unknown consequences. The contribution of alternative B to these cumulative impacts would be beneficial but very small.

IMPACTS OF IMPLEMENTING ALTERNATIVE D

Regional and Local Economy

Alternative D promotes a limited level of new development and also completes the backlog of deferred maintenance. There would be an emphasis on improving operations and maintenance efficiencies, protecting the resource, and enhancing the visitor experience. Considerable effort would be directed to providing interpretive waysides, exhibits, and opportunities for the public to experience and learn about national seashore resources. The administrative/headquarters would be in a leased facility outside the national seashore boundaries.

Additional planning efforts and studies for resource stewardship, fisheries management, archeological surveys, a user capacity study, etc., would also be part of the national seashore's new operations. Key to this alternative would be the increase in permanent staff by 10 full-time-equivalent employees and one-time costs of \$42.1 million for construction and programs to maintain the national seashore and provide for the adequate protection of resources and safe and high-quality visitor experiences.

Increased capital expenditures and additional staff compared to the no-action alternative would result in improved facilities, better service for the public, improved visitor experiences, and better protection for resources. The national seashore would continue to be an important visitor attraction along the Atlantic Coast of Volusia and Brevard counties. Improved facilities and opportunities would result in improved visitor experiences and likely in repeat visitation, especially from people outside the region. The tourism industry thrives on repeat visitation, which is good for the local and regional businesses (sales and income) and their employees (jobs and earnings). These conditions would result in minor, beneficial, and long-term impacts on the local and regional economies.

Costs of Implementing Alternative D

Alternative D proposes \$21.6 million in capital improvements and \$2 million for future planning and studies regarding various resources of the national seashore. Annual operational costs are estimated at \$3.5 million. These maintenance, improvement, and research expenditures would be a minor, beneficial, short-term impact on the regional economy. Operational expenditures would result in minor, beneficial, and long-term impacts on the regional economy.

An increase of 12.5 NPS permanent full-time-equivalent employees, two not to exceed one-year workers and one STEP (student temporary educational program) worker would be needed to continue current and proposed management programs. Alternative D has a total staffing level of 60.5 full-time-equivalent employees — 12.5 full-time-equivalent employees than the no-action alternative. Although very important to the national seashore and staff (especially the new hires), these additions would result in negligible, beneficial, long-term impacts on the regional economy.

Cumulative Effects

The Kennedy Space Center is planning to allow private development of a vertical launch facility within its boundaries that would then be leased to a third party for commercial operation. The extent of the development is unknown at this time, but it could be substantial and provide jobs and income for the construction industry. The space center is also realigning its work program and changing the total workforce as it transitions from the space shuttle program to the constellation moon-landing program. This action would likely have long-term but unknown impacts on the local economies of Titusville and surrounding areas, including Volusia and Brevard counties.

Construction and development in the national seashore and in the space administration's boundaries would have major, short-term, beneficial socioeconomic impacts on the

regional economy. Large workload changes would have long-term socioeconomic impacts on the region with unknown consequences. However, the contribution of alternative D to these cumulative impacts would be very small.

Conclusion

Expenditures by visitors traveling to the national seashore would continue to have minor beneficial effects on the local and regional economies. These impacts would be long term on a local and regional basis for most visitor-related businesses and their employees. The deferred maintenance, rehabilitation, and new work proposed under this alternative would provide one-time, short-term, minor, beneficial impacts on the

regional economy. The national seashore's annual expenditures and employee expenditures in the local gateway communities and two-county regional economy would provide long-term, minor, beneficial impacts.

The impacts of NASA-related construction activity, together with the impacts of actions proposed in alternative D, would result in short-term, moderate, beneficial cumulative effects, mostly for the construction industry. Likely changes in the space center workforce and the national seashore's small increase in its workforce would result in long-term impacts on the regional economy of unknown consequences. The contribution of alternative D to these cumulative impacts would be beneficial but very small.

OTHER REQUIRED ANALYSES

UNAVOIDABLE ADVERSE IMPACTS

Under all of the alternatives, some negligible to moderate impacts to soils, vegetation, wildlife, soundscape, and water resources caused by recreational use and facilities would be essentially unavoidable (e.g., soil compaction, vegetation trampling, and wildlife disturbances). In some areas, increases in visitor use may have low level adverse impacts on visitor experience (e.g. higher visitor numbers at docks or on trails.)

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are actions that result in loss of resources that cannot be reversed. Irretrievable commitments of resources are actions that result in the loss of resources but only for a limited period of time.

With the exception of consumption of fuels and raw materials for maintenance or construction activities, there would be no irreversible or irretrievable commitments of resources under any of the alternatives.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Under all alternatives, the national seashore would continue to be used by the public, and most areas would be protected in a natural state. The National Park Service would continue to manage the national seashore to maintain ecological processes and native biological communities and to provide appropriate recreational opportunities consistent with the preservation of cultural and natural resources. Actions would be taken with care to minimize adverse effects on the long-term productivity of biotic

communities and to provide appropriate recreational opportunities consistent with preservation of cultural and natural resources.

Under the no-action alternative there would be virtually no new development and no appreciable loss of long-term ecological productivity.

Under the alternative B, the preferred alternative, there would be a modest number of new recreational facilities, which could reduce ecological productivity in some localized areas. However, the preferred alternative would yield long-term benefits from a visitor experience perspective.

Under alternative C there would be expanded (but still relatively modest) facilities to support recreational use and some localized loss of ecological productivity. However, this alternative would yield long-term benefits from a visitor experience perspective.

Similar to alternative B, under alternative D there would be a modest number of new recreational facilities, which could reduce ecological productivity in some localized areas. However, this alternative would yield long-term benefits from a visitor experience perspective.

ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Under the no-action alternative, energy requirements would be unchanged because no new structures would be built and the way in which visitors reach the national seashore would not change. Gradually improving the energy efficiency of existing structures could reduce existing energy requirements. Alternative A would result in the least use of energy of all the alternatives

because fewer facilities are provided for visitor and administrative use.

Under alternative B, the NPS preferred alternative, energy requirements would be slightly increased, with the addition of visitor amenities.

Consolidating headquarters functions with the U.S. Fish and Wildlife Service in a new facility would result in a more energy efficient arrangement for meeting both agencies' space needs that are currently provided in separate facilities.

Under alternative C, the greatest consumption of energy would be required because this alternative entails a greater level of new facilities for visitor and administrative use. Consolidating the maintenance operations into a centralized location, versus having district operations located close to major visitor use areas, would result in a greater

consumption of fuels and travel time to reach major visitor use areas.

Energy requirements under alternative D would be similar to alternative B, with a slight increase in energy requirements for expanded facilities provided for visitor and administrative use.

Under all alternatives, the National Park Service would pursue sustainable practices whenever possible in all decisions regarding national seashore operations, facilities management, and developments. Whenever possible, the National Park Service would use energy conservation technologies and renewable energy sources. All three action alternatives contain elements that would result in more nonmotorized access for visitors to enjoy the national seashore. These actions would provide positive benefits in the area of energy and conservation potential.

Chapter **5**

Consultation and Coordination



PUBLIC INVOLVEMENT

To obtain public input during the course of the project, three newsletters were distributed and six public meetings held. Public comments included those received from local officials, national seashore staff, and various other stakeholders. In addition, our two land management partnering agencies, NASA and the US Fish and Wildlife Service, have been consulted throughout the process and have participated in planning workshops.

During the fall of 2002 and again in the fall of 2003 the National Park Service published a newsletter and hosted public meetings with national seashore users and neighbors to understand their ideas and concerns for Canaveral National Seashore. Below is a summary of the collective thoughts shared by public, agency, and staff members.

Resource Preservation

- Continue to protect and preserve the natural, archeological, and historic resources of Canaveral National Seashore
- Prevent degradation of water quality resulting from urban development
- Allow for recreational and commercial fishing, while maintaining sustainable stocks and protecting nursery habitats
- Protect habitats for birds, wildlife, and manatees
- Protect and manage areas used for nesting by sea turtles and shorebirds
- Use fire management to control exotic species and improve habitat conditions

National Seashore Access

- Encourage interpretive guide boat and eco tours in Mosquito Lagoon and its islands

- Use boating restrictions (such as wake speed or pole-on/pole-off areas) when needed for natural and cultural resource protection and public safety
- Disperse beach users throughout the 24 miles of beaches
- Allow for more beach use but do not create a feeling of overcrowding
- Keep the national seashore open around the clock, especially the beaches, or open the national seashore early enough to enjoy sunrise or early morning birding

Coordination of Government Agencies

- Improve public communications about area closures, seasonal restrictions, and changes in national seashore policy
- Coordinate with local communities and other government agencies concerning fire management and disaster recovery efforts
- Provide seamless coordination of all government agencies when managing for visitor use

Facilities and Services

- Improve facilities and services that support national seashore users
- Continue to manage the seashore in a fairly undeveloped manner
- Provide more parking spaces, drinking water, showers, and improved restroom facilities at beach access locations (Apollo Beach)
- Provide more boat launches and docks with temporary tie-ups throughout Mosquito Lagoon
- Develop sites for large group activities in national seashore areas that are near

local communities to accommodate family and organized outings, environmental education, and community events

- Provide facilities for picnicking, horseback riding, and hiking
- Offer a diverse range of camping opportunities - from vehicle/trailer camps to more remote and dispersed primitive camping sites on the islands and near beaches
- Consider locating a visitor center in or near Titusville, Florida
- Include more active and diverse, guided and unguided interpretive programs (e.g., boat tours, wayside exhibits, interpretive trails, guided walks and talks at the historic sites, and formal seminar programs)
- Upgrade current visitor center facilities to meet user's demands and improve interpretive exhibits
- Improve visitor orientation/ information at locations inside and outside the national seashore
- Help visitors understand the boundaries of the national seashore

The third newsletter was distributed during the spring of 2007, and three public meetings were held to gain input on the preliminary alternatives. Public comments were considered when selecting the preferred alternative.

Some of the comments that were heard the most often included support for more law enforcement personnel and offering more educational and history programs.

The first meeting was held at the NPS headquarters office in Titusville on June 12, 2007. The meeting was attended by about 16 people. Some of the suggestions at this meeting included concerns for keeping the national seashore's pristine environments pristine (especially Playalinda Beach), having more enforcement personnel in the lagoon, limiting fishing tournaments (number of

boaters), opening access to Bill's Hill but maintaining the area's wilderness quality (i.e., no visitor center), possibly having limited tours to remote cultural sites, having lectures/seminars about those remote sites, telling the history of the towns that existed (e.g., Wilson, Clifton, Allenhurst, Shiloh) and the people who lived there, and telling the stories of the WWI sites. Suggestions included an unpaved road in the Bill's Hill area for scenic viewing and launching skiffs and canoes and kayaks in alternative B; adding a pole/troll area from the northern NPS boundary to the southernmost USFWS boundary, with run lanes (based on what crabbers were using now via GPS coordinates) for alternative B, adding a poll/troll area in alternative C, and incorporate a visitor center/NPS headquarters facility in the Bill's Hill area in alternative D.

The second meeting was held in the visitor information center in New Smyrna Beach on June 13, 2007. The meeting was attended by about 20 people. Some of the suggestions for alternative B at this meeting included not having a nonmotorized zone near Orange Island, making the area north of Jones Creek a pole/troll zone, having a mandatory course for boaters and kayakers in Mosquito Lagoon, prohibiting fishing tournaments (or at least limiting the number of participants), having a private vendor outside the national seashore to rent canoes and kayaks, and making the fish tanks at the visitor center bigger. Suggestions for alternative C included a new visitor information center, not having a motorized ferry service between Seminole Rest and Apollo Beach, adding/not adding a pole/troll zone, prohibiting large water craft (that are making ditches and impacting fish), having more law enforcement personnel, developing a running corridor from Jones Creek on West Shore to Longies and Orange Island Creek, using a pontoon boat water shuttle to transport visitors from the mainland through the old channel to the barrier island (Eldora, etc.), teaching children about lagoon ecology and history, and providing parking on the mainland (Bill's Hill or Seminole Rest area) so that people can get to the barrier island

(which would relieve parking congestion). Suggestions for alternative D were having the visitor center in New Smyrna Beach, charging a fee for the lagoon, requiring a special permit for poll/troll zones, limiting horsepower on the main channel, and maintaining environmental education programs for schools and expanding them for adults.

The third meeting was held on June 14, 2007, at the Seminole Rest main house. About 14 people came to the meeting. Suggestions for alternative B included making the pole/troll restrictions equal for everyone (commercial and noncommercial), having more law enforcement personnel, leaving the lagoon

as it is (without a pole/troll zone), using a water shuttle from Oak Hill to Eldora and back is a good idea, keeping multiple boats from herding schools and “pounding” fish (keeping them from escaping), and protecting primary fish spawning sites. Suggestions for alternative C included using a water shuttle from Oak Hill to Eldora and back, wanting a water shuttle from Seminole Rest to Apollo Beach, and wanting to expand the guided canoe trip to the small island areas. Suggestions for alternative D included not having a pole/troll zone and increasing the poll/troll zone in the north (above the Gomez Grant) area.

CONSULTATION AND COORDINATION

FEDERAL AGENCIES

The National Park Service contacted the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). The letter advised these agencies of the NPS planning process for this *General Management Plan / Environmental Impact Statement* and requested a current list of federally listed threatened, endangered, or candidate species within the national seashore. The National Marine Fisheries Service responded in a letter dated June 8, 2005; the response letter included a list of such species found within the state of Florida.

In subsequent communications, NPS staff sought advice from the U.S. Fish and Wildlife Service and National Marine Fisheries Service regarding how to fulfill NPS responsibilities for complying with Section 7 of the Endangered Species Act. The anticipated outcome of these discussions is the preparation of a Biological Assessment by the National Park Service for this general management plan, with a Biological Opinion prepared by the U.S. Fish and Wildlife Service and National Marine Fisheries Service in response. The Biological Opinion would likely provide determinations of effect for listed species, and mitigation measures for the National Park Service to follow to ensure protection of certain threatened or endangered species.

The National Park Service contacted the Advisory Council on Historic Preservation (on September 12, 2003). The letter advised the advisory council about the start of the planning effort, asked for their involvement in the planning process, and solicited input on issues and concerns to be addressed by the plan. The advisory council would have an opportunity to review and comment on this draft plan.

STATE AGENCIES

The National Park Service contacted the Florida state historic preservation officer (SHPO) on September 12, 2003. The letter advised the state historic preservation officer about the start of the planning effort, asked for their involvement in the planning process, and solicited input on issues and concerns to be addressed by the plan. The state historic preservation office would have an opportunity to review and comment on this draft plan.

The National Park Service contacted the Florida Fish and Wildlife Conservation Commission in a letter dated May 20, 2005. The letter advised the commission of the NPS planning process for this *General Management Plan / Environmental Impact Statement*.

The National Park Service would request a consistency determination for the federal Coastal Zone Management Act via the Florida State Clearinghouse program of the Florida Department of Environmental Protection. The National Park Service proposes no development in any area of the national seashore that would conflict with the coastal management program.

NATIVE AMERICANS

The National Park Service recognizes that indigenous peoples may have traditional interests and rights in lands now under NPS management. Related Native American concerns are sought through Native American consultations. The need for government-to-government Native American consultations stems from the historic power of Congress to make treaties with American Indian tribes as sovereign nations. Consultations with American Indians and other Native Americans, such as Native Hawaiians and Alaska Natives, are required by various

federal laws, executive orders, regulations, and policies. They are needed, for example, to comply with Section 106 of the National Historic Preservation Act of 1966 as amended. Implementing regulations of the Council on Environmental Quality for the National Environmental Policy Act of 1969 (NEPA) also call for Native American consultations.

The National Park Service contacted the Miccosukee Tribe of Indians of Florida, the Seminole Tribe of Florida, and the Seminole Nation of Oklahoma by letter on September 12, 2003. The NPS letter advised the tribes of the planning process, invited them to participate in planning, and inquired about the tribes' potential interests and concerns as they relate to the planning effort.

The Tribal Historic Preservation Office of the Seminole Tribe of Florida responded with a letter requesting any information that the National Park Service may have regarding the identification and protection of cultural resources within the updated plan. The Miccosukee Tribe of Indians of Florida agreed to enter into government-to-government consultations. None of the tribes requested to take part in the planning process, but they reserved their right to comment.

All three federally recognized tribes culturally affiliated with the national seashore would have an opportunity to review and comment on this draft plan.

**LIST OF AGENCIES OR ORGANIZATIONS RECEIVING A COPY OF THIS
PLAN**

FEDERAL AGENCIES

Advisory Council on Historic Preservation
U.S. Department of Defense
 Army Corps of Engineers
 Coast Guard
U.S. Department of Agriculture
 U.S. Forest Service
 Natural Resources Conservation Service
U.S. Department of the Interior
 National Park Service
 U.S. Fish and Wildlife Service
 U.S. Geological Survey
U.S. Environmental Protection Agency

**AMERICAN INDIAN
TRIBAL GOVERNMENTS**

Miccosukee Indian Tribe
Seminole Nation of Oklahoma
Seminole Tribe of Florida (THPO)

**U.S. SENATORS AND
REPRESENTATIVES**

Honorable Bill Nelson, Senator
Honorable George S. LeMieux, Senator
Honorable Suzanne Kosmas, House of
 Representatives

**STATE OFFICIALS, SENATORS,
AND REPRESENTATIVES**

Honorable Charlie Crist, Governor
State Senator Thad Altman (District 24)
State Senator Evelyn Lynn (District 7)
State Representative Ralph Poppell (Brevard
 District 29)
State Representative Dorothy Hukill (Volusia
 District 28)
State Representative Steve Crisafulli (District
 32)

**STATE AGENCIES
AND COMMISSIONS**

Florida Department of Environmental
Protection
Florida Fish and Wildlife Conservation
Commission
State Historic Preservation Office

**REGIONAL, COUNTY, AND
LOCAL GOVERNMENTS**

Titusville
New Smyrna Beach
Edgewater
Oak Hill

**ORGANIZATIONS, BUSINESSES,
AND UNIVERSITIES**

University of Central Florida
Florida Institute of Technology
Daytona Beach Community College
University of Florida
Florida State University

LIBRARIES

Titusville
New Smyrna Beach
Edgewater
Oak Hill

SCHOOL DISTRICTS

Titusville High School
Astronaut High School
New Smyrna Beach and Space Coast
 Junior/Senior High School

NEWSPAPERS AND MAGAZINES

Florida Today
Daytona Beach News Journal
New Smyrna Beach Observer

RADIO AND TELEVISION STATIONS

Orlando Channel 2 (WESH)
Orlando Channel 6 (WKMG)
Orlando Channel 9 (WFTV)
Orlando Channel 24 (WMFE)

Appendixes,
Selected References,
Preparers and Consultants,
and Index



APPENDIX A: CANAVERAL NATIONAL SEASHORE LEGISLATION

88 STAT.] PUBLIC LAW 93-626—JAN. 3, 1975

2121

Public Law 93-626

AN ACT

To establish the Canaveral National Seashore in the State of Florida, and for other purposes.

January 3, 1975
[H. R. 5773]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to preserve and protect the outstanding natural, scenic, scientific, ecologic, and historic values of certain lands, shoreline, and waters of the State of Florida, and to provide for public outdoor recreation use and enjoyment of the same, there is hereby established the Canaveral National Seashore (hereinafter referred to as the "seashore"), as generally depicted on the map entitled "Boundary Map, Canaveral National Seashore", dated August 1974 and numbered NS-CAN-40,000A. Such seashore shall comprise approximately sixty-seven thousand five hundred acres within the area more particularly

Canaveral National Seashore,
Fla.
Establishment.
16 USC 459j.

described by a line beginning at the intersection of State Highway 3 and State Road 402, thence generally easterly following State Road 402 to a point one-half mile offshore in the Atlantic Ocean, thence northwesterly along a line which is at each point one-half mile distant from the high water mark to Bethune Beach, thence inland in a generally westerly direction through Turner Flats and Shipyard Canal, thence northwesterly to the Intracoastal Waterway, thence southerly along the Intracoastal Waterway to the boundary of the Kennedy Space Center, thence southwesterly to United States Highway 1, thence southerly along State Highway 3 to the point of beginning. The boundary map shall be on file and available for public inspection in the offices of the United States Fish and Wildlife Service and National Park Service, Department of the Interior, Washington, District of Columbia. After advising the Committees on Interior and Insular Affairs of the United States Congress, in writing, at least sixty days prior to making any boundary revisions, the Secretary may from time to time make minor revisions in the boundaries of the seashore by publication of a revised map or other boundary description in the Federal Register: *Provided*, That the total acreage included within the boundaries shall not exceed that enumerated in this section.

Boundary revisions, publication in Federal Register.

Land acquisition, 16 USC 459j-1.

SEC. 2. Within the boundaries of the seashore, the Secretary may acquire lands, waters, and interests therein by donation, purchase with donated or appropriated funds, exchange, or transfer. Any property owned by the State of Florida or any political subdivision thereof may be acquired only by donation. It is the intent and purpose of this Act that the Secretary shall have sole authority to develop and improve those State owned lands donated now and in the future in accordance with the intent and purposes of this Act. Notwithstanding any other provision of law, any federally owned property within the boundaries of the seashore may, with the concurrence of the agency having custody thereof, be transferred without consideration to the administrative jurisdiction of the Secretary of the Interior and he may develop and administer such lands in a manner consistent with the purposes of this Act. In accepting lands transferred by the National Aeronautics and Space Administration pursuant to this Act, the Secretary shall enter into a written cooperative agreement with the Administrator to assure the use of such lands in a manner which is deemed consistent with the public safety and with the needs of the space and defense programs of the Nation: *Provided*, That no new construction or development shall be permitted within the seashore, except for the construction of such facilities as the Secretary deems necessary for the health and safety of the visiting public or for the proper administration of the seashore: *Provided further*, That after the date of the enactment of this Act the Secretary of the Interior, in cooperation with the Administrator of the National Aeronautics and Space Administration, shall submit to the Committees on Interior and Insular Affairs of the Congress and to the Committee on Science and Astronautics of the House of Representatives and to the Committee on Aeronautical and Space Sciences of the Senate a report of all land transfers made by the National Aeronautics and Space Administration to the Department of the Interior under this Act.

Report to congressional committees.

SEC. 3. (a) Except for property deemed necessary by the Secretary for visitor facilities, or for access to or administration of the seashore, any owner or owners of improved property on the date of its acquisition by the Secretary may, as a condition of such acquisition, retain for themselves and their successors or assigns a right of use and occupancy of the improved property for noncommercial residential purposes for a definite term not to exceed twenty-five years, or in lieu thereof, for a term ending at the death of the owner, or the death of his spouse, whichever is the later. The owner shall elect the term to be reserved. Unless the property is wholly or partially donated to the United States, the Secretary shall pay to the owner the fair market value of the property on the date of such acquisition less the fair market value on such date of the right retained by the owner.

16 USC 459j-2.

(b) The Secretary may terminate a right of use and occupancy retained pursuant to this section upon his determination that such use and occupancy is being exercised in a manner not consistent with the purposes of this Act, and upon tender to the holder of the right of an amount equal to the fair market value of that portion of the right which remains unexpired on the date of termination.

(c) The term "improved property", as used in this section shall mean a detached, noncommercial residential dwelling, the construction of which was begun before January 1, 1971 (hereafter referred to as "dwelling"), together with so much of the land on which the dwelling is situated, the said land being in the same ownership as the dwelling, as the Secretary shall designate to be reasonably necessary for the enjoyment of the dwelling for the sole purpose of noncommercial residential use, together with any structures, necessary to the dwelling which are situated on the land so designated.

"Improved property."

(d) Except as otherwise provided, the Secretary shall have the authority to use condemnation as a means of acquiring a clear and marketable title, free of any and all encumbrances.

SEC. 4. The Secretary shall permit hunting, fishing, and trapping on lands and waters under his jurisdiction within the boundaries of the seashore in accordance with the appropriate laws of the State of Florida and the United States to the extent applicable, except that he may designate zones where, and establish periods when, no hunting, fishing, or trapping shall be permitted for reasons of public safety, administration, fish and wildlife management, public use and enjoyment, protection of the resource, or competing public use. Except in emergencies, any regulations prescribing any such restrictions shall be put into effect only after consultation with the appropriate State agency responsible for hunting, fishing, and trapping activities.

Hunting, fishing, and trapping rights.
16 USC 459j-3.

SEC. 5 (a) The seashore shall be administered, protected, and developed in accordance with the provisions of the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1, 2-4), as amended and supplemented, except that any other statutory authority available to the Secretary for the conservation management of natural resources may be utilized to the extent he finds such authority will further the purposes of the Act.

Administration.
16 USC 459j-4.

(b) Notwithstanding any other provisions of this Act, lands and waters in the Merritt Island National Wildlife Refuge as described in subsection (c)(2) of this section which are part of the seashore shall be administered for refuge purposes through the United States Fish and Wildlife Service pursuant to the National Wildlife Refuge

System Administration Act, as amended (80 Stat. 926; 16 U.S.C. 668dd-66see), except that the Secretary may utilize such additional authority as may be available to him for the conservation and management of wildlife and natural resources, the development of outdoor recreation opportunities, and interpretive education as he deems appropriate, consistent with the preservation of natural and wildlife values.

(c) The Secretary shall cause to be issued a well defined division of management authority between the National Park Service and the United States Fish and Wildlife Service. It is the intent and purpose of this Act that such management authority, generally, shall be as follows:

(1) The National Park Service shall administer those lands and waters described as follows: beginning at the intersection of State Highway 3 and State Road 402; thence easterly along State Road 402 and continuing easterly in a straight line to a point one-half mile offshore in the Atlantic Ocean, following the southern boundary of the seashore created in section 1; thence northwesterly along the boundary of the seashore created in section 1, which line is at each point one-half mile distance from the high water mark, to Bethune Beach; thence inland in a generally westerly direction through Turner Flats and Shipyard Canal; thence northwesterly to the Intracoastal Waterway; thence southerly along the Intracoastal Waterway to the boundary of the Kennedy Space Center; then southwesterly to United States Highway 1; thence southerly along State Highway 3 to the northern boundary of H. M. Gomez Grant; thence easterly along the northern boundary of H. M. Gomez Grant and continuing easterly in a straight line to a point of intersection with the line between the marsh and the dunes; thence southerly along the line between the marsh and the dunes to a point approximately one-half mile north of the southern boundary of the seashore created in section 1; thence westerly in a straight line to connect with and to follow the Government Railroad to its intersection with State Highway 3; thence southerly along State Highway 3 to the point of beginning. The portion of land bounded by the northern boundary of the H. M. Gomez Grant is hereby transferred to the Secretary of the Interior and may be used for the purpose of establishing such facilities as are needed for the administration of the seashore, for the construction of the principal visitor center which shall be designated as the "Spessard L. Holland Visitor Center", and for a central access to the seashore: *Provided, however,* That the Secretary of the Interior, upon the request of the Administrator of the National Aeronautics and Space Administration, shall close this area or any part thereof to the public when necessary for space operations. In administering the shoreline and adjacent lands the Secretary shall retain such lands in their natural and primitive condition, shall prohibit vehicular traffic on the beach except for administrative purposes, and shall develop only those facilities which he deems essential for public health and safety.

(2) The United States Fish and Wildlife Service shall administer the remaining lands described in section 1 of the Act.

SEC. 6. (a) There is hereby established the Canaveral National Seashore Advisory Commission which shall consult and advise with the Secretary on all matters of planning, development, and operation of

Spessard L.
Holland Visitor
Center, designa-
tion.

Canaveral Na-
tional Seashore
Advisory Commis-
sion.
Establishment.
16 USC 459j-5.

the seashore and shall provide such other advice and assistance as may be useful in carrying out the purposes of this Act. The Commission shall terminate ten years after the date the seashore is established pursuant to this Act, unless extended by the Congress. The Commission shall be composed of five members who shall serve for terms of two years. Members shall be appointed by the Secretary, one of whom he shall designate as Chairman, in the following manner:

Termination.

(1) one member from each county in which the seashore is located, to be selected from recommendations made by the county commission in each county;

(2) two members representing the State of Florida who shall be selected from recommendations made by the Governor of Florida; and

Membership.

(3) one member representing the general public.

(b) After the Secretary designates the member to be Chairman, the Commission may meet as often as necessary at the call of the Chairman or of the Secretary, or upon petition of a majority of the members of the Commission. Any vacancy in the Commission shall be filled in the same manner as the original appointment was made.

(c) Members of the Commission shall serve without compensation, as such, but the Secretary may pay, upon vouchers signed by the Chairman, the expenses reasonably incurred by the Commission and its members in carrying out their responsibilities under this section.

SEC. 7. Upon enactment of this Act, those lands to be used for the administrative and visitor facilities described in section 5(c)(1) shall be transferred by this Act to the Secretary of the Interior and those portions of the John F. Kennedy Space Center falling within the boundaries of the seashore as defined in section 1 of this Act shall become a part of the seashore, and within ninety days thereafter, the Administrator, National Aeronautics and Space Administration, shall grant to the Secretary for carrying out the intent and purpose of this Act such use of said portions as the Administrator determines is not inconsistent with public safety and the needs of the space and defense programs of the Nation. Notwithstanding any other provision of law, any lands within the seashore which the Administrator determines to be excess to the needs of such agency shall be transferred to the Secretary of the Interior for administration in accordance with the provisions of this Act: *Provided*, That any portions of the John F. Kennedy Space Center within the seashore not transferred to the Secretary shall remain under the control and jurisdiction of the Administrator.

Transfer of
lands
16 USC 459j-6.

SEC. 8. Within three years from the date of enactment of this Act, the Secretary shall review the area within the seashore and shall report to the President, in accordance with section 3 (c) and (d) of the Wilderness Act (78 Stat. 891; 16 U.S.C. 1132 (c) and (d)), his recommendations as to the suitability or unsuitability of any area within the seashore for preservation as wilderness, and any designation of any such areas as a wilderness shall be accomplished in accordance with said subsections of the Wilderness Act.

Report to Pres-
ident.
16 USC 459j-7.

SEC. 9. (a) There are hereby authorized to be appropriated such sums as may be necessary to carry out the purposes of this Act, but not more than \$7,941,000 for the acquisition of lands and interests in lands. In order to avoid excessive costs resulting from delays in the acquisition program, the Secretary shall make every reasonable effort to promptly acquire the privately owned lands within the seashore. Until all such lands are acquired, he shall report, in writing on June 30 of each year to the Committees on Interior and Insular Affairs of the United States Congress, the following information:

16 USC 459j-8.

Reports to con-
gressional com-
mittees.

(1) the amount of land acquired during the current fiscal year and the amount expended therefor;

(2) the amount of land remaining to be acquired; and

(3) the amount of land programed for acquisition in the ensuing fiscal year and the estimated cost thereof.

Seashore develop-
ment plan,
transmittal to
congressional
committees.

(b) For the development of essential public facilities there are authorized to be appropriated not more than \$500,000. Within three years from the date of the enactment of this Act, the Secretary shall develop and transmit to the Committees on Interior and Insular Affairs of the United States Congress a final master plan for the full development of the seashore consistent with the preservation objectives of this Act, indicating:

(1) the facilities needed to accommodate the health, safety, and recreation needs of the visiting public;

(2) the location and estimated cost of all facilities; and

(3) the projected need for any additional facilities within the seashore.

Approved January 3, 1975.

626

NATIONAL SEASHORES

2. Canaveral

102 STAT. 2831

PUBLIC LAW 100-564—OCT. 31, 1988

Public Law 100-564
100th Congress

An Act

Oct. 31, 1988
[H.R. 3559]

To authorize and direct the acquisition of lands for Canaveral National Seashore, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Florida.

SECTION 1. ADDITIONS TO CANAVERAL NATIONAL SEASHORE.

16 USC 459j-1
note.
16 USC 459j-1
note.

(a) SEMINOLE REST AND STUCKEY'S.—

(1) The Secretary of the Interior (hereinafter in this Act referred to as the Secretary) is authorized and directed to acquire approximately 25 acres of land in the State of Florida known as Seminole Rest and approximately 10 acres of land known as Stuckey's. Both areas are depicted on a map entitled "Additions to Canaveral National Seashore" numbered NS-CAN-40000-C and dated May 1988.

Historic
preservation.

(2) The Secretary shall manage the lands known as Seminole Rest for the primary purpose of protecting and interpreting their archaeological and historic resources and the lands known as Stuckey's for the primary purpose of establishing an administrative headquarters and visitor center within Volusia County, Florida.

(b) ACQUISITION AUTHORITY.—Land acquired under this section may only be acquired in accordance with section 2 of the Act entitled "An Act to establish the Canaveral National Seashore in the State of Florida, and for other purposes" (16 U.S.C. 459j-1).

SEC. 2. AUTHORIZATION OF APPROPRIATIONS RELATING TO DEVELOPMENT OF ESSENTIAL PUBLIC FACILITIES.

Section 9(b) of the Act entitled "An Act to establish the Canaveral National Seashore in the State of Florida, and for other purposes" (16 U.S.C. 459j-8) is amended by striking out "not more than \$500,000." and inserting in lieu thereof "\$2.6 million in addition to the sums previously appropriated."

16 USC 459j-1
note.

SEC. 3. MISCELLANEOUS PROVISIONS.

(a) MAP.—The Secretary shall file the map referred to in this Act with the Committee on Interior and Insular Affairs, House of Representatives, and the Committee on Energy and Natural Resources, Senate, and the map shall have the same force and effect as if included in this Act, except that correction of clerical and typographical errors in such map may be made. The map shall be on file and available for public inspection in the office of the Director of the National Park Service, Department of the Interior.

Public
information.

NATIONAL SEASHORES

627

PUBLIC LAW 100-564—OCT. 31, 1988

102 STAT. 2832

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as may be necessary to carry out the acquisitions authorized by this Act.

Approved October 31, 1988.

LEGISLATIVE HISTORY—H. R. 3559:
HOUSE REPORTS: No. 100-695 (Comm. on Interior and Insular Affairs).
SENATE REPORTS: No. 100-534 (Comm. on Energy and Natural Resources).
CONGRESSIONAL RECORD, Vol. 134 (1988):
June 20, considered and passed House.
Oct. 11, considered and passed Senate.

APPENDIX B: DESIRED CONDITIONS AND MANAGEMENT STRATEGIES FOR THE NATIONAL SEASHORE

This section focuses on desired conditions and strategies to guide management of Canaveral National Seashore in all alternatives, including the no-action alternative. They guide actions taken by NPS staff on such topics as natural and cultural resource management, NPS facilities, and visitor use management. Each topic discussed below in table format has three key parts: (a) desired conditions for that topic, (b) a list of associated law or policy sources, and (c) broad management strategies that may be used to achieve those desired conditions.

Desired conditions articulate the ideal conditions the National Park Service is striving to attain. Desired conditions provide guidance for fulfilling the national seashore's purpose and for protecting the national seashore's fundamental resources and values on a national seashore-wide basis.

The associated strategies describe actions that could be used by the National Park Service (and/or its partners) to achieve the desired conditions. This is not an exhaustive list of management strategies. As new ideas, technologies, and opportunities arise, they would be considered if they further support achieving the desired condition.

Although attaining some conditions set forth in these laws and policies and strategies may have been temporarily deferred in a national park system unit because of funding or staffing limitations, the National Park Service would continue to strive to implement these requirements with or without a new management plan.

NATURAL RESOURCE MANAGEMENT STRATEGIES

ECOSYSTEM MANAGEMENT (terrestrial and marine)	
Desired Conditions	Sources
<p>The national seashore is managed holistically, as part of a greater ecological, social, economic, and cultural system.</p>	<ul style="list-style-type: none"> NPS Management Policies 2006 NPS 77 "Natural Resource Management Reference Manual #77"
Management Strategies	
<ul style="list-style-type: none"> Continue to seek cooperative agreements with the U.S. Fish and Wildlife Service, National Aeronautics and Space Administration, and other adjacent land-managing agencies to protect ecosystem habitat and wildlife. Continue to develop cooperative agreements, partnerships, and other feasible arrangements to set an example in resource conservation and innovation, and to facilitate research related to national seashore resources and their management. Work collaboratively with the landowners inside and outside the national seashore to protect viewsheds leading into, within, and seen from inside the national seashore. Use cooperative agreements, conservation easements, donation, land exchanges, cooperatively produced management plans, or other tools to accomplish viewshed protection. Inventory all ecosystem components and determine limits of natural system variation (baseline condition). Monitor system dynamics to detect abnormal changes in time to affect remedial actions. Maintain and restore all components and processes of naturally evolving ecosystems, recognizing that change caused by extreme natural events such as hurricanes are an integral part of functioning natural systems. Maintain natural genetic diversity of terrestrial and marine ecosystems. Maintain or improve air and water qualities that affect terrestrial and marine ecosystems. Protect and restore threatened and endangered species and their critical habitat. Regulate and mitigate human activities to minimize adverse impacts. Educate visitors about the importance and fragility of terrestrial and marine resources, threats to them, and mitigation to lessen impacts. 	
FIRE MANAGEMENT	
Desired Conditions	Sources
<p>National seashore fire management programs are designed to meet resource management objectives prescribed for the various areas of the national seashore.</p> <p>All wildland fires are effectively managed, considering resource values to be protected and firefighter and public safety, using the full range of strategic and tactical operations as described in an approved fire management plan.</p>	<ul style="list-style-type: none"> NPS Management Policies 2006" 2007 Canaveral National Seashore Fire Management Plan
Management Strategies	
<ul style="list-style-type: none"> Maintain a current fire management plan to reflect changes in wildland fire policy, fire use applications, and the body of knowledge on fire effects within the national seashore's vegetation types. Maintain a cooperative agreement for fire suppression with appropriate federal, tribal, state, and local agencies and organizations. Provide information on whether specified objectives for prescribed fires are met. Institute monitoring programs for such fires to record fire behavior, smoke behavior, decisions, and fire effects. Use fire as a management tool to maintain native plant communities and control exotic species. Provide visitors information so that they can learn the role of fire in the ecosystem. 	

NATURAL RESOURCE MANAGEMENT STRATEGIES

SPECIAL STATUS SPECIES	
Desired Conditions	Sources
<p>Federal and state listed threatened and endangered species and their habitats are protected and sustained.</p> <p>Native threatened and endangered species populations that have been severely reduced in or extirpated from the national seashore are restored where feasible and sustainable.</p>	<ul style="list-style-type: none"> • Endangered Species Act • Marine Mammal Protection Act • Marine Protection, Research and Sanctuaries Act • Migratory Marine Game-Fish Act • Coastal Zone Management Act • Florida state protective legislation • NPS <i>Management Policies 2006</i> • NPS 77 "Natural Resource Management Reference Manual #77"
Management Strategies	
<ul style="list-style-type: none"> • Support research that contributes to management knowledge of special status species and their habitat. • Complete an inventory of rare or protected plants and animals in the national seashore and regularly monitor the distribution and condition (e.g., health, disease). Modify management plans to be more effective based on the results of monitoring. • Cooperate with the U.S. Fish and Wildlife Service and NOAA-Fisheries, as appropriate, to ensure that NPS actions comply with the Endangered Species Act. • Protect and strive to recover all species native and their habitats to the national seashore that are listed under the Endangered Species Act. • Participate in the recovery planning process when appropriate. • Manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for listed species. 	
NONNATIVE SPECIES	
Desired Conditions	Sources
<p>The management of populations of exotic plant and animal species, up to and including eradication, are undertaken wherever such species threaten national seashore resources or public health and when control is prudent and feasible.</p>	<ul style="list-style-type: none"> • Executive Order 13112, "Invasive Species" • NPS <i>Management Policies 2006</i> • NPS 77 "Natural Resource Management Reference Manual #77"
Management Strategies	
<ul style="list-style-type: none"> • Complete an inventory of plants and animals in the national seashore and regularly monitor the distribution and condition (e.g., health, disease) of selected species that are (a) invasive exotics or (b) native species capable of creating resource problems (e.g., habitat decline due to overpopulation). • Assess the methods by which exotic species become established and spread into native plant communities so that strategies for preventing introduction and establishment can be developed and implemented. Study the environmental and ecological effects of exotic species invasion to assess threats, develop a long-term program for reversing threats, and prioritize management actions. • Control or eliminate exotic plants and animals, exotic diseases, and pest species where there is a reasonable expectation of success and sustainability. • Manage exclusively for native plant species in pristine and primitive management areas. In other management areas, limit planting of nonnative species to noninvasive plants that are justified by the historic scene or operational needs. • Provide interpretive and educational programs on the preservation of native species for visitors and for residents neighboring the national seashore. 	

NATURAL RESOURCE MANAGEMENT STRATEGIES

GEOLOGIC RESOURCES	
Desired Conditions	Sources
<p>The national seashore's geologic processes and resources are preserved and protected as integral components of the natural systems.</p>	<ul style="list-style-type: none"> • NPS Management Policies 2006 • NPS 77 "Natural Resource Management Reference Manual #77"
Management Strategies	
<ul style="list-style-type: none"> • Assess the impacts of natural processes and human-related events on geologic processes and resources. • Maintain and restore the integrity of existing geologic processes and resources. • Integrate geologic resources management into national seashore operations and planning. • Develop a plan to address geologic research, inventory, and monitoring. • Prepare a geologic inventory, including the identification of the significant geologic processes that shape national seashore ecosystems and the identification of the human influences on those geologic processes (i.e., the identification of geologic hazards; inventory of type sections or type localities within the national seashore; "textbook" localities that provide particularly good or well-exposed examples of geologic features or events and that may warrant special protection or interpretive efforts; and identification of interpretive themes or other opportunities for interpreting the significant geologic events or processes that are preserved, exposed, or occur in the national seashore). • Update geologic map of the national seashore in digital format that can be used in the national seashore's geographic information system (GIS). • Update geologic interpretations of localities that are the subject of interpretive stops or displays, and develop programs to educate visitors about geologic processes and resources. 	

SOILS	
Desired Conditions	Sources
<p>The National Park Service actively seeks to understand and preserve the soil resources of the national seashore, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.</p> <p>Natural soil resources and processes function in as natural a condition as possible, except where special considerations are allowable under policy.</p>	<ul style="list-style-type: none"> • NPS Management Policies 2006 • NPS 77 "Natural Resource Management Reference Manual #77"
Management Strategies	
<ul style="list-style-type: none"> • Collect baseline information on soils. • Update soils map of the national seashore in digital format that can be used in the national seashore's geographic information system (GIS). • Take actions to prevent or minimize adverse, potentially irreversible impacts on soils and implement soil conservation and soil amendment practices to reduce impacts as appropriate. • Minimize soil excavation, erosion, and off-site soil migration during and after any ground-disturbing activity. • Survey areas of the national seashore with soil resource problems and take actions appropriate to prevent or minimize further erosion, compaction, or deposition. • Apply effective best management practices to problem soil erosion and compaction areas in a manner that stops or minimizes erosion, restores soil productivity, and reestablishes or sustains a self-perpetuating vegetative cover. • Whenever possible, educate visitors about soils. 	

NATURAL RESOURCE MANAGEMENT STRATEGIES

WATER RESOURCES	
Desired Conditions	Sources
<p>Surface water and groundwater are protected and water quality meets or exceeds all applicable water quality standards.</p> <p>NPS and NPS-permitted programs and facilities are maintained and operated to avoid pollution of surface water and groundwater.</p>	<ul style="list-style-type: none"> • Clean Water Act; Executive Order (EO) 11514 "Protection and Enhancement of Environmental Quality" • Clean Water Act; Executive Order (EO) 12088 "Federal Compliance with Pollution Control Standards," • Rivers and Harbors Act • NPS <i>Management Policies 2006</i> • NPS 77 "Natural Resource Management Reference Manual #77"
Management Strategies	
<ul style="list-style-type: none"> • Work with appropriate governmental bodies to obtain the highest possible water quality standards available under the Clean Water Act. Continue to follow the recommendations of the 1996 <i>Indian River Lagoon Comprehensive Conservation and Management Plan</i>. • Cooperate with other government agencies to maintain and/or restore the quality of national seashore water resources. • Take all necessary actions to maintain or restore the quality of surface and ground waters in the national seashore consistent with the Clean Water Act. • Study the effects of the water quality on aquatic life. • Promote water conservation by the National Park Service, concessioners, visitors, and national seashore neighbors. • Apply best management practices to all pollution-generating activities and facilities in the national seashore, such as NPS maintenance and storage facilities and parking areas. • Minimize the use of pesticides, fertilizers, and other chemicals and manage them in keeping with NPS policy and federal regulations. • Continue to monitor the effects of visitor use. • Continue to assess stormwater runoff. • Promote greater public understanding of water resource issues at the national seashore, and encourage public support for and participation in protecting the Mosquito Lagoon watershed. • Continue NPS water quality monitoring program and participation in watershed councils. 	

NATURAL RESOURCE MANAGEMENT STRATEGIES

WETLANDS	
Desired Conditions	Sources
<p>The natural and beneficial values of wetlands are preserved and enhanced.</p> <p>The National Park Service implements a “no net loss of wetlands” policy and strives to achieve a longer-term goal of net gain of wetlands across the national park system through the restoration of previously degraded wetlands.</p> <p>The National Park Service avoids to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and avoids direct or indirect support of new construction in wetlands wherever there is a practicable alternative.</p> <p>The National Park Service compensates for remaining unavoidable adverse impacts on wetlands by restoring wetlands that have been previously degraded.</p>	<ul style="list-style-type: none"> • Clean Water Act • Rivers and Harbors Act • EO 11514 “Protection and Enhancement of Environmental Quality” • EO 11990 “Protection of Wetlands” • “Protecting America’s Wetlands: A Fair, Flexible, and Effective Approach,” White House Office on Environmental Policy, 1993 • NPS <i>Management Policies 2006</i> • DO 77-1 “Wetland Protection”
Management Strategies	
<ul style="list-style-type: none"> • Conduct or obtain national seashore-wide wetland inventories to ensure proper planning, management, and protection of wetlands. • Locate all facilities to avoid wetlands if feasible. If avoiding wetlands is not feasible, take other actions to comply with Executive Order 11990 “Protection of Wetlands”, the Clean Water Act, and Director’s Order 77-1 “Wetland Protection”. • Prepare a “Statement of Findings” for wetlands if the NPS actions would result in adverse impacts on wetlands. Include in the “Statement of Findings” an analysis of the alternatives, a delineation of the wetland, a wetland restoration plan to identify mitigation, and a wetland functional analysis of the impact site and restoration site. • Enhance natural wetland values by using them for educational and scientific purposes that do not disrupt natural wetland functions. • If natural wetland functions have been degraded or lost because of human action, work to restore wetlands to predisturbance conditions, to the extent practicable. 	

NATURAL RESOURCE MANAGEMENT STRATEGIES

FLOODPLAINS	
Desired Conditions	Sources
<p>Natural floodplain values are preserved or restored.</p> <p>Long- and short-term environmental effects associated with the occupancy and modification of the floodplain are avoided.</p> <p>When it is not practicable to locate or relocate development or inappropriate human activities to a site outside the floodplain or where the floodplain would be affected, the National Park Service.</p> <ul style="list-style-type: none"> • prepares and approves a "Statement of Findings" in accordance with DO 77-2 • uses nonstructural measures as much as practicable to reduce hazards to human life and property while minimizing impacts on the natural resources of floodplains • ensures that structures and facilities are designed to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 CFR 60) 	<ul style="list-style-type: none"> • Rivers and Harbors Act • EO 11988 "Floodplain Management" • Special Directive 93-4 "Floodplain Management, Revised Guidelines for National Park Service Floodplain Compliance" (1993) • National Flood Insurance Program (44 CFR 60) • NPS <i>Management Policies 2006</i> • Director's Order 77-2 "Floodplain Management"
Management Strategies	
<ul style="list-style-type: none"> • Continue to follow the recommendations of the 1996 Indian River Lagoon Comprehensive Conservation and Management Plan. • Establish flood awareness, preparedness, and warning system plans as necessary. • Make national seashore visitors aware of hazards associated with flash flooding and inform visitors what to do in such situations. • Avoid development and location of visitor activities in floodplains to the extent practicable. 	

NATURAL RESOURCE MANAGEMENT STRATEGIES

AIR QUALITY	
<p>Canaveral National Seashore is classified as a class II area under the Clean Air Act. This classification is the second-most stringent and is designed to prevent air quality degradation. Air quality is monitored by the state of Florida at a number of stations outside by the national seashore.</p>	
Desired Conditions	Sources
<p>Good to excellent air quality is maintained. Scenic views, both day and night, are protected and unimpaired for the enjoyment of current and future visitors.</p>	<ul style="list-style-type: none"> • Clean Air Act • Florida state air regulations • NPS <i>Management Policies 2006</i> • NPS 77 "Natural Resource Management Reference Manual #77"
Management Strategies	
<ul style="list-style-type: none"> • Although the National Park Service has very little direct control over air quality in the air shed encompassing the national seashore, national seashore managers would continue to cooperate with the Florida Department of Environmental Protection (FDEP), Commission on Environmental Quality, and the U.S. Environmental Protection Agency on air quality issues. • Minimize air quality pollution emissions associated with national seashore operations, including the use of prescribed fire and visitor use activities. • Ensure healthful indoor air quality at NPS facilities. • Participate in federal, regional, and local air pollution control plans and in drafting regulations and reviewing permit applications for major new air pollution sources. • Develop educational programs to inform visitors and regional residents about the threats of air pollution. • Form regional partnerships to develop alternative transportation systems and promote clean fuels. • Participate in research on air quality and effects of air pollution. Determine changes in national seashore ecosystem functions caused by atmospheric deposition and assess the resistance and resilience of native ecosystems in the face of these external factors. 	

NIGHT SKY	
Desired Conditions	Sources
<p>Excellent opportunities to see the night sky are available. Artificial light sources both within and outside the national seashore do not unacceptably adversely affect native species (such as sea turtle nesting and hatchlings) or visitor's opportunities to see the night sky.</p>	<ul style="list-style-type: none"> • NPS <i>Management Policies 2006</i>
Management Strategies	
<ul style="list-style-type: none"> • Cooperate with visitors, neighbors, and local government agencies to find ways to prevent or minimize the intrusion of artificial light into the night scene in the national seashore. • In natural areas, limit artificial outdoor lighting to basic safety requirements and use shielding when possible. • Evaluate the impacts on the night sky caused by national seashore facilities. If light sources are affecting night skies, study alternatives such as shielding lights, changing lamp types, or eliminating unnecessary sources. 	

NATURAL RESOURCE MANAGEMENT STRATEGIES

NATURAL SOUNDSCAPES	
<p>An important part of the NPS mission is to preserve or restore the natural soundscapes associated with national park system units. The sounds of nature are among the intrinsic elements that combine to form the environment of our national park system units. Current laws and policies require that the following conditions be achieved in the national seashore:</p>	
Desired Conditions	Sources
<p>The National Park Service preserves the natural ambient soundscapes, restores degraded soundscapes to the natural ambient condition wherever possible, and protects natural soundscapes from degradation due to human-caused noise.</p> <p>Noise sources are managed to preserve or restore the natural soundscape.</p>	<ul style="list-style-type: none"> • NPS Management Policies 2006 • DO 47 "Sound Preservation and Noise Management" • Executive memorandum signed by President Clinton on April 22, 1996
Management Strategies	
<ul style="list-style-type: none"> • Monitor and minimize or prevent or minimize unnatural sounds that adversely affect national seashore resources or values or visitors' enjoyment of them. • Minimize noise generated by NPS management activities by strictly regulating administrative functions — such as the use of motorized equipment. Consider noise in the procurement and use of equipment by NPS staff. • Encourage visitors to avoid unnecessary noise, such as the use of generators and maintaining quiet hours in the campgrounds. • Disruptions from recreational uses are managed to provide a high quality visitor experience in an effort to preserve or restore the natural quiet and natural sounds. 	

CULTURAL RESOURCE MANAGEMENT STRATEGIES

ARCHEOLOGICAL RESOURCES	
Desired Conditions	Sources
<p>Archeological sites are identified and inventoried, and their significance is determined and documented. Archeological sites are protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable. When disturbance or deterioration is unavoidable, the site is professionally documented and excavated, and the resulting artifacts, materials, and records are curated and conserved in consultation with the appropriate state historic preservation office and affiliated American Indian tribes, as appropriate. Some archeological sites that can be adequately protected may be interpreted to visitors.</p>	<ul style="list-style-type: none"> • National Historic Preservation Act of 1966, as amended; Sections. 106 and 110 • Executive Order 11593 • Archeological Resources Protection Act • Native American Graves Protection and Repatriation Act • <i>The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation</i> • 2008 Programmatic Memorandum of Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers • <i>NPS Management Policies 2006</i> • Director's Order #28 "Cultural Resource Management and NPS-28: Cultural Resource Management Guideline" (1998)
Management Strategies	
<ul style="list-style-type: none"> • Complete national seashore-wide archeological resource inventory, including within the marine environment. Document and evaluate archeological resources for their National Register of Historic Places eligibility. The most critical area for study is land where development or visitor activity is planned. • Determine which archeological sites should be added to the Archeological Sites Management Information System (ASMIS). • Initiate a program of evaluation and nomination for those properties believed to be eligible for inclusion in the National Register and/or for properties that have had a consensus determination of eligibility already made. • Educate visitors on regulations governing archeological resources, encouraging them through the national seashore's interpretive programs to respect such resources and leave them undisturbed. Monitor and assess the condition of known archeological sites. Develop and implement stabilization strategies for sites being threatened or destroyed. • Treat all archeological resources as eligible for listing on the National Register pending a formal determination of their significance by the National Park Service, the Florida state historic preservation office, and associated Indian tribes. • Protect all archeological resources eligible for inclusion in or listed on the National Register. Design facilities to avoid known or suspected archeological resources. If disturbance to such resources is unavoidable, conduct formal consultation with the Advisory Council on Historic Preservation, as appropriate, and the Florida state historic preservation office and Indian tribes in accordance with the National Historic Preservation Act and the 2008 NPS Programmatic Agreement among the National Park Service, Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers. • Conduct data recovery excavations at archeological sites only where protection or site avoidance during design and construction is infeasible. Should archeological resources be discovered following mitigation and during construction, stop work in that location until consultation with the appropriate state historic preservation officer, consistent with 36 CFR Part 800, has been completed. • Limit archeological research to sites that are in imminent or identifiable danger of destruction through natural causes or as the result of development actions. 	

CULTURAL RESOURCE MANAGEMENT STRATEGIES

PREHISTORIC AND HISTORIC STRUCTURES	
Desired Conditions	Sources
<p>Prehistoric and historic structures are inventoried, and the significance and integrity are evaluated under National Register of Historic Places criteria. Qualities that contribute to their listing in, or eligibility for listing in, the National Register are protected in accordance with the <i>Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation</i>, unless it is determined through formal processes that disturbance or natural deterioration is unavoidable.</p>	<ul style="list-style-type: none"> • National Historic Preservation Act of 1966, as amended; Sections 106 and 110 • Archeological and Historic Preservation Act • Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation • Secretary of the Interior's Standards for the Treatment of Historic Properties • 2008 Programmatic Memorandum of Agreement Among the National Park Service, Advisory Council on Historic Preservation, and National Council of State Historic Preservation Officers • NPS <i>Management Policies 2006</i> • Director's Order #28 "Cultural Resource Management and NPS-28: Cultural Resource Management Guideline" (1998)
Management Strategies	
<ul style="list-style-type: none"> • Update and certify the national seashore's List of Classified Structures. • Complete a survey, inventory, and evaluation of all prehistoric and historic structures under National Register criteria. • Submit the inventory and evaluation results to the Florida state historic preservation officer and the keeper of the National Register with recommendations for eligibility for listing in the National Register. • Determine the appropriate level of preservation for each historic property listed in, or determined eligible for listing in, the National Register, subject to the <i>Secretary of the Interior's Standards</i> and in consultation with the Florida state historic preservation officer. • Implement and maintain the appropriate level of preservation treatment for such properties. • Analyze the design elements of prehistoric and historic structures in the national seashore to guide rehabilitation and preservation treatment of such properties. • Get additional information on and interpret the historic African American communities at Clifton and Allenhurst. 	

CULTURAL RESOURCE MANAGEMENT STRATEGIES

CULTURAL LANDSCAPES	
<p>According to Director’s Order 28, the “Cultural Resource Management Guideline,” a cultural landscape is a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.</p>	
Desired Conditions	Sources
<p>Cultural landscape inventories are conducted to identify landscapes potentially eligible for listing in the National Register of Historic Places, and to assist in future management decisions for landscapes and associated resources, both cultural and natural.</p> <p>Management of cultural landscapes focuses on preserving the landscape’s physical attributes, biotic systems, and use when that use contributes to its historic significance.</p> <p>Preservation, rehabilitation, restoration, or reconstruction of cultural landscapes is undertaken in accordance with the <i>Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes</i>.</p>	<ul style="list-style-type: none"> • National Historic Preservation Act and Advisory Council on Historic Preservation implementing regulations • <i>Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes</i> • <i>NPS Management Policies 2006</i> • Director’s Order #28 “Cultural Resource Management and NPS-28: Cultural Resource Management Guideline” (1998)
Management Strategies	
<ul style="list-style-type: none"> • Complete a survey, inventory, and evaluation of cultural landscapes under National Register criteria. • Submit the inventory and evaluation results to the Florida state historic preservation officer and the Keeper of the National Register with recommendations for eligibility for listing in the National Register. • Determine the appropriate level of preservation for each cultural landscape listed in, or determined eligible for listing in, the National Register, subject to the <i>Secretary of the Interior’s Standards</i> and in consultation with the Florida state historic preservation officer. • Implement and maintain the appropriate level of preservation treatment for such cultural landscapes. 	

CULTURAL RESOURCE MANAGEMENT STRATEGIES

MUSEUM COLLECTIONS	
Desired Conditions	Sources
<p>All museum collections (objects, specimens, and manuscript collections) are identified and inventoried, catalogued, documented, preserved, and protected, and provision is made for access to and use of the collections for exhibits, research, and interpretation.</p>	<ul style="list-style-type: none"> • National Historic Preservation Act • American Indian Religious Freedom Act • Archeological and Historic Preservation Act • Archeological Resources Protection Act • Native American Graves Protection and Repatriation Act • NPS <i>Management Policies 2006</i> • Director's Order #28 "Cultural Resource Management and NPS-28: Cultural Resource Management Guideline" (1998) • NPS Museum Handbook, Parts I & II
Management Strategies	
<ul style="list-style-type: none"> • Inventory and catalog all national seashore museum collections in accordance with NPS standards. • Use NPS standards and guidelines on the display and care of artifacts; plan for exhibit areas facilities that are sufficient to meet current curatorial standards. • Protect the qualities that contribute to the significance of collections in accordance with established standards. • Identify, inventory, catalogue, document, preserve, and protect all museum objects and manuscripts and make them available to use for exhibits — except irreplaceable items that would not be displayed or stored at the national seashore. 	

CULTURAL RESOURCE MANAGEMENT STRATEGIES

ETHNOGRAPHIC RESOURCES	
Desired Conditions	Sources
<p>Contemporary affiliated American Indian and other communities are permitted by law, regulation, or policy to pursue customary religious, subsistence, and other cultural uses of national seashore resources with which they are traditionally associated. Recognizing that resource protection mandates affect human use and the cultural context of national seashore resources, the National Park Service plans and executes programs in ways that safeguard cultural and natural resources while reflecting informed concern for contemporary peoples and cultures traditionally associated with them.</p> <p>The National Park Service and tribes that are culturally affiliated with the national seashore maintain positive, productive, government-to-government relationships. NPS managers and staff respect the viewpoints and needs of the tribes, continue to promptly address conflicts that occur, and consider American Indian values in national seashore management and operation.</p>	<ul style="list-style-type: none"> • National Historic Preservation Act of 1966, as amended, and Advisory Council on Historic Preservation implementing regulations (36 CFR 800) • American Indian Religious Freedom Act • Native American Graves Protection and Repatriation Act • Executive Order 13007 on American Indian Sacred Sites • Presidential Memorandum of April 29, 1994, on Government-to-Government Tribal Relations • <i>NPS Management Policies 2006</i> • Director's Order #28 "Cultural Resource Management and NPS-28: Cultural Resource Management Guideline" (1998)National Environmental Policy Act • NPS Organic Act of 1916 • Archeological Resources Protection Act
Management Strategies	
<ul style="list-style-type: none"> • Complete an ethnographic overview and assessment of the national seashore, including the historic African American communities at Clifton and Allenhurst. Provide interpretation, if appropriate. • Consult periodically with affiliated American Indian tribes regarding management of cultural resources. • Continue to provide access to sacred sites and national seashore resources by American Indians when the use is consistent with seashore purposes and the protection of resources. • Treat all ethnographic resources as eligible for listing in the National Register of Historic Places pending a formal determination by the Florida state historic preservation officer as to their significance. • Protect all ethnographic resources determined eligible for listing in, or listed in, the National Register; if disturbance to such resources is unavoidable, conduct formal consultation with the Florida state historic preservation officer and the Advisory Council on Historic Preservation, and affiliated tribes as appropriate, in accordance with the provisions of the National Historic Preservation Act. • Conduct regular consultations with affiliated tribes to continue to improve communications and resolve any problems or misunderstandings that occur. • Provide for access to, and use of, natural and cultural resources in the national seashore and collections by American Indians that are consistent with national seashore purposes; do not unreasonably interfere with American Indian use of traditional areas or sacred resources, and do not degrade national seashore resources. • Encourage employment of American Indians on the national seashore staff to improve communications and working relationships, and encourage cultural diversity in the workplace. • Continue to cooperate with tribes in conducting ethnographic studies to better understand which tribes are culturally affiliated with the national seashore and identify culturally significant resources. • Continue regular consultations with affiliated tribes to improve communications and resolve any problems or misunderstandings. • Consider culturally affiliated tribal values in efforts to improve overall management and interpretation. • Implement a joint monitoring program to monitor potential impacts on ethnographic resources. 	

VISITOR USE MANAGEMENT STRATEGIES

VISITOR USE	
<p>Current laws, regulations, and policies leave considerable room for judgment about the best mix of types and levels of visitor use activities, programs, and facilities. For this reason, most decisions related to visitor use are addressed in the alternatives. However, all visitor use of national park system units must be consistent with the following guidelines.</p>	
Desired Conditions	Sources
<p>National seashore resources are conserved “unimpaired” for the enjoyment of future generations. Visitors have opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the national seashore. No activities occur that would cause derogation of the values and purposes for which the national seashore has been established.</p> <p>For all zones, districts, or other logical management divisions within a national park system unit, the types and levels of visitor use are consistent with the desired resource and visitor experience conditions prescribed for those areas.</p> <p>Visitors would have opportunities to understand and appreciate the significance of the national seashore and its resources, and to develop a personal stewardship ethic by directly relating to the resources.</p> <p>To the extent feasible, programs, services, and facilities in the national seashore are accessible to and usable by all people, including those with disabilities.</p>	<ul style="list-style-type: none"> • NPS Organic Act • National Park System General Authorities Act • NPS <i>Management Policies 2006</i> • Title 36 <i>Code of Federal Regulations</i> • Architectural Barriers Act Accessibility Standards 2006 • Americans with Disabilities Act of 1990 • 28CFR36 • Architectural Barriers Act Accessibility Standards (May 2006) • U.S. Access Board Draft Final Accessibility Guidelines for Outdoor Developed Areas 2009 • DO-42 “<i>Accessibility for Visitors with Disabilities in NPS Programs, Facilities, and Services</i>” • Rehabilitation Act of 1973 • 43 CFR 17 Subpart E, <i>Enforcement of Nondiscrimination on the Basis of Handicap in Programs or Activities Conducted by the Department of the Interior</i>
Management Strategies	
<ul style="list-style-type: none"> • Provide a range of opportunities for visitors to understand, appreciate, and enjoy the national seashore and its natural and cultural resources. • Continue to monitor visitor comments on such issues as crowding, encounters with other visitors in the backcountry, availability of backcountry campsites during busy times of the year, availability of parking, etc. • Conduct periodic visitor surveys to stay informed of changing visitor demographics and desires to better tailor programs to visitor needs, desires, and interests. • Ensure that all national seashore programs and facilities are accessible to the extent feasible and consistent with legal and policy requirements. • Continue to enforce the regulations promulgated in 36 CFR with regard to visitor use limitations. • Develop strategies to ensure that all new and renovated buildings/facilities, programs, activities, and services, including those provided/offered by concessioners, are designed and constructed in accordance with applicable rules, regulations, and standards. Evaluate buildings/facilities, programs, activities, and services to determine the degree to which they are currently accessible to and usable by people with disabilities; identify barriers that limit access, and develop strategies for removing those barriers. 	

VISITOR USE MANAGEMENT STRATEGIES

VISITOR ACCESS	
Desired Conditions	Sources
<p>Visitors have reasonable access to the national seashore, and there are connections from the national seashore to regional transportation systems as appropriate. Transportation facilities in the national seashore provide access for the protection, use, and enjoyment of national seashore resources, and they preserve the integrity of the surroundings, respect ecological processes, protect national seashore resources, and provide the highest visual quality and a rewarding visitor experience.</p> <p>The National Park Service participates in all transportation planning forums that may result in links to the national seashore or that impact national seashore resources. Working with federal, tribal, state, and local agencies on transportation issues, the National Park Service seeks reasonable access to the national seashore and connections to external and alternative transportation systems.</p>	<ul style="list-style-type: none"> • NPS Management Policies 2006 • NPS Transportation Planning Guidebook
Management Strategies	
<ul style="list-style-type: none"> • Work with gateway communities and local, regional, state, tribal, and federal agencies to develop a regional approach to transportation planning between local communities and national seashore areas. Encourage establishment of a multiagency, multicounty regional transportation planning group. • Work with the U.S. Department of Transportation, the Federal Highway Administration, the Florida Department of Transportation, and other sources to seek funding and staff to participate in and encourage effective regional transportation planning and enhancements, including both road and nonroad transportation (e.g., bikeways, road signs, trails, intelligent transportation systems, cultural resources, recreational access and facility development, visitor centers, traffic-calming devices, and gateway community enhancements). • Encourage, where appropriate, alternative transportation systems that contribute to maximum visitor enjoyment of and minimum adverse impacts on national seashore resources and values. • Advocate for corridor crossings for wildlife and other accommodations to promote biodiversity. • Avoid or mitigate harm to individual animals, fragmentation of habitats, and the disruption of natural systems. 	

BACKCOUNTRY USE	
Desired Conditions	Sources
<p>Backcountry use is managed in accordance with a backcountry management plan (or other plan addressing backcountry uses) that is designed to avoid unacceptable impacts on national seashore resources or adverse effects on visitor enjoyment of appropriate recreational experiences. The Park Service seeks to identify acceptable limits of impacts, monitors backcountry use levels and resource conditions, and takes prompt corrective action when unacceptable impacts occur.</p>	<ul style="list-style-type: none"> • NPS Management Policies 2006
Management Strategies	
<ul style="list-style-type: none"> • Develop the national seashore’s backcountry management plan to avoid unacceptable impacts on resources or adverse effects on visitor enjoyment of appropriate recreational experiences. • Pay special attention to occupancy limits in backcountry and wilderness island settings. 	

VISITOR USE MANAGEMENT STRATEGIES

COMMERCIAL SERVICES	
<p>Commercial services are another way of providing for the visitor experience and use previously described. Commercial operators are “partners” with the National Park Service to provide goods and services to visitors that are necessary and appropriate but not provided by the National Park Service. The Park Service manages commercial service levels and types to achieve the same resource protection and visitor experience conditions required by the NPS Organic Act, General Authorities Act, management policies, and other regulations and policies. In addition, commercial services must comply with the provisions of the NPS Concessions Management Improvement Act of 1998. By law, all commercial activities in national park system units must be authorized in writing by the superintendent. A commercial activity is defined as any activity for which compensation is exchanged. It includes activities by for-profit and nonprofit operators. Commercial services are more than just concessions. They include concession contracts, commercial use authorizations, leases, cooperative agreements, rights-of-way, and special use permits. All commercial services must be managed. All commercial services must be necessary and/or appropriate by achieving the resource protection and visitor use goals for the park system unit.</p>	
Desired Conditions	Sources
<p>All commercial services must be authorized, must be necessary and/or appropriate, and must be economically feasible. Appropriate planning must be done to support commercial services authorization.</p> <p>Same as Visitor Experience and Use (described earlier)</p>	<ul style="list-style-type: none"> • NPS Management Policies 2006 • NPS Concessions Management Improvement Act of 1998 • Same as Visitor Experience and Use
Management Strategies	
<ul style="list-style-type: none"> • Establish and document that all commercial services in the national seashore are necessary and/or appropriate before they are proposed or reauthorized. • Ensure that all necessary and/or appropriate commercial activities in the national seashore are authorized in writing by the superintendent. • Stop all unauthorized commercial activities in the national seashore. • Use the most appropriate authorization tool (concession contracts, commercial use authorizations, leases, cooperative agreements, rights-of-way, and special use permits) to manage the commercial services program effectively and efficiently. • Ensure that all commercial activities in the national seashore provide high quality visitor experiences while protecting important natural, cultural, and scenic resources. • Ensure that new or modified concessions are economically feasible and that the operator has a reasonable opportunity to make a profit before they are proposed in a planning document. • Establish levels of commercial use that are consistent with resource protection and visitor experience goals for the national seashore, and do not unduly interfere with the independent visitor’s ability to participate in the same activity. • Ensure that all commercial services are safe and sustainable. • Authorize only those commercial services that are not or cannot be made available within a reasonable distance outside the national seashore. • Prepare a commercial services plan if necessary to describe in detail the actions required to achieve commercial services and related visitor experience goals. 	

VISITOR USE MANAGEMENT STRATEGIES

PUBLIC HEALTH AND SAFETY	
<p>NPS <i>Management Policies 2006</i> state that the saving of human life would take precedence over all other management actions as the National Park Service strives to protect human life and provide for injury-free visits. Current laws and policies require that the following conditions be achieved in the national seashore:</p>	
Desired Conditions	Sources
<p>While recognizing that there are limitations on its capability and constraints imposed by the Organic Act to not impair resources, the Park Service and its concessioners, contractors, and cooperators would seek to provide a safe and healthful environment for visitors and employees.</p> <p>NPS staff would strive to identify recognizable threats to safety and health and protect property by applying nationally accepted standards. NPS staff would reduce or remove known hazards and/or apply appropriate mitigative measures, such as closures, guarding, gating, education, and other actions.</p>	<ul style="list-style-type: none"> • Occupational Safety and Health Administration 29CFR • NPS <i>Management Policies 2006</i> • DO-50 and RM-50 "Safety and Health" • DO-58 and RM-58 "Structural Fire Management" • DO-83 and RM-83 "Public Health" • DO-51 and RM-51 "Emergency Medical Services" • DO-30 and RM-30 "Hazard and Solid Waste Management"
Management Strategies	
<ul style="list-style-type: none"> • Maintain a current hurricane evacuation plan. • Establish a documented safety program to address health and safety concerns and identify appropriate levels of action and activities. • Ensure that all potable water systems and waste water systems meet state and federal requirements. • Provide for interpretive signs and materials to notify visitors of potential safety concerns, hazards, and procedures to help provide for a safe visit and to ensure that visitors are aware of possible risks of certain activities. • Establish a structural fire program and maintain a structural fire brigade to provide prevention programs and protection of life and property. • Develop an emergency preparedness program to maximize visitor and employee safety and protection of resources and property. • Develop an emergency operations plan including a hazardous spill response plan to plan for and respond to spills. • Provide a search and rescue program to make reasonable efforts to search for lost persons and rescue sick, injured, or stranded persons. • Provide an emergency medical services program to provide for the care of the ill and injured, including emergency pre-hospital care and the emergency medical transport of sick and injured from the national seashore's remote setting to medical help. 	

OTHER MANAGEMENT STRATEGIES

SUSTAINABILITY	
<p>Sustainability can be described as doing things in ways that do not compromise the environment or its capacity to provide for present and future generations. Sustainable practices consider local and global consequences to minimize the short- and long-term environmental impacts of human actions and developments through resource conservation, recycling, waste minimization, and the use of energy-efficient and ecologically responsible materials and techniques.</p>	
Desired Conditions	Sources
<p>NPS and concessioner visitor management facilities are harmonious with national seashore resources, compatible with natural processes, aesthetically pleasing, functional, as accessible as possible to all segments of the population, energy-efficient, and cost-effective.</p> <p>All decisions regarding operations, facilities management, and development in the national seashore, from the initial concept through design and construction, reflect principles of resource preservation. Thus, all national seashore developments and operations are sustainable to the maximum degree possible and practical. New developments and existing facilities are located, built, and modified according to the <i>Guiding Principles of Sustainable Design</i> (NPS 1993) or other similar guidelines. The national seashore has, whenever possible, state-of-the-art water systems for conserving water, and energy conservation technologies and renewable energy sources. Biodegradable, nontoxic, and durable materials are used in the national seashore whenever possible. The reduction, use, and recycling of materials is promoted, while materials that are nondurable, environmentally detrimental, or that require transportation from great distances are avoided as much as possible.</p>	<ul style="list-style-type: none"> • Executive Order 12873 mandates federal agency recycling and waste prevention • Executive Order 12902 mandates energy efficiency and water conservation at federal facilities • <i>NPS Management Policies 2006</i> • <i>NPS Guiding Principles of Sustainable Design</i> (1993)
Management Strategies	
<p>The <i>NPS Guiding Principles of Sustainable Design</i> directs NPS management philosophy. It provides a basis for achieving sustainability in facility planning and design, emphasizes the importance of biodiversity, and encourages responsible decisions. The guidebook articulates principles to be used in the design and management of tourist facilities that emphasize environmental sensitivity in construction, the use of nontoxic materials, resource conservation, recycling, and integrating visitors with natural and cultural settings. Sustainability principles have been developed and are followed for interpretation, natural resources, cultural resources, site design, building design, energy management, water supply, waste prevention, and facility maintenance and operations. In addition to following these principles, the following also would be accomplished:</p> <ul style="list-style-type: none"> • Work with experts both inside and outside the National Park Service to make the national seashore's facilities and programs sustainable. Seek partnerships to implement sustainable practices in the national seashore. Also work with stakeholders and business partners to augment NPS environmental leadership and sustainability efforts. • Work with suppliers and contractors to incorporate sustainable practices. • Promote energy-efficient practices and renewable energy sources wherever possible. • Mention sustainable and nonsustainable practices in interpretive programs. Educate visitors on the principles of environmental leadership and sustainability through exhibits, media, and printed material. • Educate NPS employees so that they have a comprehensive understanding of their relationship to environmental leadership and sustainability. 	

OTHER MANAGEMENT STRATEGIES

CLIMATE CHANGE	
<p>Climate change is expected to affect the national seashore’s weather, resources (e.g., shorelines, vegetation, fish and wildlife, historic structures, and submerged cultural resources), facilities (e.g., docks and roads), and visitors (e.g., seasonal use patterns, recreational fishing, navigational hazards, and visitor opportunities). These changes would have direct implications on resource management and national seashore operations, and on the way visitors use and experience the national seashore. Although climate change would affect the seashore during the life of this plan, many of the specific effects, the rate of changes, and the severity of impacts are not known.</p>	
Desired Conditions	Sources
<p>Canaveral National Seashore is a leader in its efforts to address climate change by reducing the contribution of national seashore operations and visitor activities on climate change; preparing for and mitigating climate change impacts; and increasing its use of alternative transportation, renewable energy and other sustainable practices. NPS staff proactively monitor and mitigate for climate change impacts on cultural and natural resources and visitor amenities. Education and interpretive programs help visitors understand climate change impacts in the national seashore and beyond, and how they can respond to climate change. Partnerships with various agencies and institutions allow NPS staff to participate in research on climate change impacts. The best available scientific climate change data and modeling would be incorporated into specific management planning, decisions, or actions which may be taken under any of the alternatives described in this plan.</p>	<ul style="list-style-type: none"> • NPS Organic Act • Executive Order 13423 (includes requirements for the reduction of greenhouse gases and other energy and water conservation measures) • Department of the Interior Secretarial Order 3226 (ensure that climate change impacts be taken into account in connection with departmental planning and decision making) • NPS <i>Management Policies 2006</i> (including sections on environmental leadership [1.8], sustainable energy design [9.1.1.6], and energy management [9.1.7]) • NPS Environmental Quality Division’s “Draft Interim Guidance: Considering Climate Change in NEPA Analysis”
Management Strategies	
<ul style="list-style-type: none"> • Identify key natural and cultural resources and visitor amenities that are at risk from climate change. Establish baseline resource conditions, identify thresholds, and monitor for change. Identify key resources in various management zones/areas (e.g., backcountry, recreational beaches, seagrass protection, or national seashore operations) that may require different management responses to climate change impacts. • Undertake comprehensive climate change planning to anticipate, adapt to, and mitigate for climate change impacts on the national seashore. This might include climate change scenario planning, participation in the NPS Climate Friendly Parks program, or adherence to future Climate Change Response Strategy or “Green Parks” planning guidance. • Explore and establish alternative transportation options for staff and visitors, such as bicycle lanes and parking and shuttle or ferry services. Explore use of low-emission vehicles and biofuels for national seashore operations. Encourage partners and concessioners to provide or use alternative transportation. • Form partnerships with other resource management entities to maintain regional habitat connectivity and refugia that allow species dependent on national seashore resources to better adapt to changing conditions. • Use the dynamic environment of the northern Florida coast as a teaching opportunity about climate change. Educate visitors about climate change and research efforts, and climate change impacts on the resources they are enjoying. Inspire visitors to action through leadership and education. • Restore key ecosystem features and processes, and protect key cultural resources to increase their resiliency to climate change. By reducing other types of impacts on resources, the overall condition of the resources would improve and they would have more easily recover from or resist the impacts of climate change. <p style="text-align: right;">Adapted from IHDP 2008.</p>	

OTHER MANAGEMENT STRATEGIES

LAND PROTECTION	
Desired Conditions	Sources
Land protection plans are prepared to determine and publicly document what lands or interests in land need to be in public ownership, and what means of protection are available to achieve the purposes for which the national seashore was established.	NPS <i>Management Policies 2006</i>
Management Strategies	
<ul style="list-style-type: none"> • Prepare an updated land protection plan for the national seashore. • Seek acquisition of the Stuckey property on a willing-seller basis. 	

COMMUNITY AND AGENCY RELATIONS	
Desired Conditions	Sources
<p>The national seashore is managed as part of a greater ecological, social, economic, and cultural system.</p> <p>Good relations are maintained with adjacent landowners, surrounding communities, and private and public groups that affect, and are affected by, the national seashore. The national seashore is managed proactively to resolve external issues and concerns and ensure that national seashore values are not compromised.</p> <p>Because the national seashore is an integral part of larger regional environment, the National Park Service works cooperatively with others to anticipate, avoid, and resolve potential conflicts, protect national seashore resources, and address mutual interests in the quality of life for community residents. Regional cooperation involves federal, state, and local agencies; Indian tribes; neighboring landowners; and all other concerned parties.</p>	<ul style="list-style-type: none"> • NPS <i>Management Policies 2006</i>
Management Strategies	
<ul style="list-style-type: none"> • Continue to establish and foster partnerships with public and private organizations to achieve the purpose of the national seashore. Seek partnerships for resource protection, research, education, and visitor enjoyment. • Keep landowners, land managers, local governments, and the general public informed about national seashore management activities. Have periodic consultations with landowners and communities affected by national seashore visitors and management actions. Work closely with local, state, and federal agencies and tribal governments whose programs affect or are affected by activities in the national seashore. • To foster a spirit of cooperation with neighbors and encourage compatible adjacent land uses, keep landowners, land managers, local governments, and the public informed about NPS management activities. Respond promptly to conflicts that arise over their activities, visitor access, and proposed activities and developments on adjacent lands that may affect the national seashore. Seek agreements with landowners to manage their lands in a manner that is compatible with national seashore purposes. Seek ways to provide landowners with technical and management assistance to address issues of mutual interest. 	

OTHER MANAGEMENT STRATEGIES

UTILITY AND COMMUNICATION FACILITIES	
Desired Conditions	Sources
<p>National seashore resources or public enjoyment of the national seashore are not denigrated by nonconforming uses. Telecommunication structures are permitted in the national seashore to the extent that they do not jeopardize the national seashore’s mission and resources. No new nonconforming use or rights-of-way are permitted through the national seashore without specific statutory authority and approval by the director of the National Park Service or his representative, and are permitted only if there is no practicable alternative to such use of NPS lands.</p>	<ul style="list-style-type: none"> • Telecommunications Act; 16 USC 79; 23 USC 317; 36 CFR 14 • NPS <i>Management Policies 2006</i> • DO 53A, “Wireless Telecommunications” • Reference Manual 53 “Special Park Uses”
Management Strategies	
<p>The Telecommunications Act of 1996 directs all federal agencies to assist in the national goal of achieving a seamless telecommunications system throughout the United States by accommodating requests by telecommunication companies for the use of property, rights-of-way, and easements to the extent allowable under each agency’s mission. The National Park Service is legally obligated to permit telecommunication infrastructure in the national seashore if such facilities can be structured to avoid interference with national seashore purposes.</p> <ul style="list-style-type: none"> • Locate new or reconstructed utilities and communications infrastructures in association with existing structures and along roadways or other established corridors in developed areas. For reconstruction or extension into undisturbed areas, select routes that would minimize impacts on the national seashore’s natural, cultural, and visual resources. • Place utility lines underground to the maximum extent possible. • Work with service companies, local communities, and the public to locate new utility lines so that there is minimal effect on national seashore resources. • Follow NPS policies in processing applications for commercial telecommunications applications. 	

APPENDIX C: DETERMINATION OF IMPAIRMENT

Canaveral National Seashore General Management Plan / Environmental Impact Statement

A determination of impairment is made for each of the resource impact topics carried forward and analyzed in the environmental impact statement for the preferred alternative. The description of national seashore's significance in chapter 1 was used as a basis for determining if a resource is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the national seashore, or
- key to the natural or cultural integrity of the national seashore or to opportunities for enjoyment of the national seashore, or
- identified in the national seashore's general management plan or other relevant NPS planning documents as being of significance.

A determination of impairment is not required for the impact topics of visitor use and experience, social and economic environment, and NPS operations because impairment findings relate back to national seashore resources and values. These impact areas are not generally considered to be resources or values according to the Organic Act, and cannot be impaired the same way that an action can impair resources and values.

CULTURAL RESOURCE TOPICS

Archeological Resources

Canaveral National Seashore contains more than 100 archeological sites dating from the transitional and St. Johns periods (ca. 3,000 BC to AD 1565). Most of these sites are associated with shell middens or burial mounds. Various archeological surveys have been conducted in the Cape Canaveral area since the 1870s, including areas in the present-day national seashore. Lands around Mosquito Lagoon, Seminole Rest, near State Highway 3, at Castle Windy, and at Ross

Hammock have received additional investigation. In addition to the shell midden sites, a French shipwreck and shipwreck survivors' camp are two notable archeological sites in the national seashore. Many archeological sites have not yet been systematically surveyed, but the sites remain preserved through administration and protection by the National Park Service.

The preservation of archeological resources is key to maintaining the cultural integrity of the national seashore. Also, Congress specifically added the lands known as Seminole Rest to Canaveral National Seashore "for the primary purpose of protecting and interpreting their archaeological and historic resources" (Public Law 100-564, 1988). The actions in the preferred alternative would result in no adverse impacts on archeological resources; some positive effects of this alternative include continued survey, inventory, and possible listing in the National Register of Historic Places. Any development of bike trails, wayside exhibits, or other disturbance would be implemented to avoid or mitigate any associated impacts. Water or sewer line placement, such as that proposed at Seminole Rest, would be sited on top of the mound to avoid disturbance of possible archeological resources. Increased patrols and an emphasis on education may discourage vandalism or inadvertent disturbance of archeological resources. Because there would be no adverse impacts on archaeological resources, the preferred alternative would not result in impairment.

Ethnographic Resources

Ethnographic resources are an important component of the human history at Canaveral National Seashore. Though an ethnographic study has not been undertaken, the national seashore contains historic resources related to

ethnic communities. Clifton and Allenhurst are former African American enclaves to the north and south of the New Haulover Canal, respectively, that thrived on the edge of Mosquito Lagoon during the late 19th and early 20th centuries. A small schoolhouse was found near Clifton in the 1960s, and it contained personal items from the daughter of a former slave who homesteaded in the area in the 1870s. Shiloh, a white enclave north of the Haulover area, was also settled in the post-Civil War era.

The preservation of ethnographic resources is key to maintaining the cultural integrity of the national seashore. The impacts from the preferred alternative would be long term and would benefit these resources through better investigation, preservation, and interpretation. The National Park Service would collaborate with tribes and other ethnic groups to identify and develop strategies for managing ethnographic resources and carrying out anthropological research in the national seashore. Because there would be no adverse impacts on ethnographic resources, the preferred alternative would not result in impairment.

Historic Structures

Historic resources at Canaveral National Seashore include 15 structures that have been listed on the List of Classified Structures. These include several burial mounds (Turtle, Max Hoeck, Ross Hammock, and Bill's Hill), the Old Haulover Canal, Castle Windy, Seminole Rest main house and caretaker's house, the Schultz House, Allenhurst Cemetery headstones, and several other resources. A historic resource study has been initiated for Canaveral National Seashore, but it remains incomplete. Several of the structures above are listed in the National Register of Historic Places, are eligible for listing, or are contributing sites or districts. These resources are key to the cultural integrity of the national seashore and are integral components of the historic values for which the national seashore was established (Public Law 93-626, 1975). Under the preferred alternative, historic structures that are listed or eligible for listing

in the National Register would continue to be protected and preserved. Historic structures would continue to be surveyed, inventoried, and evaluated. Stabilization, preservation, and rehabilitation of some structures would be carried out in accordance with the *Secretary of Interior's Standards for the Treatment of Historic Properties* (1995). All activities would be carried out in such a way as to have no adverse impacts on historic structures. Therefore, there would be no impairment of historic structures under the preferred alternative.

Cultural Landscapes

Three landscapes (Canaveral National Seashore, Seminole Rest, and the Eldora historic area) and one component landscape (Haulover Canal) in Canaveral National Seashore have been identified as cultural landscapes that have potential for listing in the National Register. These are key to the cultural integrity of the national seashore and also integrate important natural resources as well.

Under the preferred alternative, cultural landscapes at the national seashore would continue to be surveyed, inventoried, and evaluated to determine their eligibility for listing in the National Register. All preservation, stabilization, and rehabilitation efforts would be undertaken in accordance with the *Secretary of Interior's Standards for the Treatment of Historic Properties* (1995). These activities would have no adverse impacts on cultural landscapes. New or expanded facilities in the national seashore would be designed to minimally affect the scale and visual relationships among landscape features. Additionally, the removal and burial of overhead power and telephone lines in the Apollo Beach and Eldora Hammock areas, and the proposed protection and preservation at the Eldora State House, would have long-term beneficial impacts on cultural landscapes in the national seashore. Because there would be no adverse impacts on cultural landscapes, the preferred alternative would not result in impairment.

NATURAL RESOURCE TOPICS

Geologic Resources and Soils

The barrier islands of Canaveral National Seashore are the longest undeveloped beach on Florida's east coast. The 24-mile barrier island that separates the Mosquito Lagoon from the Atlantic Ocean is a sandy beach on the ocean side and is backed by a single sand dune ridge. These formations are representative of the complex geologic history that formed the landscape during periods of glaciation and glacial retreat. Barrier islands and their component sands and soils are strongly influenced by geologic processes such as erosion, storm deposition, tidal action, and shoreline retreat. Although sand makes up about 35 of the soils in the national seashore, other more organic sediments are present in the upland areas.

Soils, sand dunes, beaches, and barrier islands are a key component of the natural integrity of the national seashore and represent some of the natural resources cited in the national seashore's enabling legislation. The preferred alternative would result in some short-term impact of small consequence, such as soil disturbance during boardwalk relocation at Playalinda Beach or extension of the Castle Windy Trail. Long-term soil-disturbing activities such as the construction of a bike path would affect only a small percentage of the soils of the national seashore. Whenever possible, soils that are disturbed would be revegetated for a long-term reduction of soil erosion. The establishment of a slow-speed zone and a poll/troll zone would result in long-term benefits by reducing shoreline erosion due to wave action of passing boats. Overall, the impacts of the preferred alternative would be slight, short term, and highly localized and would not result in impairment of geologic resources and soils.

Floodplains

Much of Canaveral National Seashore is in a 100-year floodplain, as classified by the Federal Emergency Management Agency. These floodplains are located along low-lying

coastal waters and associated stream channels. Floodplains naturally moderate floods by temporarily spreading out floodwaters, reducing erosion. Floodplains support high levels of nutrient cycling and a great diversity of plants and animals.

Floodplains are a key component of the natural integrity of the national seashore and represent some of the natural resources cited in the national seashore's enabling legislation. Some short- and long-term adverse impacts are expected under the preferred alternative. Construction activities in the Apollo Beach area would result in minor to moderate short-term impacts on floodplains. Trail construction in several areas may increase the area of impervious surface, causing localized, long-term, changes to the floodplain. Mitigation of construction impacts and use of gravel rather than paved surfaces would greatly reduce the detrimental impacts of these activities. Additionally, floodplains would be managed in compliance with Executive Order 11988, "Floodplain Management." Overall, impacts on wetlands under the preferred alternative would be minor and adverse, with some mitigation resulting in beneficial effects. However, all impacts on floodplains would be highly localized, and some impacts would be short term in duration. Therefore, the preferred alternative would not result in impairment of floodplains at Canaveral National Seashore.

Wetlands

Canaveral National Seashore has two types of wetlands—mangroves and salt marshes. The national seashore is in a transition zone between these vegetation types, with mangroves in the southern part of the national seashore and salt marshes farther north. Salt marshes occur in both low- and high-tide areas, while mangrove swamps are found in less saline waters. Red mangroves have been planted along Mosquito Lagoon to reduce shoreline erosion. Overall, the wetlands of the Mosquito Lagoon basin cover about 42% of the terrestrial area of the national seashore.

Wetlands are an important component of the natural integrity of the national seashore and represent some of the natural resources cited in the national seashore's enabling legislation. Under the preferred alternative, impacts on wetlands would largely be negligible to minor and adverse because of construction activities, but these impacts would not last long into the future. Activities such as trail development or facility construction may have short-term impacts on runoff or siltation into wetland areas. Long-term benefits to wetlands may be realized with the establishment of a slow-speed zone or poll/troll zone in several locations. In all cases, wetlands would be managed in compliance with Executive Order 11990, "Wetland Management" and NPS policy that directs managers to minimize adverse impacts on wetlands from new development or facilities, or to compensate for unavoidable impacts via restoration of degraded wetlands. Therefore, while some adverse impacts on wetlands may occur, they would be highly localized, short term, and slight in nature, and mitigation activities would be applied. As a result, impairment of wetlands would not occur under the preferred alternative.

Water Resources

Surface waters comprise about two-thirds of the total national seashore area, including waters of the Atlantic Ocean out to 0.5 mile offshore; Mosquito Lagoon; and numerous sloughs, wetlands, and marshes. In addition to marine waters and subsurface aquifers, the national seashore receives 48-56 inches of rainfall each year. Ocean waters are a primary focus for visitors and provide habitat for numerous marine plants and wildlife. Mosquito Lagoon is one of the most species-rich estuaries in North America. Species composition changes on a seasonal basis, with tropical and subtropical species dominating the waters during the summer, and temperate species dominating during the winter. Mosquito Lagoon is considered pristine habitat, and it has been designated an Estuary of National Significance and an Outstanding Florida Water by the U.S. Environmental

Protection Agency and the state of Florida, respectively.

These diverse and high-quality water resources contribute to the natural integrity of Canaveral National Seashore and represent some of the natural resources cited in the national seashore's enabling legislation. These resources also are key components of visitor enjoyment of the national seashore. Under the preferred alternative, adverse impacts on water resources may occur in several locations where temporary disturbance of vegetation and soils for construction may result in short-term, negligible to minor increases in runoff to nearby water bodies. Some of these areas might include a new parking lot at Bill's Hill, possible future restoration work at the Stuckey property, and construction of a bike path near Playalinda Beach. Beneficial impacts would be realized in the long term by revegetation of disturbed areas. Turbidity and disturbance of bottom sediments is expected to diminish in the long term in areas where a slow-speed zone or a poll/troll zone is instituted (in northern Mosquito Lagoon). Overall, implementation of the preferred alternative would result in short- and long-term, negligible to moderate, adverse impacts and some long-term beneficial impacts. Because the small adverse impacts would be highly localized in nature, and would be mitigated where possible with revegetation, there would be no impairment of water resources at Canaveral National Seashore.

Vegetation

Canaveral National Seashore supports a unique convergence of temperate and subtropical vegetation. Two examples of this convergence are hammocks, which contain an overstory of temperate species and an understory of subtropical plants, and the shift in vegetation from salt marsh cordgrass in the north to mangrove species in the southern part of national seashore. A number of different vegetation communities, such as the beach dune community, the coastal strand community, the coastal shrub community, and the slash pine flatwood community, in

addition to hammocks and estuarine areas, are found in the national seashore. Vegetation species range from seagrasses to live oak to sea oaks, and these species provide food and habitat for a wide diversity of wildlife.

Healthy and diverse vegetation communities comprise an important component of the natural integrity of Canaveral National Seashore, and they represent some of the natural resources cited in the national seashore's enabling legislation. In addition, the unique composition of the vegetation adds to the experience and enjoyment of national seashore visitors. Under the preferred alternative, there would be short- and long-term, negligible to moderate, adverse impacts and short- and long-term beneficial impacts on vegetation. Direct removal of vegetation because of construction activities for infrastructure, facilities, or biking or hiking paths would cause adverse impacts. In many locations, revegetation would follow this disturbance, offsetting much of the disturbance and leading to overall negligible impacts. Beneficial impacts would also be realized through relocation of the administrative boardwalk, relocating the entrance area at northern Mosquito Lagoon, and possible future restoration of the Stuckey property. Because adverse impacts on vegetation would be largely short term, localized, and slight in nature, there would be no impairment of vegetation at Canaveral National Seashore.

Wildlife

The unique convergence of vegetation types in the national seashore supports a similarly diverse set of wildlife species. More than 300 species of birds are found in the national seashore, including many that find important winter habitat there. At least 20 mammals find home in the national seashore, as well as 50 reptile species and more than 400 fish species. Canaveral National Seashore also protects essential fish habitat for penaeid shrimp, red drum, coastal pelagic fish, coastal sharks, and reef fish. Other important wildlife species include clams, oysters, wading birds, herons,

muskrats, eastern woodrats, skunks, and about a dozen snake species. A subset of the wildlife species at Canaveral National Seashore are listed by federal and state agencies as threatened, endangered, or species of special concern. Some of these of particular importance are gopher tortoise, West Indian manatee (Florida stock), southeastern beach mouse, eastern indigo snake, roseate spoonbill, and five species of sea turtle.

Protection of the wildlife of Canaveral National Seashore is key to maintaining the natural integrity of the national seashore, and it represents some of the natural resources cited in the national seashore's enabling legislation. In addition, the diversity of wildlife adds to the experience and enjoyment of national seashore visitors. Under the preferred alternative there would be short- and long-term, negligible to minor, adverse impacts and short- and long-term beneficial impacts on wildlife. Most of the potential disturbance to wildlife would be associated with construction activities and impacts on wildlife habitat for short durations. Because revegetation would replace some of this habitat, these impacts would be negligible in the long run in most locations. The establishment of a slow-speed zone and a poll/troll zone (in northern Mosquito Lagoon) would have beneficial impacts on wildlife by reducing disturbance from boating activity. Expansion of environmental education opportunities could have beneficial impacts on wildlife by increasing public awareness. Consultation with the appropriate federal or state agency would occur before disturbance of possible habitat for listed species. Because adverse impacts on wildlife would be largely short term, localized, and slight in nature, there would be no impairment of wildlife resources at Canaveral National Seashore.

Soundscapes and Noise

The natural quiet of Canaveral National Seashore is an important resource that provides opportunities for visitor enjoyment. Natural sounds include surf on the beach, the calls of gulls and shorebirds, and wind

through dune vegetation. Natural sounds are prevalent in the national seashore much of the time and in most locations. In some locations and at some times, noise (unwanted sound) can be heard. Currently, internal sources of noise in the national seashore include motor vehicles on roads, maintenance equipment such as mowers, visitors in heavily used areas, and motor boats in Mosquito Lagoon. External sources of noise are predominantly aircraft overflights and NASA shuttle and rocket operations. These external sources can be loud but are generally sporadic in occurrence. Under the preferred alternative, construction activities are expected to have short-term, minor to moderate, adverse impacts on natural sound. Examples include construction in the Apollo Beach, northern Mosquito Lagoon, and Playalinda Beach areas. Some long-term beneficial impacts would be expected from establishing a poll/troll zone or slow speed zone (in northern Mosquito Lagoon) because of quieter boat activity. The preferred alternative is not expected to substantially increase any negative effects on the soundscape, especially because most impacts on sound are short term and highly localized due to construction activities. Therefore, there would be no impairment of the soundscape at Canaveral National Seashore under the preferred alternative.

Air Quality

Air quality in Canaveral National Seashore is important for natural resource health and for visitor enjoyment. Air quality standards for the national seashore are established by the

U.S. Environmental Protection Agency. Both Brevard and Volusia counties, in which the national seashore lies, have air quality that is better than the national standards for ozone, carbon monoxide, sulfur dioxide, respirable particulate matter, and lead. These counties are therefore considered to be “in attainment” of these standards. National parks also have special legislation that specifically makes air quality management part of a national effort; Canaveral National Seashore is classified as a Class II airshed because it is currently in attainment. The air pollutants of most concern in the national seashore are ozone, carbon monoxide, particulate matter, wet deposition, and dry deposition.

High air quality is key to the natural integrity of the national seashore and supports some of the purposes identified in its enabling legislation. High air quality is also important for visitor enjoyment of the national seashore. Under the preferred alternative, minor adverse impacts on air quality would be expected in some locations because of construction activities and possible increases in visitation. Some localized beneficial impacts would also be expected because of the availability of alternative transportation, such as shuttle buses or bicycle paths. Short-term emissions due to construction activities would be highly localized and due in large part to demolition or construction vehicles. Increases in emissions would not be expected to result in exceedance of national air quality standards. Because impacts on air quality would be localized, short term, and slight in nature, there would be no impairment of air quality under the preferred alternative.

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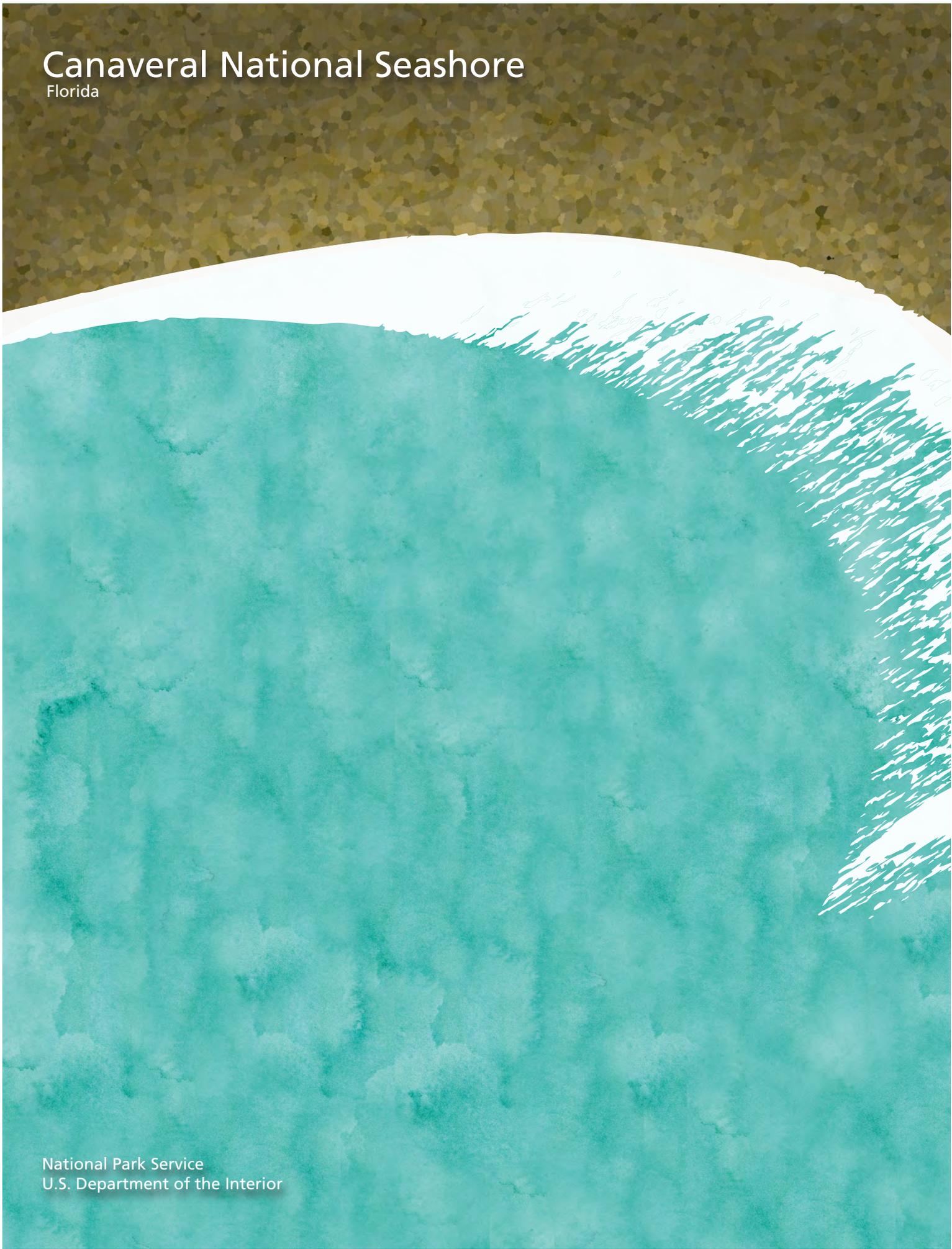


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