

# CHAPTER 3



AFFECTED ENVIRONMENT



## INTRODUCTION

This chapter describes the characteristics of the environmental components identified as impact topics that could be affected by implementing the alternatives. It provides information for “Chapter 4: Environmental Consequences,” which assesses the effects that implementing the alternatives might have on these topics. The description of the affected environment focuses on only those environmental components that are potentially subject to effects from implementing one or more of the alternatives.

The Big Cypress National Preserve *General Management Plan and Environmental Impact*

*Statement* (NPS 1991) included a comprehensive description of the natural resources of the original Preserve. The *Recreational ORV Management Plan* (NPS 2000) also included detailed descriptions of the affected environment as it related to motorized use in the original Preserve. This *General Management Plan / Wilderness Study / ORV Management Plan / Environmental Impact Statement* for the Addition tiers from those documents, in conformance with the Council on Environmental Quality (1978) guidelines for implementing the National Environmental Policy Act.

## NATURAL RESOURCES

Information on the area's natural resources was gathered from several sources, including but not limited to, the following documents:

- *General Management Plan* for the original preserve (NPS 1991)
- *Recreational ORV Management Plan* for the original Preserve (NPS 2000)
- *Draft South Florida and Caribbean Parks Exotic Plant Management Plan* (NPS 2006b)
- *Water Resources Management Plan* (NPS 1996)
- *Draft Hydrology of the Addition Lands Report* (NPS 2002)
- *Fire Management Plan* (NPS 2005)
- *The Big Cypress National Preserve* (Duever et al. 1986)

### BOTANICAL RESOURCES

#### Vegetation, Including Soils

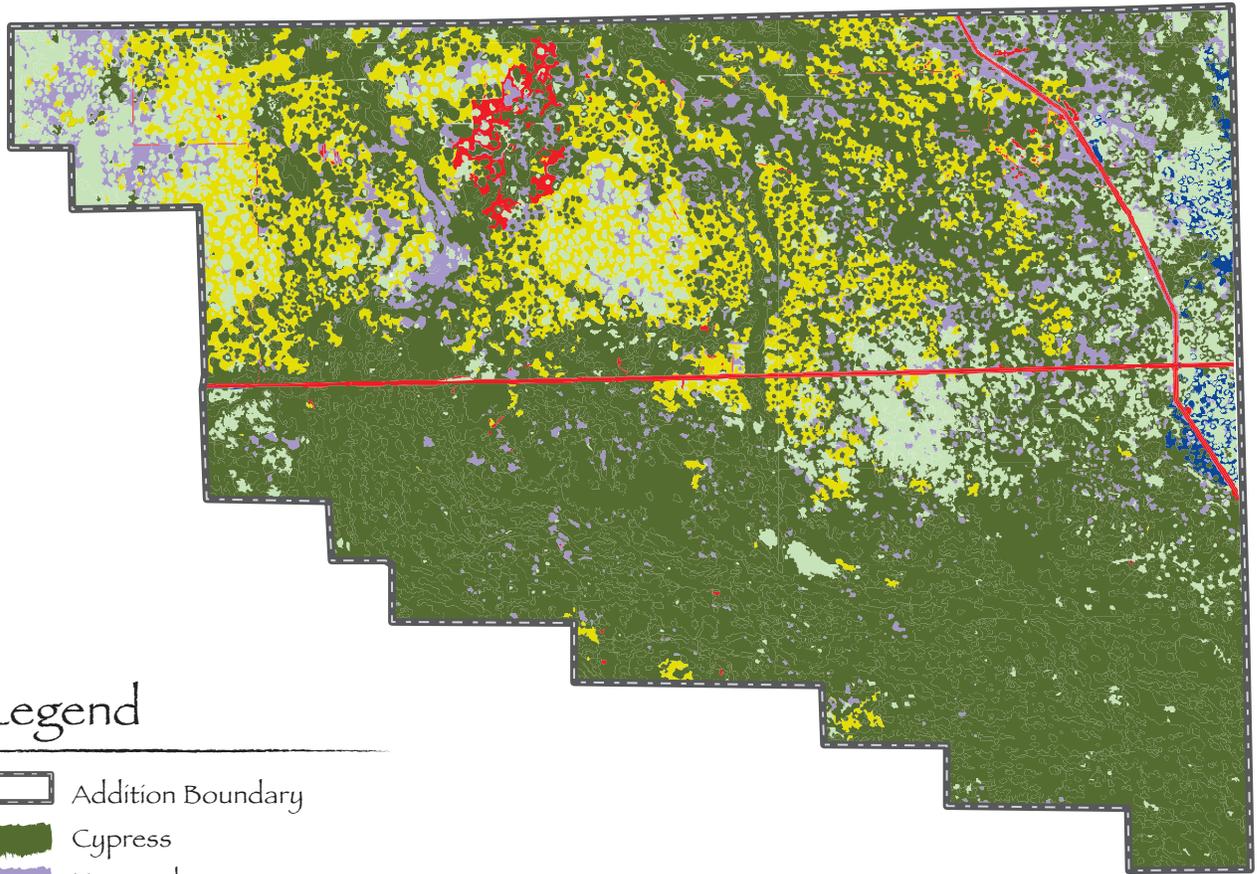
Five major vegetation communities can be found in the Addition: (1) cypress strands and domes, mixed-hardwood swamps, and sloughs, (2) prairies and marshes, (3) mangrove forests, (4) pinelands, and (5) hardwood hammocks. Disturbed areas can also be found throughout the Addition and are intermixed within all of these vegetation communities. Each of these communities is described below and identified in the following vegetation maps (Maps 9 and 10: Vegetation for the Northeast Addition and Western Addition) for the Northeast Addition and Western Addition. The vegetation classes used in this plan are the same as those used in the 2000 *Recreational ORV Management Plan*, with the exception of the addition of "disturbed areas." Disturbed areas were identified and described in the 1991 *General Management Plan / Environmental Impact Statement* for the original Preserve— so collectively, the descriptions provided below

tier to and are compatible with these two plans.

Temperate plants are abundant in Big Cypress, but most species are tropical. Pinelands, cypress strands and domes, and prairies, and marshes are the most prevalent vegetation types in the Addition and are dominated by temperate species. Tropical species primarily occur in hardwood hammocks, but are also found in pinelands, mixed-hardwood swamps, and cypress strands. Endemic plants, native only to the Preserve area, comprise 10 % of the Big Cypress vegetation (Long 1974). NPS staff are active in the NPS Inventory and Monitoring Program and have completed a thorough inventory of the Preserve's vascular plants.

The dominant tree in the preserve is cypress. Two species have been identified — bald (*Taxodium distichum*) and pond (*T. ascendens*) — although the taxonomic distinctions are still in question. Cypress are deciduous trees that can grow to 130 feet tall and reach diameters of 7 to 10 feet. Most of the larger cypress trees have been removed by logging, and only a few large trees remain. Cypress trees are highly resistant to fire and thrive in saturated soils.

**Cypress Strands and Domes, Mixed-Hardwood Swamps, and Sloughs.** Cypress forests are swamp communities that are dominated by bald cypress trees. These communities assume differences in response to competition and abiotic factors, so that several types of cypress forest can be identified. In southern Florida, cypress strands, cypress domes, mixed-hardwood and cypress swamps, and dwarf (hatrack) cypress communities are common. The Big Cypress Swamp, much of which occurs in Big Cypress National Preserve, is mostly composed of these types of cypress forests. In many situations, the cypress trees here live in conditions that do not support robust growth so that the trees do not attain great size (e. g., dwarf cypress



## Legend

-  Addition Boundary
-  Cypress
-  Hammocks
-  Mangrove
-  Pinelands
-  Prairie
-  Disturbed
-  Water

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0.5 1 2 3 4 5 Miles

Map 9

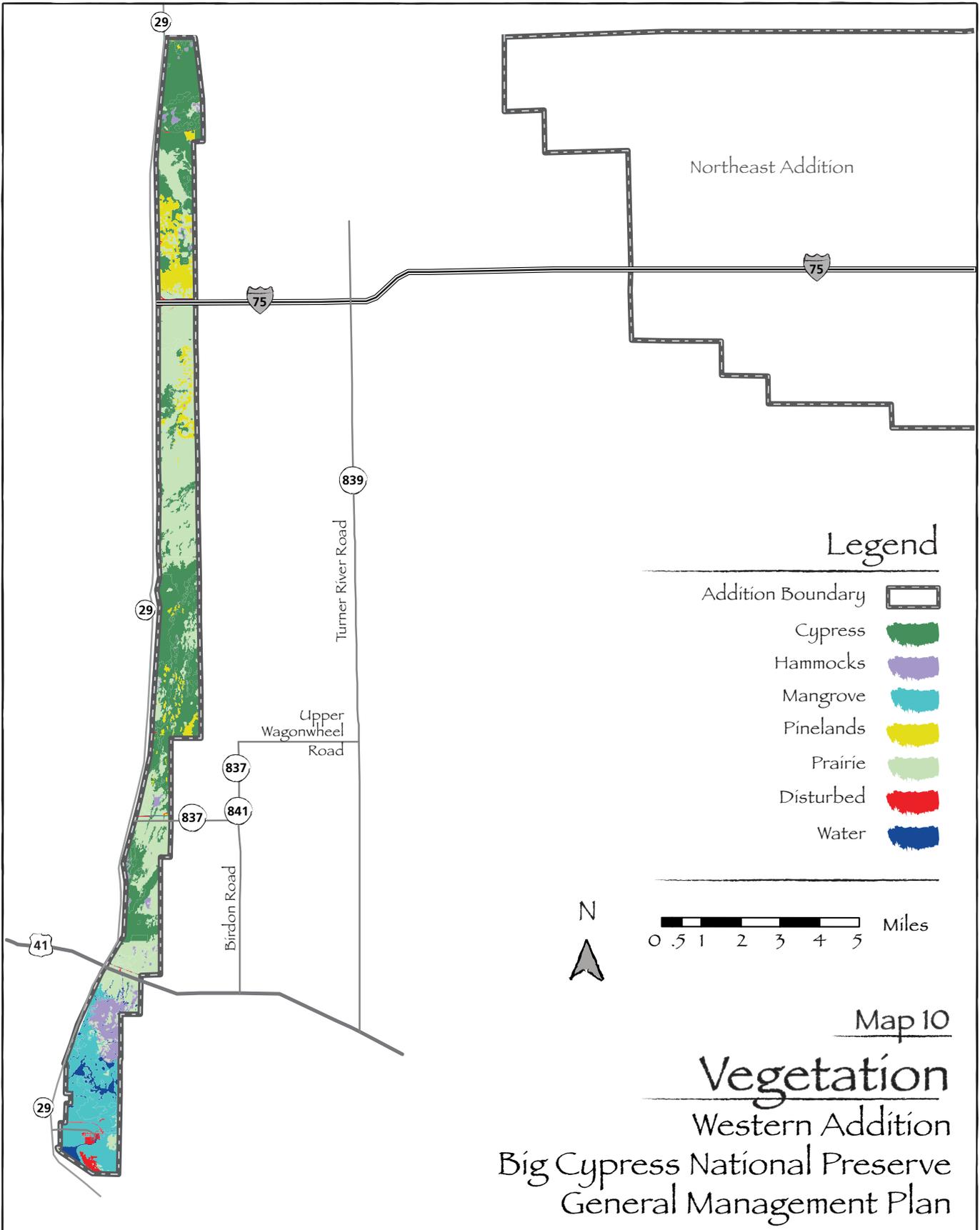
# Vegetation

## Northeast Addition Big Cypress National Preserve General Management Plan

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Northeast Addition

### Legend

- Addition Boundary
- Cypress
- Hammocks
- Mangrove
- Pinelands
- Prairie
- Disturbed
- Water



Map 10

# Vegetation

## Western Addition

### Big Cypress National Preserve General Management Plan

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communities). The name “Big Cypress” is derived from the large area dominated by various cypress communities, rather than the size of the resident trees.

Limestone caprock, which is common throughout much of the Addition, is usually only a few inches beneath the ground surface. The fracturing and rearrangement of the limestone results in a depression of the substrate (the surface on which an organism lives), so that the ground surface in the depression or solution hole is closer to the water table than the surrounding area. Cypress forests typically occur in the areas of the solution holes. The breaks in the limestone also allow the roots of large plants to penetrate well below the soil surface, so trees are able to become established. Because the substrate surface is near to, or below, the water for most of the year (i.e., has a long hydroperiod), trees that are adapted to long hydroperiods survive and dominate these communities. In the region, bald cypress trees are the common dominants in these hydric communities. As cypress and other trees become established, the leaves and branches that are shed from the trees collect in the solution hole depression, which is usually underwater. As a result, organic material in the soils of these communities decomposes slowly and often becomes a thick mantle on the substrate surface.

This slow decomposition and buildup of organic material tends to increase the acidity of the water in these communities. Limestone (calcium carbonate), which is very common in the substrate surrounding the cypress forests, is soluble in acidic solutions and neutralizes acidity as it dissolves. The dissolution of limestone results in a surface water solution that is saturated with calcium. This is important in the formation of marl, a soil component of prairies.

**Cypress Strands** — Cypress strands are swamps that are dominated by bald cypress trees, similar to cypress domes (see below). The primary difference is that a strand is a

linear feature rather than a small, discrete, dome-shaped community. Strands are generally much larger than domes, and so may be more diverse and biologically complex. Strands often contain hardwood trees that are adapted for hydric conditions, such as pop ash (*Fraxinus caroliniana*) or red maple (*Acer rubrum*). Shrub layers are sparse, but may consist of scattered dahoon holly (*Ilex cassine*), myrsine (*Rapanea punctata*), or swamp dogwood (*Cornus foemina*). Ground cover may be nearly absent because hydroperiods are often long, or it may be ephemeral and appearing during the dry season; swamp fern (*Blechnum serrulatum*) is a common ground cover that is dominant in strands. Knolls within this vegetation type comprise a principal habitat for the rare royal palm (*Roystonea elata*), and older forests serve as homes for many birds, mammals, reptiles, and amphibians (U. S. Forest Service, Wade et al. 1980a). The substrates of these communities are inundated or saturated with water nearly year-round.

**Cypress Domes** — Cypress domes are small, relatively discrete areas of freshwater swamp dominated by bald cypress trees. These areas are nearly circular and are often surrounded by marl prairies or herbaceous marsh community with few trees. The domed shape of these communities is produced by taller cypress trees growing near the center of the community and progressively shorter trees occurring near the peripheral areas. The centers of the dome communities and their associated solution hole substrates support the growth of cypress trees, with marginal growth conditions in the peripheral areas.

In the margins of cypress domes, the community becomes transitional with the surrounding marl prairies. Limestone usually occurs near the substrate surface in these peripheral areas, and cypress trees are often unable to establish root systems

beneath this layer of rock. The trees that survive in this area are usually smaller than those near the wetter central part of the dome. Also, because the trees in this marginal area are scattered and do not form a complete canopy, sufficient sunlight reaches the ground to support a substantial grass community, similar to that found in the adjacent prairies.

Dry season fires are common in prairie communities, and they are carried into the cypress margins by the grassy ground cover. These fires ordinarily do not kill the cypress trees, but these fires can damage the trees enough to slow their growth. Thus, a difference in habitat conditions occurs, from a moist, nutrient-rich substrate with almost no fires near the center of the dome to a seasonally dry, nutrient-poor substrate with frequent fires at the periphery. The result is a community that supports tall, vigorous trees near the center of the dome with progressively shorter, less vigorous trees toward the margins.

**Mixed-Hardwood Swamps** — Cypress swamps that contain significant populations of hardwood trees that co-dominate the tree canopy with bald cypress trees are often referenced as mixed hardwood and cypress swamps. Mixed hardwood swamps are essentially wetlands dominated by trees. Red bay (*Persea borbonia*), sabal palm (*Sabal palmetto*), pond apple (*Anona glabra*), or laurel oak (*Quercus laurifolia*) commonly co-dominate these communities. Epiphytes are common in these communities, as greater tree diversities result in greater diversities of substrates available to epiphyte establishment.

Several bromeliads (*Tillandsia* spp., *Guzmania monostachia*) and orchids, such as epidendrums (*Epidendrum* spp.), and ghost orchids (*Polyradicion (Polyporrhiza) lindenii*) are found on the trunks and branches of these trees. Epiphytic ferns, such as shoestring fern (*Vittaria lineata*)

and golden serpent fern (*Phlebodium aureum*), are common on the trunks of sabal palms. Vines, including poison ivy (*Toxicodendron radicans*), several grapes (*Vitis* spp.) and ratan vine (*Berchemia scandens*), are also common components of the tree canopy. These swamp communities are usually diverse, and may represent a stage of community succession later than the bald cypress-dominated community.

**Sloughs** — Sloughs are sinuous, elongated natural drainage channels that are inundated most of the time. Dominant species are aquatic plants and include white water lily (*Nymphaea odorata*), water hyssop (*Bacopa caroliniana*), and ludwigia (*Ludwigia repens*). Emergent plants are sparse, with spike rush common in some areas. Sloughs are generally a few feet to a few inches below adjacent marshes. Soils are mostly peat or muck, with submerged surface sediments rising and falling with fluctuating water levels. During severe droughts, surface sediments dry out and ground fires may develop, but generally sloughs are wet most of the year and have historically served as fire breaks for communities bordering the sloughs. When fires do occur, depressions are formed in the organic soils, and they fill with water to become ponds. Ponds and sloughs provide important habitat for alligators.

**Suitability for ORVs** — Cypress strands, cypress domes, mixed hardwood swamps, and sloughs are the wettest of all vegetated communities in the Addition. The interiors of these areas serve as important refuges and concentration points for water-dependent wildlife during the annual dry season. Generally these communities are natural barriers to off-road vehicles. Because these wetlands are associated with topographic depressions, water depth increases substantially from their edges to the center. Most of the areas covered by these wetlands have unstable substrate, water that is too deep, or too many trees to support ORV use.

Deep water and large, closely spaced trees confine off-road vehicles to established, previously cut trails threading along the margins where mineral soil or bedrock provides sufficient traction and water depth is relatively shallow. ORV tracks usually encircle or skirt cypress domes along their outermost perimeter for the same reasons. There are relatively few ORV trails that are perpendicular to the forested drainages. ORV trails crossing strands and swamps are normally on well-established, deeply entrenched routes where the forest narrows and water levels are shallower. In the original Preserve, Duever et al. (1981) found that established ORV trails through strands and swamps had the deepest ruts of all vegetation types, and that typically trails were worn down to bedrock and filled with standing water. Sloughs typically contain deep water and deposits of muck or peat, all of which discourage the use of wheeled off-road vehicles.

### Prairies and Marshes.

**Prairies** — Prairies are treeless areas dominated by grasses and grasslike plants. Herbaceous (wet) prairies and cypress prairies can be found in the Addition. Herbaceous (wet) prairie communities in the region are typically seasonally inundated short-grass communities. Herbaceous broad-leaved plants are common components of these communities, but these plants do not usually dominate them. Graminoids (herbaceous grasses or grasslike plants) such as muhly grass (*Muhlenbergia capillaris*), blue maidencane (*Amphicarpum muhlenbergianum*), or south Florida bluestem (*Schizachyrium rhizomatum*) often dominate these prairies. Prairie communities may occur on many soils, but these communities are often found on frequently flooded fine sands or calcium carbonate marls. Limestone is commonly near the soil surface in prairie areas, which does not support trees; thus

vegetation is limited to ground cover. These areas are inundated for part of the year, and they receive much sunlight.

Prairies will burn during periods of drought and when sufficient fuel is present. Fire maintains prairies by eliminating invading trees and shrubs.

Cypress prairies are communities that transition between short-grass prairies and cypress-dominated swamp communities and typically contain elements of both. Cypress prairies are usually dominated by graminoid ground cover made up of species common in prairies, such as muhly grass (*Muhlenbergia capillaris*), or saw grass (*Cladium jamaicense*). Bald cypress trees are common in these prairies, but seldom attain a large size. This is partly because the limestone caprock that is a common component of substrates in the region is close to the soil surface and inhibits the establishment and growth of cypress trees unless there are fractures in the limestone where the cypress trees can establish limited growth. These trees are called dwarf or hatrack cypress. These areas are inundated (usually less than 1 foot of water depth) through much of the wet season.

**Suitability for ORV Use** — Prairies appear to be the vegetation community most impacted by ORV use. ORV trails in this community are easily distinguished on aerial photography. The tracks made by off-road vehicles persist and are even visible on small-scale aerial images. Impacts of ORV traffic in prairies include vegetation loss and exposed soils. Duever et al. (1981) and Duever et al. (1986b) described effects of ORV traffic in marl marshes and sand marshes in the original Preserve. Based on the species composition of these areas, these now appear to be classified as prairies. Duever et al. (1986b) observed that sand marshes that were not inundated were less likely to sustain heavy impacts from ORV use. This suggests that

seasonal variation in hydrology may be an important factor in determining ORV effects, and that ORV use in prairies during the wet season should be minimized.

ORV uses have been shown to alter plant community structure. After one year of recovery in the original Preserve, Duever et al. (1981) found that sawgrass and muhly grass were reduced in the tire lanes. Hyssop (*Bacopa* sp.) and bladderwort (*Utricularia* sp.) were common in the rutted areas; this was attributed to an increased hydroperiod in the tire ruts and increased sunlight from tree or shrub canopy removal within ORV use areas. After seven years, Duever et al. (1986b) found that four graminoids were more common in ORV trails than in comparison areas. Sawgrass was less common in the trails used by off-road vehicles than in the undisturbed comparison areas.

Duever et al. (1981) and Duever et al. (1986b) also evaluated effects in “small cypress” communities. Descriptions of these areas in Duever et al. (1981) suggest that they may be similar to that of cypress prairies outlined above. These areas are closely aligned ecologically with marl prairies. Duever et al. (1981) indicated that of all five vegetative communities in the original Preserve tested with wheeled vehicles, the small cypress communities required the lowest amount of use by wheeled off-road vehicles to create “a significant impact.” Duever et al. (1986b) indicated recovery of small cypress communities was less than other communities seven years after intermediate and heavy impacts from wheeled off-road vehicles. Duever et al. (1981) found that small (less than 3 feet tall) cypress trees suffered minor damage in areas used by off-road vehicles, but that cypress trees between 3 feet and 10 feet tall had severe damage. Damage to these trees and associated mortality increased with ORV use. This indicates that cypress trees between 3 and

10 feet tall can be adversely affected in areas used by off-road vehicles, but that after limited ORV use, recovery of very small trees can occur quickly.

**Marshes** — Since the preparation of the 1991 *General Management Plan*, the classification of marshes in the Preserve has been changed to be consistent with vegetation classification throughout the south Florida region. Under the new classification of Welch et al. (1999), marshes now include many of the areas identified as prairies in 1991.

Freshwater and saline marshes can be found in the Addition. Freshwater marshes are wetland communities that are dominated by herbaceous plants and occasional shrubs. These communities are typically inundated nearly year-round and have substrates with a thick organic mantle on the surface. Marshes are usually dominated by herbaceous species, but a marsh that is dominated by grasses or sedges may be considered a graminoid marsh. Grasses usually occur in areas without standing water during some part of the year, but related graminoids may be common in areas with prolonged hydroperiods. The graminoid that is probably most common in such areas is sawgrass. Sawgrass is a sedge (Cyperaceae) that is commonly found in wetlands with various depths to limestone, often with a significant organic peat layer covering the limestone. This organic layer is usually derived from sawgrass. Other similar communities that are dominated by different grasslike plants may also be graminoid marshes and would be identified by the graminoid that is the dominant ground cover plant.

Freshwater marshes are commonly dominated by broad-leafed plants, such as pickerel weed (*Pontederia cordata*), cattail (*Typha domingensis* or *T. latifolia*), or duck potato (*Sagittaria* spp.). These wetlands have comparatively deep water (1.5–2.0 m)

during the wet season and persist as aquatic communities year-round or well into the dry season. These deeper areas provide refuge for fish during dry seasons, when few places are under water, and also tend to concentrate populations of fish and other aquatic animals as water levels decrease with dry weather. Many wading birds, such as wood storks (*Mycteria americana*) and American egrets (*Casmerodius albus*), depend on these concentrated prey populations to find sufficient food for nesting and brood rearing.

Saline marshes occur in coastal areas and are often affected by marine systems. These communities, influenced by tidal fluctuations, have higher soil salinity than inland freshwater systems. Saline marshes that are far inland may be affected by marine waters only during extreme storm tides, such as those associated with hurricanes. This produces a change in salinity very infrequently, but the effects of this change may remain with the marsh community for several years. These communities are usually populated with plants that are typical of freshwater marshes but that are able to tolerate small increases in salinity. Plants that inhabit these areas include cattail (*Typha domingensis*), pond apple (*Anona glabra*) and cord grass (*Spartina bakeri*). These areas and other communities inland from coastal systems may be dominated by fresh water almost all of the time but may still be frequently influenced by tidal changes in water level. During the dry season, decreased flow of fresh water may allow salt water to flow farther inland than during the wet season.

Nearer the coast, tidal systems are more likely to dominate, so that mixing of fresh water and salt water becomes more common. When salt water becomes diluted by fresh water, brackish water results. Communities that are dominated most of the year by brackish water are likely to be

dominated by saline marsh with occasional mangrove trees. These saline marshes are often populated by black rush (*Juncus roemerianus*) salt marsh cord grass (*Spartina* spp.), or salt grass (*Distichlis spicata*). Fires sweep through salt marshes when weather conditions and fuel loads are conducive. Without fire or frost, trees would eventually replace salt marsh vegetation (Forest Service, Wade et al. 1980a).

**Suitability for ORV Use** — ORV use has been shown to alter marsh plant composition and structure. Duever et al. (1981 and 1986) described effects of ORV traffic in inundated sand marshes and peat marshes (wheeled vehicles were not tested in peat marshes). These communities appear to include much of the “marshes” category used here. These are open communities with few trees or shrubs, and ground cover is dominated by emergent herbs. Inundation is year-round or nearly year-round. Duever et al. (1981) indicated that off-road vehicles produced heavy impacts in inundated sand prairies, but less impact in noninundated sand prairies with the same amount of ORV use. Continuously inundated marl marshes were not tested with wheeled vehicles but appeared to be more affected when they were inundated than when the water table was below the ground surface. This suggests that marl marshes with extended hydroperiods may be quickly impacted by ORV use.

In marl marsh communities in the original Preserve, Duever et al. (1981) found that panic grass (*Panicum* sp.), sawgrass and muhly grass decreased with increased ORV use. Bladderwort, often a floating aquatic plant, was common in the rutted areas; this was attributed to an increased hydroperiod in the tire ruts. Sand marsh communities showed little difference in plant diversities with comparison areas after one year. After seven years, coinwort (*Centella asiatica*)

was more common in marl marsh areas used by off-road vehicles.

**Mangrove Forests.** Mangrove forests (mangrove swamps) are intertidal wetlands dominated by hardwood trees that are tolerant of coastal, saline conditions. Three mangrove trees — red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), and white mangrove (*Laguncularia racemosa*) — and buttonwood (*Conocarpus erectus*), a mangrove associate, are common in southern Florida. These trees make up a dense forest on much of the coast in southern Florida and form scattered tree islands farther inland, where surface waters become brackish.

Depending on the distance from the coast and seasonal runoff from inland freshwater systems, mangrove forest soils can vary in salinity. These changes in ground water and salt content create adverse conditions for most organisms, so that species richness in mangrove forests is usually low. Catastrophic events such as fires, frosts, hurricanes, and oil spills also limit mangrove productivity. Frosts severely prune mangroves, and hurricanes can destroy them.

The mangrove communities in the Addition are found primarily in the southern part of the narrow strip of the Addition that is east of SR 29 and adjacent to the Barron River and Everglades City. This area is currently open to motorized and nonmotorized boats.

**Suitability for ORV Use** — Mangrove forests are not suitable for wheeled vehicles. Airboats have also caused damage to mangrove trees when wind generated by propellers damages leaves and small branches of mangrove trees. Florida law prohibits destruction of mangrove trees.

**Pinelands.** Pinelands occur in areas that are higher than most wetlands, so their substrates are inundated less frequently. In the Addition, slash pine (*Pinus elliottii*) dominates these communities. Slash pine forests are woodland

communities with pine trees that are spaced several yards apart, so that an incomplete tree canopy is formed. Depending on substrate, some of these woodlands form a pine and palmetto community, where scattered pine trees form an open (incomplete) canopy with a dense shrub layer composed mostly of saw palmetto (*Serenoa repens*). The palmetto shrub layer is usually dense so that ground-cover does not become well established.

Slash pine-dominated communities that occur on limestone outcrops are called pine rockland communities. These areas also develop a palmetto shrub layer, but the palmettos are usually not as dense as in the pine and palmetto communities. This allows the establishment of other shrubs and ground cover, so that pine rocklands are often more diverse than pine and palmetto communities living on sandy substrates. Pine rockland communities often contain plants that are associated with the Atlantic coastal ridge communities.

The pine and palmetto and pine rockland communities are typically mesic communities, but frequently include extensive ecotonal (transitional) areas that are adjacent to wetlands. These ecotonal communities have brief or infrequent hydroperiods and contain elements of the adjacent wetlands. Palmettos apparently do not adapt well to hydric conditions and are not common in areas that are saturated or inundated often. Slash pines, however, tolerate some hydric conditions, so that in areas with short hydroperiods, slash pines commonly live without the saw palmetto understory. In these areas, the open pine canopy allows sunlight to penetrate, and graminoids commonly found in prairies are supported.

Several ecotonal communities can be found in pinelands. These ecotonal communities occur in areas with subtle topographic differences, so that differences in the communities may occur because of differences in soil type,

hydrology, small elevation differences, or fire history.

Pine needles, grasses, and other combustible materials accumulate relatively quickly in pinelands, and pinelands burn at frequent intervals. Pinelands are fire-dependent, and prescribed fires by NPS staff maintain the habitat viability by preventing hardwood succession. If fires are suppressed, pinelands eventually succeed to hardwood-dominated stands.

Pinelands provide habitat for the federally listed red-cockaded woodpecker. Red-cockaded woodpeckers form clusters of cavity trees within pinelands. NPS annual surveys of red-cockaded woodpecker clusters have documented no loss of pines due to ORV traffic.

**Suitability for ORV Use** — Of all the plant communities in the original Preserve tested for ORV impacts by Duever et al. (1981), pinelands were the most resistant to adverse effects from ORV use. Wetter pine communities were more heavily affected. Duever et al. (1986b) found that two of three pineland areas affected by off-road vehicles had recovered after seven years, but that the third, and wettest, pineland had not fully recovered. Amounts of ground cover did not appear to be substantially altered by ORV use. Heights of plants in areas of ORV use were decreased, but the plants recovered in one growing season.

Within the pineland understory, Duever et al. (1981) found few differences in plant communities compared with undisturbed areas after one year. However, they did note slight increases in sawgrass, coinwort, and *Hyptis* sp. compared with undisturbed comparison sites, while panic grass and three-awn grass (*Aristida* sp.) decreased with increased ORV use. After seven years, Duever et al. (1986b) indicated that *Hypericum* sp., *Ludwigia* sp., and yellow-eyed grass (*Xyris* sp.) were more common in ORV trails than in comparison

areas, while fleabane (*Pluchea* sp.) was less common. Sawgrass was less common in the trails used by off-road vehicles than in the undisturbed comparison areas.

Duever (1986) indicated that pinelands recovered more quickly than other areas, so that these areas may be considered favorably for designated trails.

**Hardwood Hammocks.** Mesic and hydric hardwood hammocks are scattered throughout the Addition. Often appearing as islands of trees, hardwood hammock communities occur on slightly elevated areas, and the soils are generally drier than the surrounding wetlands. Hammocks are usually small areas (1 hectare or about 2.5 acres or less) that are surrounded by other communities; in the Big Cypress region, the surrounding community is typically a wetland swamp or prairie. These slightly elevated areas function as refuges for wildlife during periods of high water. Because soils remain moist most of the year, hardwood hammocks rarely burn, but they are susceptible to fire during extended droughts. Following a fire, the species composition of recolonized hammocks often changes significantly (Duever et al. 1986a).

Hammocks are usually dominated by hardwood trees with sabal palms; saw palmettos frequently occur as part of the shrub layer and often appear to be remnants of an earlier, more open successional stage. Near the coast, these hammocks are protected from frosts by the adjacent Gulf of Mexico, so that tropical hardwoods dominate these hammocks. Many of these hammocks are located on shell mounds that were constructed by the Calusa Indians. These shell mounds support a diversity of tropical hardwoods, including, gumbo limbo (*Bursera simaruba*), mastic (*Mastichodendron foetidissimum*), and poison wood (*Metopium toxiferum*).

Hammocks that occur inland are usually surrounded by freshwater wetlands; these may be swamps (wetlands dominated by trees)

or wet prairies (wetlands dominated by herbaceous ground cover). Inland hammocks are usually dominated by live oak (*Quercus virginiana*) or laurel oak trees with understories made up of cocoplum (*Chrysobalanus icaco*), snowberry (*Chiococca alba*), and beauty berry (*Callicarpa americana*). Ground cover is sparse, usually consisting of tufted grasses such as bluestem (*Andropogon virginicus*). Epiphytes are common, especially on the branches of oak trees, where resurrection fern (*Polypodium polypodioides*), many bromeliads, and several uncommon orchids grow. Many epiphytes also occur on the trunks and bootjacks (leaf bases that remain for some time on the palm trunk) of sabal palms, such as shoestring fern and golden serpent fern. Vines such as poison ivy, several grapes (*Vitis* spp.), and pepper vine (*Ampelopsis arborea*) are common canopy components. Elevated areas with sandy soils and limestone near the substrate surface often support cabbage palm (sabal palm) hammocks. These hammocks are usually not especially diverse, and have few trees other than sabal palms forming the tree canopy. Shrubs are uncommon, and ground cover is sparse. Vines and epiphytes may occur on the palm trunks, but these are also usually sparse.

**Suitability for ORV Use** — Trees that dominate these hardwood hammock communities are often large, such as oaks, sabal palms, or wild tamarind (*Lysiloma latisiliquum*). As a result, ORV riders usually avoid hardwood hammocks, although the substrate in these areas would support ORV use. Hardwood hammocks are susceptible to invasion by unwanted exotic species, especially Brazilian pepper, when their soils and tree canopies are disturbed.

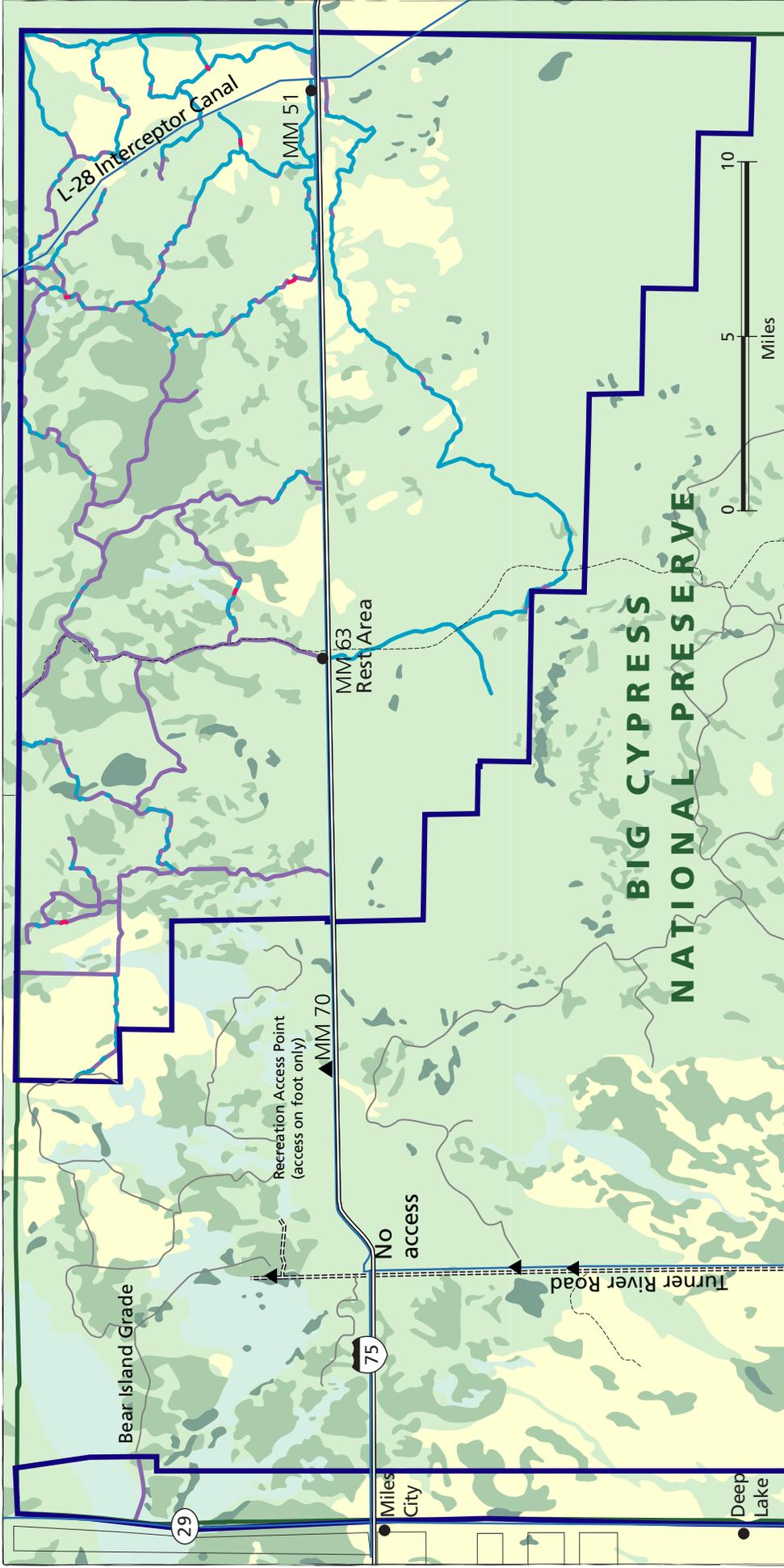
Occasionally, smaller trees and shrubs in the understory may be subject to damage because they can be bent or broken by vehicles. Duever et al. (1986b) stated that abandoned

trails in the original Preserve were vegetated by saltbush (*Baccharis* spp.) after seven years. Saltbush species are opportunistic in disturbed areas. Duever et al. (1986b) speculated that the abandoned trails would eventually succeed to the native understory species, but no further assessment has been conducted to determine if this is occurring.

Hardwood hammock communities are commonly associated with archeological resources, and changes to substrates may affect cultural remnants. These communities are ordinarily small and isolated enough that they can be avoided. To reduce the risk of compromising cultural resources that may be in the hardwood hammock substrates, ORV use should be directed away from hammock communities.

See map 11 for an illustration of the relationship between the location of the preferred alternative's primary ORV trails and the Addition's ecosystem types.

**Disturbed Areas.** Disturbed areas, found throughout the Addition and intermixed within all of the above vegetation communities, are areas that have been affected by nature (fire, freeze, storms, extreme tides, etc.) or by man's activities such as logging, canal and road construction, farming and grazing, oil extraction, ORV use, fire, introducing exotic species, earth moving, altering drainage, altering the chemistry of water or soils, or facility construction. Community succession has been altered in disturbed areas. Soils in disturbed areas differ with locations and original substrates. The result is a change in the ecosystem that usually allows colonization and recruitment of ruderal (weedy) species. These weeds are often exotic plants that outcompete natives and quickly dominate the disturbed area.

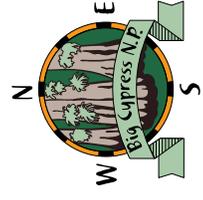


**Legend**

- Preserve Boundary
- Addition Boundary
- Canal
- Existing Access Point
- Unpaved Road
- Uplands
- Wetlands, No Fill Needed
- Wetlands, Fill Needed
- Existing Hiking Trail
- Designated Primary ORV Trail

**Key to Ecosystem**

- Cypress
- Hardwood Hammock
- Pineland
- Mangrove
- Freshwater Marl Prairie
- Freshwater Slough
- Coastal Marsh
- Marine and Estuarine



**Map 11 • Preferred Alternative Conceptual Primary ORV Trails and Ecosystem Type  
Big Cypress National Preserve--Addition  
General Management Plan**



**Protected Plant Species**

As shown in table 12, two species of plants that reside in the Addition are listed as candidate species for federal listing as endangered or threatened. The state of Florida lists an additional 96 species that occur in the Addition as threatened or endangered, along with

three more that are listed as commercially exploited. Collectively, these species warrant attention because they have had long-term population declines and are vulnerable to exploitation or environmental changes. Table 12 displays the status of all 102 special status plant species that occur in the Addition.

**TABLE 12: LISTED PLANT SPECIES FOR BIG CYPRESS NATIONAL PRESERVE ADDITION<sup>a</sup>**

Common Name	Scientific Name	Designated Status <sup>b</sup>	
		Federal	State
Paurotis palm, Everglades palm	<i>Acoelorrhaphe wrightii</i>		T
Golden leather fern	<i>Acrostichum aureum</i>		T
Brittle maidenhair	<i>Adiantum tenerum</i>		E
Sensitive joint-vetch, meadow joint-vetch	<i>Aeschynomene pratensis</i>		E
White colic-root, bracted colic-root	<i>Aletris bracteata</i>		E
Pineland-allamanda, pineland golden trumpet	<i>Angadenia berteroi</i>		T
Eared spleenwort	<i>Asplenium erosum</i>		E
Bird's-nest fern, wild birdnest fern	<i>Asplenium serratum</i>		E
Pinepink	<i>Bletia purpurea</i>		T
Fakahatchee bluethread	<i>Burmannia flava</i>		E
Manyflowered grasspink	<i>Calopogon multiflorus</i>		E
Spicewood, pale lidflower	<i>Calyptrothrix pallens</i>		T
Leafless bentspur orchid	<i>Campylocentrum pachyrrhizum</i>		E
Narrow strap fern, narrow-leaved strap fern	<i>Campyloneurum angustifolium</i>		E
Tailed strap fern	<i>Campyloneurum costatum</i>		E
Powdery strap airplant	<i>Catopsis berteroniana</i>		E
Florida strap airplant	<i>Catopsis floribunda</i>		E
Southern Florida sandmat	<i>Chamaesyce pergamena</i>		T
Porter's sandmat	<i>Chamaesyce porteriana</i>		E
Satinleaf	<i>Chrysophyllum oliviforme</i>		T
Coffee colubrina, greenheart	<i>Colubrina arborescens</i>		E
Butterflybush, Curacao bush	<i>Cordia globosa</i>		E
Quailberry, Christmasberry	<i>Crossopetalum ilicifolium</i>		T
Pepperbush	<i>Croton humilis</i>		E
Florida tree fern, red-hair comb fern	<i>Ctenitis sloanei</i>		E
Blodgett's swallowwort	<i>Cynanchum blodgettii</i>		T
Cowhorn orchid, cigar orchid	<i>Cyrtopodium punctatum</i>		E
Florida prairieclover	<i>Dalea carthagenensis</i> var. <i>floridana</i>	Candidate	E
Ghost orchid, palmplolly	<i>Dendrophylax lindenii</i>		E
Caribbean crabgrass	<i>Digitaria filiformis</i> var. <i>dolichophylla</i>		T
Florida pineland crabgrass	<i>Digitaria pauciflora</i>	Candidate	E
Guiana-plum	<i>Drypetes lateriflora</i>		T

Common Name	Scientific Name	Designated Status <sup>b</sup>	
		Federal	State
Clamshell orchid, cockleshell orchid	<i>Encyclia cochleata</i>		E
Florida butterfly orchid	<i>Encyclia tampensis</i>		CE
Dingy-flowered star orchid	<i>Epidendrum anceps</i>		E
Acuna's star orchid	<i>Epidendrum blancheanum</i>		E
Umbrella star orchid	<i>Epidendrum floridense</i>		E
Night-blooming epidendrum, night-scented orchid	<i>Epidendrum nocturnum</i>		E
Stiff-flower star orchid	<i>Epidendrum rigidum</i>		E
Sanibel Island love grass	<i>Eragrostis tracyi</i>		E
Beach verbena, coastal mock vervain	<i>Glandularia maritima</i>		E
Wild cotton, upland cotton	<i>Gossypium hirsutum</i>		E
West Indian tufted airplant	<i>Guzmania monostachia</i>		E
Snowy orchid	<i>Habenaria nivea</i>		T
Needleroot airplant orchid	<i>Harrisella porrecta</i>		T
Poeppig's rosemallow	<i>Hibiscus poeppigii</i>		E
Hanging club-moss	<i>Huperzia dichotoma</i>		E
Delicate violet orchid	<i>Ionopsis utricularioides</i>		E
Rockland morningglory	<i>Ipomoea tenuissima</i>		E
Pineland clustervine	<i>Jacquemontia curtisii</i>		T
Skyblue clustervine	<i>Jacquemontia pentanthos</i>		E
West coast lantana, Sanibel shrubverbena	<i>Lantana depressa</i> var. <i>sanibelensis</i>		E
Catesby's lily, pine lily	<i>Lilium catesbaei</i>		T
Small's flax	<i>Linum carteri</i> var. <i>smallii</i>		E
Pantropical widelip orchid	<i>Liparis nervosa</i>		E
Nodding club-moss	<i>Lycopodiella cernua</i>		CE
Hidden orchid	<i>Maxillaria crassifolia</i>		E
Pineland blackanthers	<i>Melanthera parvifolia</i>		T
Climbing vine fern	<i>Microgramma heterophylla</i>		E
Twiberry, Simpson's stopper	<i>Myrcianthes fragrans</i>		T
Giant sword fern	<i>Nephrolepis biserrata</i>		T
Wild basil, wild sweet basil	<i>Ocimum campechianum</i>		E
Florida dancinglady orchid	<i>Oncidium ensatum</i>		E
Hand fern	<i>Ophioglossum palmatum</i>		E
Erect pricklypear	<i>Opuntia stricta</i>		T
Royal fern	<i>Osmunda regalis</i> var. <i>spectabilis</i>		CE
Pineland passionflower	<i>Passiflora pallens</i>		E
Comb polypody	<i>Pecluma ptilodon</i> var. <i>caespitosa</i>		E
Cypress peperomia	<i>Peperomia glabella</i>		E
Florida peperomia, baby rubberplant	<i>Peperomia obtusifolia</i>		E
Yerba linda	<i>Peperomia rotundifolia</i>		E
Southern fogfruit	<i>Phyla stoechadifolia</i>		E
Greater yellowspike orchid	<i>Polystachya concreta</i>		E
Bahama ladder brake	<i>Pteris bahamensis</i>		T
Swartz's snoutbean	<i>Rhynchosia swartzii</i>		E
Royal palm, Florida royal palm	<i>Roystonea regia</i>		E
Leafless beaked lady's-tresses	<i>Sacoila lanceolata</i>		T
Ray fern	<i>Schizaea pennula</i>		E
Florida Keys nutrush	<i>Scleria lithosperma</i>		E

Common Name	Scientific Name	Designated Status <sup>b</sup>	
		Federal	State
Everglades bully	<i>Sideroxylon relinatum subsp. Austrofloridense</i>		E
Mullein nightshade	<i>Solanum verbascifolium</i>		T
Everglades Keys false buttonweed	<i>Spermacoce terminalis</i>		T
Texas ladiestresses	<i>Spiranthes brevibraris</i>		E
Lacelip lady's-tresses	<i>Spiranthes laciniata</i>		T
Longlip lady's-tresses	<i>Spiranthes longilabris</i>		T
Southern lady's-tresses	<i>Spiranthes torta</i>		E
West Indian mahogany	<i>Swietenia mahagoni</i>		T
Broad halbard fern	<i>Tectaria heracleifolia</i>		T
Curtiss' hoarypea	<i>Tephrosia angustissima var. curtissii</i>		E
Lattice-vein fern	<i>Thelypteris reticulata</i>		E
Reflexed wild-pine, northern needleleaf	<i>Tillandsia balbisiana</i>		T
Stiff-leaved wild-pine, cardinal airplant	<i>Tillandsia fasciculata var. densispica</i>		E
Banded wild-pine, twisted airplant	<i>Tillandsia flexuosa</i>		T
Hoary wild-pine, fuzzywuzzy airplant	<i>Tillandsia pruinosa</i>		E
Giant wild-pine, giant airplant	<i>Tillandsia utriculata</i>		E
Soft-leaved wild-pine, leatherleaf airplant	<i>Tillandsia variabilis</i>		T
Chiggery grapes	<i>Tournefortia hirsutissima</i>		E
Entire-winged bristle fern	<i>Trichomanes holopterum</i>		E
Hoopvine	<i>Trichostigma octandrum</i>		E
Florida gamagrass	<i>Tripsacum floridanum</i>		T
Leafy vanilla	<i>Vanilla phaeantha</i>		E
Rain-lily, redmargin zephyrlily	<i>Zephyranthes simpsonii</i>		T

Sources: USFWS 2006; Florida Department of Agriculture, Division of Plant Industry 2006; Florida Natural Areas Inventory 2006.

a Species in this table include those that have been documented in the preserve- it does not include listed species for Collier County that are not present in the preserve.

b E = endangered                      Candidate= species is a candidate for listing as threatened or endangered  
T = threatened                      CE = commercially exploited

### Exotic and Nonnative Plant Species

Thousands of nonnative plant species have been introduced to south Florida for ornamental plantings, agriculture, and other human uses. Because of the relative youth of the south Florida landmass and the semi-tropical climate, it is theorized that the region is particularly susceptible to invasion by exotic plant species (Duever et al. 1986a). Some 297 exotic plants have become established in south

Florida (Duever et al. 1986a). Many of these are reported from Big Cypress National Preserve, but most are restricted to early successional stages on disturbed sites, and only a few pose a long-term threat to native communities. Of these, five species — melaleuca (*Melaleuca quinquenervia*), Brazilian pepper, water hyacinth (*Eichhornia crassipes*), hydrilla (*Hydrilla verticillata*), and Old World climbing fern (*Lygodium microphyllum*) — are fairly common in the

Preserve and the Addition. Australian pine (*Casuarina* spp.) was identified as an exotic species of concern; however, in the last two decades it has been eradicated. Today, except for those on private property, all known Australian pine plants have been eliminated from the Preserve and the Addition. Crested floatingheart (*Nymphoides cristata*), a relatively new exotic for south Florida, was discovered in the Preserve in August 2006. Infestations are restricted to about 4 miles of canal along Tamiami Trail and two strand swamps south of the trail (NPS 2006a). Evidence suggests that this species was introduced to the Preserve through the transfer of propagules attached to a net or other fishing gear. Invasion of the adjacent swamps likely occurred from water flowing through culverts in the area. Water lettuce (*Pistia stratiotes*) and air potato (*Dioscorea bulbifera*) are also known to be present.

Melaleuca and Brazilian pepper are capable of invading native plant communities, and control efforts have been concentrated on these species.

The exotic plant control program is carried out by the NPS contractors and maintenance and resource management staff. NPS staff are active participants in the Florida Exotic Pest Plant Council, an interagency task force organized to share technical information on the control of exotics, monitor the distribution of exotics in south Florida, and collaborate on comprehensive control strategies.

Even though exotics are spread by natural events (such as hurricanes) and animals (such as raccoons and birds), there are indications that off-road vehicles have resulted in the spread of exotic and invasive plants within the Preserve, including Brazilian pepper, melaleuca, and Old World climbing fern. Off-road vehicles transport seed in their tire treads and vehicle beds and distribute it in currently unaffected areas of the Preserve as they travel. Evidence of the spread of invasive plants along ORV trails has been documented

around the Monroe Station trailhead (Pernas 1999).

**Melaleuca.** Melaleuca, a native of Australia and New Guinea, was introduced to Florida around 1910 for landscaping. Perhaps the first introduction of melaleuca in Big Cypress was at Monroe Station around 1940. Because it grows in pure stands at the expense of native plants and can occupy large areas, melaleuca is considered to be a major threat to the ecological integrity of the Preserve.

Melaleuca has successfully invaded much of south Florida because of its outstanding ability to propagate. A mature tree may contain tens of thousands of small woody seed capsules along its branches, and each capsule contains about 250 seeds. The capsules remain closed as long as they receive moisture from the tree's vascular system. However, if the vascular system fails due to damage by fire, frost, cutting, herbicidal injury, or simply old age, the capsules will slowly dry out, open, and release hundreds of thousands of seeds. The seeds fall within a short distance of the parent tree and germinate best on open, moist soils. Germination is limited on very dry or very wet soils and under dense canopy cover. As a result, melaleuca does well in prairies and open, moist pinelands, but is slower to invade wetter communities such as cypress domes and strands.

Melaleuca is extremely fire tolerant. The spongy inner bark insulates the trunk while the papery outer bark and oil-rich leaves readily carry fire. Following a fire, melaleucas will both release seeds and resprout, and fires create excellent conditions for melaleuca seed germination and seedling survival. Hence, fire in a mature melaleuca stand can encourage the exotic to spread.

Melaleuca is controlled through two primary methods: (1) hand pulling — manually pulling the plants when they are small enough, and (2) cut stump — brushing or

spraying herbicide on freshly cut stump surfaces. Both techniques are labor intensive, and trained personnel are required to handle the herbicides. Once mature, seed-bearing trees have been killed, prescribed fire or cutting may be used to control seedlings and sprouts.

The entire Addition has been inspected for the presence of melaleuca plants, and about 632,000 melaleuca stems have been treated and/or removed. Today, melaleuca is considered to be under control within the Preserve and the Addition. Future treatments of melaleuca in the Addition will focus on re-treating previously treated areas.

**Brazilian Pepper.** A native of South America, Brazilian pepper was first introduced to south Florida around 1900. It is now widespread in the region, primarily on disturbed, well-drained sites.

Brazilian pepper reproduces by seed. Seeds are produced in bright red berries that are ingested by birds and other wildlife and then spread to other areas. Ingestion appears to improve seed germination potential.

Fire has variable effects on pepper plants. Seedlings are killed by fairly frequent fires; however, in more mature stands trees may be top-killed by fires but can resprout and reoccupy a burned area. Intense fires on upland sites tend to eliminate competing vegetation and prepare good seedbed conditions for a *Schinus* invasion.

Like melaleuca, Brazilian pepper occurs in dense, pure stands, particularly in the Addition. However, unlike melaleuca, dense pepper stands are almost always confined to areas with substrate disturbance (roadsides, canal banks, abandoned homesites, or camps— typically areas in which fill has been placed to create dry land). As some upland areas mature toward hardwood hammock vegetation, Brazilian pepper will decline in importance. However, in most upland areas

the natural fire cycle is likely to maintain Brazilian pepper as a component of the understory indefinitely. Fire and hydrological cycles seem to prevent Brazilian pepper from invading undisturbed prairies, marshes, and other more moist types of environments.

Brazilian pepper occurs in mesic communities nearly throughout the Preserve, especially in the Addition. It is often found on old farm fields, spoil banks, and canal berms. In 2005 NPS staff initiated large-scale treatment of Brazilian pepper in the Addition north of I-75 and west of Nobles Grade. This is an area with perhaps the greatest concentration of Brazilian pepper in the entire Preserve. Much of this area was disturbed by small-scale agriculture and grazing, with several hunting camps and many swamp buggy trails; these changes to the landscape created significant areas for Brazilian pepper establishment. In 2005 about 780 acres were treated for dense infestation, and in 2006 about 10,058 acres of moderate to dense infestation of Brazilian pepper were treated, mostly in the area between Nobles and Bundschu grades (NPS 2006a). Collectively, nearly 11,000 acres in the Addition have been treated. Infestations were heaviest along Nobles Grade and in abandoned hunt camp sites. Treatments of infestations around Deep Lake and in the strip of land along SR 29 are planned for early 2009. The overall goal is for stopping the spread of Brazilian pepper in the entire Preserve, including the Addition, which will likely take about 10 years (NPS 2006a).

**Water Hyacinth and Hydrilla.** Water hyacinth and hydrilla have invaded the Addition's canal systems and excavated ponds, where they often form dense mats. Neither plant can invade seasonally dry wetlands, and the plants appear to be restricted to permanent water in canals and ponds. For this reason no major control program is currently warranted.

**Old World Climbing Fern.** This plant is rapidly becoming a significant problem species throughout southern Florida. It

apparently originated in the Palm Beach County area on the east coast of the state and has been spreading rapidly westward and southward. The first recorded treatment of Old World climbing fern in the Preserve occurred in 1998. Since then this exotic species has been found in nearly 100 sites in the Preserve. Infestations have been found throughout the Preserve, with the greatest concentration in the northeast portion of the Addition. Most of these infestations are small (<0.5 acre), although some larger patches have been found. To date all known infestations of this plant in the Addition have been treated. However, further establishment of this fern in the Addition is anticipated, and detailed reconnaissance to locate infestations will occur annually. All of the known Old World climbing fern in the Addition, about 150 acres, has been treated. In 2006 treatments were focused on infestations in the Kissimmee Billy and Cow Bell Strands. The overall goal is to prevent incipient infestations of Old World climbing fern from becoming major eradication problems.

Another, similar exotic climbing fern (*Lygodium japonicum*) is causing similar problems with native communities, but this plant is more common to the north. Although *Lygodium japonicum* has been recorded in the Addition, it is not common.

## FIRE ECOLOGY AND MANAGEMENT

The natural vegetation communities of Big Cypress are dynamic, and boundaries of the communities shift over time. The two major influences on vegetation distribution are hydroperiods and fires; other significant factors are frost and hurricane damage, although they are somewhat less important because they occur infrequently. Of these influences, only fire can be used as a practical management application in natural areas.

The importance of fire in the natural environment of south Florida is well documented

(Forest Service, Wade et al. 1980a; NPS 1953; Davis 1943). All natural communities in the region are affected by fire, and many not only survive periodic burning but are ultimately dependent on fire for their perpetuation. Many plants in fire-dependent communities, such as prairies and pinelands, are highly flammable, and fires spread rapidly in these communities. Ignition sources are plentiful. south Florida has the highest incidence of lightning of any region in the nation, and there is also a long history of human-caused fire (Forest Service, Wade et al. 1980a). Lightning-caused fires can occur year-round, but are more typical during the latter part of the dry season just before the summer rains begin. Human-caused fires can also occur any time but tend to be more frequent in the dry winter months. Human-caused fires have probably been an influence on the regional vegetation for several thousand years (Duever et al. 1986a). Frequent ignition and high flammability, particularly in combination with annual dry seasons, create an extraordinarily high fire frequency, and fires in south Florida tend to be large.

The effects of fires in Big Cypress are extremely complex and depend on factors such as the season, intensity, extent, and duration of burning and the susceptibility and responsiveness of vegetation to fire damage. The flammability of vegetation types varies through the annual wet and dry seasons and from year to year. For example, drier, more upland types such as pinelands and some prairies are susceptible to fire earlier in the year than most wet prairies and marshlands, which dry out as the season progresses. However, hardwood hammocks, mixed-hardwood swamps, and cypress strands are rarely dry enough to burn except during extended droughts.

Roughly 90% of the Addition consists of plant communities (cypress and mixed hardwood swamps, marl prairies and marshes, and pinelands) that require periodic fire for perpetuation (Burch 2003). In such com-

munities, surface fires tend to eliminate competing vegetation, stimulate sprouting or seed production, create seedbed conditions, and release nutrients. Without cyclic fire, fire-tolerant species decrease in reproduction as a site is invaded and eventually dominated by fire-intolerant plants. Natural fire intervals range from as frequent as every 3 to 5 years in prairies to as long as every 50 to 100 years in mixed hardwood swamps (Burch 2003).

Although periodic surface fires tend to maintain certain communities, extreme fire conditions can dramatically alter plant, and consequently animal, distribution. When the fire cycle is retarded, organic materials accumulate and create hazardous fuel levels that can threaten even fire-tolerant species. Prolonged droughts or human-caused drainage can dry out the organic soils of many plant communities and, when coupled with hazardous fuel accumulations, can result in intense fires that consume organic soil materials. Peat fires, as such fires are called, can literally burn the soil out from under established vegetation, radically changing the plant composition. Peat fires tend to lower the surface level of the burned area, thereby extending the hydroperiod and affecting the replacement vegetation. The pond in the middle of a cypress dome, for instance, may be enlarged by a peat fire. In an extreme example, a hardwood hammock on deep organic soil may be completely burned and replaced by an open pond.

It would not be possible to exclude fire from the Addition, nor would it be desirable to do so. It is the job of resource managers not simply to stop fires, but rather to attempt to control where, when, and how intensely they burn.

Recent fire activity in the Addition has affected many of its vegetation communities. During May and June 2007 a lightning-caused fire burned about 64,000 acres east of SR 29 on both sides of I-75. Two fires that burned

on the north side of I-75 came together and created 24 miles of fire line (from mile markers 52 to 76).

The NPS fire management program covers the Addition and is guided by the *Fire Management Plan* (NPS 2005). The NPS staff uses an integrated program of wildland fire suppression and prescribed fire. The *Fire Management Plan* is being amended to include the management of naturally ignited wildland fires to accomplish specific, pre-stated resource management objectives in predefined geographic areas outlined in the *Fire Management Plan*. The NPS prescribed fire management program at Big Cypress is the largest in the national park system in terms of the amount of burning accomplished — about 40,000 acres annually to reduce accumulated fuels in plant communities. This program has about 20 full-time employees. NPS fire management staff work closely with property owners in the area as well as the state's Division of Forestry because state restrictions often constrain fire operations.

Management-ignited fires (prescribed fires) have been used in the Addition to reduce hazardous fuel accumulations around property and in historically high arson areas, to improve pastures on grazing allotments (this was a historic land use practice; no grazing is currently allowed in the Addition), to maintain habitat for the Cape Sable seaside sparrow and red-cockaded woodpecker, to aid in the removal of exotic plants, and to research the effects of fire on prairie vegetation. Burning is also used to reduce the debris from demolished structures — but only at sites that are tolerant of prescribed burning. All prescribed fires are conducted in compliance with state and federal fire management regulations.

## WATER RESOURCES

### Hydrologic Cycle

The Big Cypress Swamp is a recognized physiographic province in southwestern Florida. It is a source of recharge for the shallow aquifers of south Florida and is important to the integrity of the water resources in the western part of Everglades National Park. The hydrological features of the swamp were recognized by Congress when it established Big Cypress National Preserve and the Addition.

The original Preserve is essentially a rain-driven hydrologic unit, and for the most part it is not dependent on adjacent land for water flow. However, the Addition is more prominently influenced by upstream inputs from external drainages (Map 12: Hydrology of the Addition).

Like the original Preserve, the Addition is flooded with a shallow sheet of surface water starting shortly after the onset of the rainy season (usually in June) and ending in the winter dry season after surface waters recede. Rainfall averages 54 inches per year, but it has ranged from 35 inches to 80 inches per year. Summer rains are usually short, intense, and frequent. Winter rains are a result of frontal systems, and they last longer and have less intensity. Tropical systems, including hurricanes, occur most frequently in September and October and can sometimes bring significant and torrential rainfall.

During the rainy season, shallow depressions fill with water. Because of the poor drainage, water stands on the land until it evaporates, infiltrates to the underlying aquifer, or slowly drains off through sloughs or strands. Thus, at the peak of the rainy season as much as 90% of the Addition is inundated to depths ranging from a few inches to more than 3 feet. When the dry season begins, the water level starts to recede. The recession normally continues into May, when perhaps only 10% of the Addition

is covered by water in ponds, cypress domes, and sloughs. The water regimen of the area largely determines the patterns in which temperate and tropical vegetative communities and their related wildlife species occur.

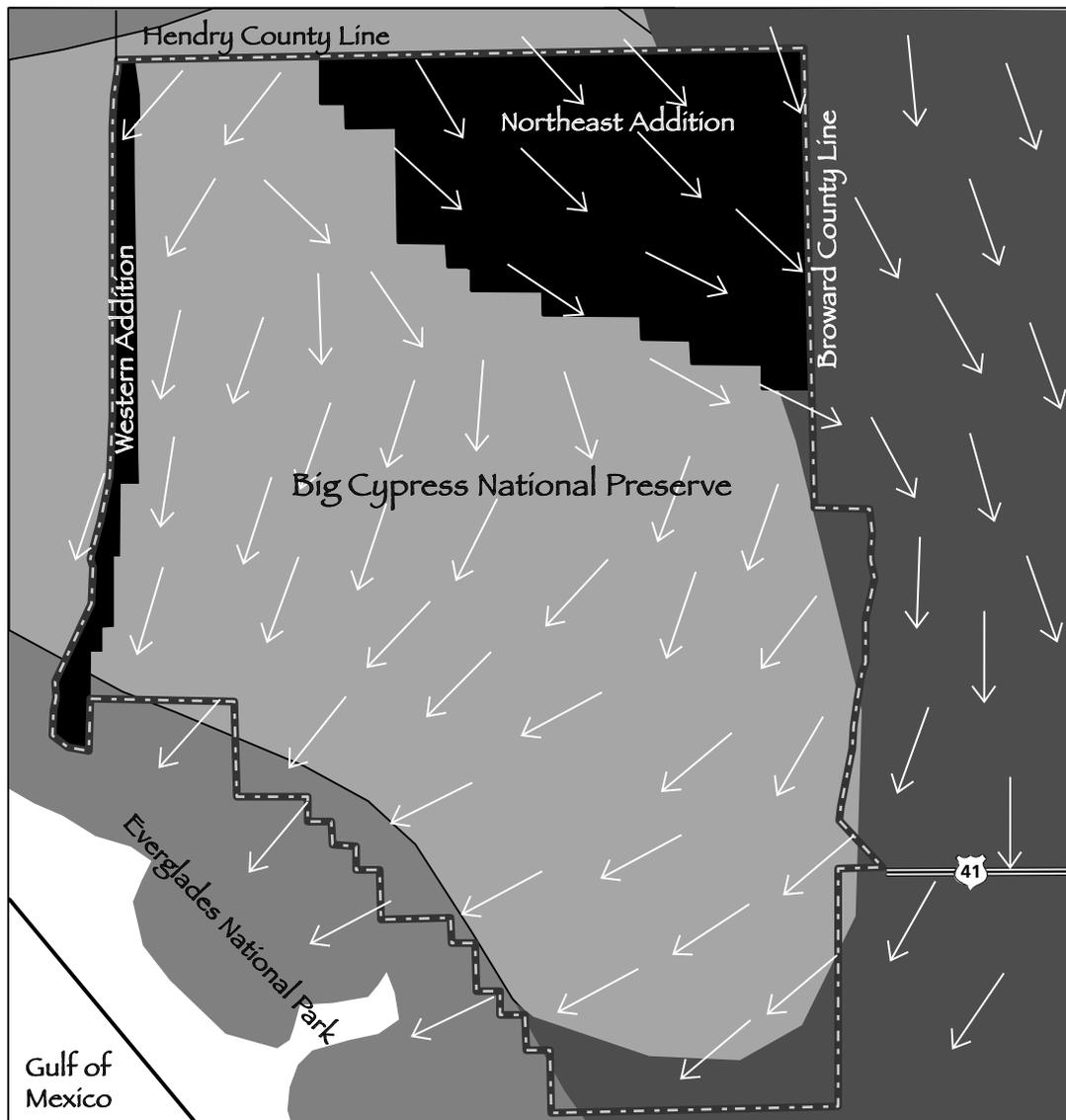
### Surface Water Flows

The Addition lies within a large interconnected freshwater system called the Kissimmee-Lake Okeechobee-Everglades Watershed. This watershed covers almost 11,000 square miles in south-central Florida and is the dominant freshwater supply for the region's population centers.

The Addition is exceptionally flat, with a typical gradient of only 5 to 10 inches per mile. Surface water hydrology of the Addition is typically characterized as a "sheet flow" flooding regime. During the wet season, the landscape becomes covered with a shallow, continuous expanse of water that flows slowly toward the coast. Water movement is almost imperceptible in the interior of the original Preserve, where the terrain slopes an average of less than a foot per mile. However, flows are easily observable where the expanse of sheet flow is constricted to pass under a roadway or is channeled into a canal. Typically, marsh, prairie, and cypress areas will have water depths of 1 to 3 feet, while pinelands and hammock habitats will have little or no water.

After surface flows have ceased, water losses continue through evapotranspiration and groundwater seepage. The Addition typically has an almost full drydown condition during the late spring, before the onset of summer rainfall. During drydown condition, standing water is retained only in the deepest depressions and canals.

Flows tend to follow bedrock undulations, which are generally oriented in a northeast-southwesterly direction and range in relief from approximately 1 foot to as much as 10



0 5 10 Miles

N



## Legend

-  Addition Lands
-  Big Cypress Swamp
-  Mangroves
-  Everglades
-  General direction of surface-water flow

Map 12

# Hydrology of the Addition

## Big Cypress National Preserve – Addition General Management Plan

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DSC • October 2010 • 176/20083



feet. These low areas control surface water flows because the water table is below the crests of the undulations most of the time.

Surface flows in the Addition are influenced by upstream management practices and internal barriers to flow. Major physical alterations of the landscape and associated water management practices have greatly modified the volume, timing, distribution, and quality of surface water in south Florida. Since the 1880s, development was assisted by large-scale drainage of wetlands, canal and levee building, road construction, agriculture, residential and commercial development, and operation of pumps and flood gates. Today, many portions of the watershed are drier or wetter for longer periods than before such development and have poorer water quality related to agricultural and urban runoff.

Investigators have documented that surface water in the Big Cypress vicinity preferentially flows in channels rather than in adjacent wetlands (Duever et al. 1981; Pernas et al. 1995). However, Duever et al. (1986a) also observed that topographic irregularities interrupted excessive drainage. Channelization is of particular concern at the southern boundary of the original Preserve and the Addition where fresh water and salt water mix and where changes in salinity can change the vegetation composition.

A recent review of historical water-level information by NPS staff showed an increase in the duration of surface water inundation in the 1990s relative to the two previous decades (Sobczak and Pernas 2000). It is thought that the wetter condition in the 1990s was caused by increased rainfall amounts, but upstream water releases, gate operations in adjacent areas, and features within the Preserve that block and channelize flow also contributed to the condition. Because the relatively dry conditions that prevailed in the 1970s and 1980s also were influenced by water management practices, there is uncertainty regarding future hydrologic conditions, both in terms of

the weather patterns and the *Comprehensive Everglades Restoration Plan* (U.S. Army Corps of Engineers 1999).

Major physical and operational alterations that will directly impact the Addition during the next 50 years include removal of part or all of the L-28 canal and levee, partial modification of the L-28 Tie Back, alteration of flows at the northern boundary of the Addition, and changes in the operational rules for regulating flows in adjacent and upstream areas. As shown in Map 12: Hydrology of the Addition, the L-28 canal system is directly east of the Addition boundary and interrupts the generally northeast to southwest flow of water across the Addition. Water management practices from upstream citrus expansion may influence high-water conditions along the northeast portion of the Addition, but the extent of this impact (if any) is unclear.

#### **Surface Water Flows and ORV Use.**

Flattened vegetation and tire tracks at roadside entry points are generally the extent of ORV effects seen by most observers. However, aerial views of the Addition show a vast network of ORV trails and travel corridors. This network of tire ruts and ridges could be influencing the volume, timing, and distribution of surface water flows.

The extent, occurrence, and severity of effects that off-road vehicles have had on surface water flows of the Addition are largely unknown. However, ORV ruts, which can be two or more feet deep, can channel water and potentially alter natural water flow patterns and timing. Two studies have documented greater water flow rates within ORV ruts than in adjacent undisturbed areas. Duever et al. (1981) found that over wet and dry seasons, water flows accelerated from two to four times in trails oriented parallel to the direction of water flows. Flows in some trails continued after water had ceased flowing in surrounding areas, possibly leading to a shortened natural hydroperiod in a localized area. Pernas et al. (1995) found that surface water flow always

followed airboat trails, regardless of the trail orientation. Within the study area, these flow rates were accelerated approximately five times faster within the airboat trails than in adjacent undisturbed areas.

Duever et al. (1986a) hypothesized that trails that were extensively rutted and oriented parallel to flow could drain surface water from an adjacent wetland, particularly in low-lying areas. However, they also observed that topographic irregularities interrupted excessive drainage effects, so that impacts tended to be localized.

### Groundwater

The Addition is underlain by an extensive, shallow, surficial aquifer, which serves as the main source of fresh water in Collier County. The aquifer lies in a porous limestone formation that is approximately 50-100 feet thick on the Addition's western boundary and generally diminishes in thickness to the east. Throughout much of the Addition, the limestone of this shallow, unconfined aquifer is within 10 feet of the surface. Groundwater travels relatively quickly through the formation and is recharged quickly by fresh surface water flows. Where limestone or other porous aquifers are near the coast, salty seawater can begin to move inward and infiltrate freshwater aquifers. This is particularly problematic where fresh groundwater is pumped to provide urban water supplies. Rapid development in south Florida has resulted in saline marine groundwater moving inward more than 15 miles in some places (USGS 2001). During the rainy season, groundwater levels are high. By April, the usual end of the dry season, water levels normally reach their annual lows.

### Water Quality

The water in Big Cypress is relatively unpolluted. The fresh surface waters of Big Cypress National Preserve are designated as Outstand-

ing Florida Waters. This is a state designation, delegated by the U.S. Environmental Protection Agency (EPA) under the Clean Water Act, and it is intended to protect existing, high-quality waters. The Big Cypress Swamp is also designated as an Area of Critical State Concern by Florida state statute (Chapter 380.05). This designation provides the state's Division of Community Planning with oversight on local development projects and comprehensive planning within the designated area (Collier County).

Concentrations of nitrogen, phosphorus, total organic carbon, and persistent pesticides, which often serve as indicators of pollution, are generally similar to concentrations in nearby, relatively uninhabited areas, and concentrations are considerably less than those of nearby urbanized areas. Water quality changes occur seasonally and diurnally in Big Cypress and are related to the natural hydrologic and biologic regimes. The seasonal recession of water levels triggers physical, chemical, and biological changes in water quality. During low water, diurnal fluctuations in dissolved oxygen are greatest as a result of the high concentration of organisms in the remaining water. During the day plants produce excess oxygen by photosynthesis. At night dissolved oxygen decreases as photosynthesis ceases and respiration demands are met. Fish kills sometimes occur during periods of low dissolved oxygen; they have been observed in the spring in the Tamiami Canal about 10 miles west of Forty-Mile Bend, and often they spread both east and west for several miles.

The low-nutrient, high-quality water in the Addition is vulnerable to degradation from contaminants. Because the water is of such high quality, even small amounts of contaminants can result in relatively large adverse effects. External sources of pollution primarily include nutrient-enriched runoff from upstream agricultural and urban activities, especially in the north. Internal contaminant sources include NPS development, operation of boats and vehicles within the original

Preserve, and oil and gas leakage in the Preserve. Today, water quality in some locations is dramatically different than before 1900. Surface water entering the Addition is nearly completely controlled, and having drained from agricultural and developed areas is laden with nutrients, dissolved solids, and trace amounts of pesticides and herbicides (SFWMD 1992).

The National Park Service established a long-term water monitoring program for measuring surface water stage and quality in the original Preserve in 1988. Water quality samples currently are collected every other month at 20 stations located throughout the original Preserve and the Addition. The objective of this water monitoring program is to provide a long-term record for assessing ambient water quality conditions and contamination threats. The South Florida Water Management District (SFWMD) maintains water-quality monitoring programs in lands upstream and adjacent to the Addition. The most important parameters of interest for tracking long-term water quality conditions include total phosphorus, nitrate, sulfate, and pesticides.

**Water Quality and ORV Use.** The use of off-road vehicles in the original Preserve generates visible, localized turbidity in the upper portion of the water column. This effect is most pronounced in areas where ruts are deepest and vegetation has thinned. However, a study by Duever et al. (1986b) determined that the effects of ORV use on water quality were negligible, localized, and produced no threat to regional water quality. Localized impacts included hydroperiod alteration, temperature variation, introduction of sediment into the water, chemical pollution, and salinity changes. The turbidity that resulted from ORV operation was found to decrease sunlight penetration, thereby decreasing plant productivity.

According to Beardsley (1995), extensive vegetation impacts from ORV use may inhibit nutrient uptake, causing greater levels of

nutrients to remain in the water. Beardsley also stated that loss of vegetation cover reduces water filtration and removes frictional forces that reduce retention of water in the wetland. In some cases, subtle modification to water quality can impact other biological, vegetative, and wildlife components of the environment, and the existence of many localized impacts can translate into regional-scale and long-term impacts if the processes that cause them occur regularly and are permanent. Regional water quality effects would be most likely during times of heavy ORV use and when ORV trails are heavily rutted and oriented in the direction of sheet flow.

Water quality is not a primary parameter used to evaluate ORV impacts because ORV impacts on waters tend to be localized and ephemeral. However, areas of high ORV use show persistent alteration of the local vegetative community that is likely related to disturbance of soil structure and chemistry.

## Wetlands

The Addition has been mapped by the U.S. Fish and Wildlife Service (USFWS) as part of the *National Wetlands Inventory*. Most of the Addition is classified as wetlands; exceptions are scattered hardwood hammocks, some pinelands, and artificially filled areas. Twenty-seven different types of wetlands occur in the Addition, with the majority of them being seasonal wetlands. Cowardin classifications present in the Addition include periphyton communities, marshes, sloughs, prairies, open cypress domes, lakes, lake shorelines, and drainage canals/ditches. Most of the wetland area is seasonal, except for the lacustrine and riverine areas. The lacustrine, littoral, and riverine systems make up a much smaller area, but have more diverse classifications because many of these bodies of water and associated biological systems result from excavation of substrates.

### Floodplains

The southwestern corner of the original Preserve, including Ochopee, was mapped for floodplains by the Federal Emergency Management Agency (FEMA). This area is located along U.S. 41, east of the Western Addition. According to FEMA, the headquarters and residential area at Ochopee are within the 100-year floodplain. A 100-year storm or hurricane storm surge could flood the Ochopee area to a depth of 8 feet above mean sea level. There are no areas within the Preserve in the coastal high hazard area, and no areas are subject to flash flooding (NPS 1991). No additional data are available that are specific to the Addition.

### Estuarine Resources

The estuarine habitats of the Addition are concentrated in the coastal interface zone south of Everglades City. They are influenced by freshwater inflows and result in waters of mixed salinity that provide unique and highly productive wildlife habitat.

## WILDLIFE

### Protected Wildlife Species

A total of 31 animal species that could occur in the Addition receive some level of special protection or are recognized as rare species by the state of Florida or the federal government. Most of these species are limited to south Florida, and they are endangered as a result of habitat reduction caused by water management projects, urbanization, and agricultural expansion.

Nine of the 31 species mentioned above are listed as either federally endangered or threatened and reside in the preserve — 8 of those 9 are known to be present in the Addition. The state lists 14 species as species of special concern. Collectively, these species warrant attention because they have

experienced long-term population declines and are vulnerable to exploitation or environmental changes. Table 13 displays the status of all 31 special status wildlife species that are known to occur in the Preserve.

Descriptions of those federally listed species that will be analyzed in detail in “Chapter 4, Environmental Consequences” are provided below.

**Florida Panther.** The Florida panther (*Puma concolor coryi*) was listed as endangered under the federal Endangered Species Act in 1967. Critical habitat for the Florida panther has not been designated by the U.S. Fish and Wildlife Service. Lands in the Addition contain suitable habitat for the Florida panther.

Florida panthers once lived throughout most of the southeastern United States, but intensive hunting of these animals as a pest species and the conversion of wildlands to agriculture have severely reduced the population. Today, the only confirmed breeding population is in south Florida. The population is centered in and around Big Cypress, including Everglades National Park, Fakahatchee Strand Preserve State Park, the Florida Panther National Wildlife Refuge, and privately owned lands north of the preserve in Collier and Hendry counties. The panther population has been steadily increasing in recent years. In 2000, the estimated population was 62 individuals, with a population density of one panther per 31,923 acres (112,919 hectares) (McBride 2000). In 2003 the population was estimated at 83 panthers (117 minus 21 mortalities) (FFWCC 2008). The 2008 population estimate was 84 panthers (104 minus 20 mortalities) (FFWCC 2008).

In general, panther population centers appear to indicate a preference toward large, remote tracts with adequate prey, cover, and reduced levels of human disturbance. A study conducted by Kautz et al. (2006) confirmed that forest patches comprised an important component of Florida panther habitat in

TABLE 13: LISTED WILDLIFE SPECIES FOR BIG CYPRESS NATIONAL PRESERVE<sup>a</sup>

Common Name	Scientific Name	Designated Status <sup>b</sup>	
		Federal	State
<b>Mammals</b>			
Everglades mink	<i>Mustela vison evergladensis</i>		T
Florida panther	<i>Puma concolor coryi</i>	E	E
Mountain lion	<i>Puma concolor</i>		S/A
Big Cypress fox squirrel	<i>Sciurus niger avicennia</i>		T
West Indian manatee	<i>Trichechus manatus</i>	E	E
Florida black bear	<i>Ursus americanus floridanus</i>		T
Florida bonneted bat	<i>Eumops floridanus</i>		E
<b>Birds</b>			
Cape Sable seaside sparrow	<i>Ammodramus maritimus mirabilis</i>	E	E
Limpkin	<i>Aramus guarauna</i>		SSC
White-crowned pigeon	<i>Columba leucocephala</i>		T
Little blue heron	<i>Egretta caerulea</i>		SSC
Reddish egret	<i>Egretta rufescens</i>		SSC
Snowy egret	<i>Egretta thula</i>		SSC
Tricolored heron	<i>Egretta tricolor</i>		SSC
White ibis	<i>Eudocimus albus</i>		SSC
Peregrine falcon	<i>Falco peregrinus</i>		E
Florida sandhill crane	<i>Grus canadensis pratensis</i>		T
American oystercatcher	<i>Haematopus palliatus</i>		SSC
Bald eagle	<i>Haliaeetus leucocephalus</i>		T
Wood stork	<i>Mycteria americana</i>	E	E
Osprey	<i>Pandion haliaetus</i>		SSC
Brown pelican	<i>Pelecanus occidentalis</i>		SSC
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	SSC
Roseate spoonbill	<i>Platalea ajaja</i>		SSC
Black skimmer	<i>Rhynchops niger</i>		SSC
Everglade snail kite	<i>Rostrhamus sociabilis plumbeus</i>	E	E
Least tern	<i>Sterna antillarum</i>		T
<b>Reptiles</b>			
American alligator	<i>Alligator mississippiensis</i>	T(S/A)	SSC
American crocodile	<i>Crocodylus acutus</i>	T	E
Eastern indigo snake	<i>Drymarchon corais couperi</i>	T	T
<b>Mollusks</b>			
Florida tree snail	<i>Liguus fasciatus</i>		SSC

SOURCES: USFWS 2006; USFWS 2007; Florida Fish and Wildlife Conservation Commission 2006c; Florida Natural Areas Inventory 2006.

a Species in this table include those that have been documented in the Preserve; it does not include listed species for Collier County that are not present in the Preserve. Not all species listed in this table have been documented in the Addition.

b E = Endangered                      S/A = Similarity of appearance to a threatened or endangered species  
T = Threatened                      SSC = Species of special concern (no regulatory authority)

south Florida. According to the Kautz study, the three most frequently used habitat types found within panther home ranges included upland hardwood forest, hardwood swamp, and pinelands, respectively. The hammocks are important foraging areas, and the pine flatwoods, with a dense understory, are important for denning and resting. Panthers prefer to move through vegetated areas, and rarely move through open areas except at night. It is important to maintain vegetated corridors between habitats to allow for panther movement.

Only preliminary data are available on Florida panther reproduction. Existing data indicate that breeding may occur throughout the year, with a peak during winter and spring, a gestation period of around 90 to 95 days, litter sizes of one to four kittens, and a breeding cycle of two years for females successfully raising young to dispersal, which typically occurs at 18 months (USFWS 2008).

According to NPS staff, dispersal of young in the Preserve typically occurs around 15 to 18 months. Most panther births occur between March and July, and the den sites are used for two months after birth.

The panther's preferred prey is white-tailed deer (*Odocoileus virginianus*). Reports show that while subadults and nonbreeding female panthers feed almost exclusively on small prey, such as raccoon, marsh rabbit, and alligator, breeding females prey primarily on white-tailed deer. If deer populations decline, the panther population declines.

The Florida Panther Habitat Preservation Plan (Logan et al. 1993) identified about 926,000 acres of habitat considered essential to maintaining a minimum viable population of panthers in south Florida. About 582,000 of these acres are within Big Cypress National Preserve, representing approximately 63% of the essential habitat.

Radio-tracking data and surveys of panther sign (e.g., tracks, droppings, and other physical

evidence) conducted by the National Park Service and the Florida Fish and Wildlife Conservation Commission (FFWCC) indicate two population centers in the Big Cypress area. One includes the Fakahatchee Strand/northern Big Cypress swamp area (including the Deep Lake and Bear Island units of the original Preserve, the Addition, Fakahatchee Strand Preserve State Park, the Florida Panther National Wildlife Refuge, and private lands to the north), and the other center includes the eastern half of the original Preserve (including all or portions of the Corn Dance, Loop, and Stairsteps units). Evidence of panthers has been occasionally found in other areas of the original Preserve and the Addition, but these areas appear to be the most regularly inhabited.

The panther population centers exist relatively close to each other, but there are some striking differences in the condition of the panthers. In 1985, panthers in the Bear Island unit and adjoining private lands north of I-75 were more abundant, heavier, and healthier than their counterparts south of I-75 (Roelke et al. 1985). In fact, one male panther weighed by researchers gained 20 pounds when he moved to the north side of I-75 from Fakahatchee Strand. From 1982 to 1985 panther sign declined noticeably in Fakahatchee Strand and the Corn Dance unit of the original Preserve, but sign did not decline in the Bear Island unit or on adjacent private lands. The condition of the current population is believed to be in better condition than what it was in 1985. During the past 25 years, radio telemetry data on collared panthers indicates that 1–3 collared panthers have been using the Addition each year. These data represent collared panthers only, and it is fair to presume that more panthers than those with collars are using the area.

Recruitment — the number of young panthers surviving to adulthood — is also higher in the Bear Island area. Possible reasons for the better condition of panthers north of I-75 are that (1) the area may contain a better mix of

vegetation types supporting deer, (2) that past range management for cattle grazing in the area may have supported more deer, and (3) that low hunting pressure on private lands may provide a refuge for both deer and panthers.

The automobile is the most frequent direct cause of panther deaths. Between 1981 and 1986 there were 12 documented panther deaths or injuries in south Florida, and half were road kills. Of these, four panthers were struck by cars on Florida 84 (now I-75) between mile-markers 16 and 18; one was hit on SR 29 near Copeland; and one was hit on U.S. 41 near Turner River Road. Because of the threat to panthers from automobiles, the state installed special underpasses while constructing I-75 across Big Cypress in order to provide for safer panther movements. Road kills are still frequent despite the mitigation measures that were put into place to avoid conflict with vehicles — in 2007, 14 panthers were killed in the first six months of the year (Schulze 2007). Fifteen panthers were killed on roads in 2007 (FFWCC 2008). Additionally, there were 10 highway mortalities in 2008 (FFWCC 2008). The number of panthers dying from disease or parasites is unknown. More recent data indicates that intra-specific aggression (panthers killing panthers) is also a factor in panther mortality rates.

In 1995, eight female Texas cougars were released into the Florida panther population, including four introduced into the Big Cypress, to offset the negative effects of inbreeding documented in panthers.

Several government agencies and advisory groups are involved in panther management and research in south Florida and Big Cypress. Under the Endangered Species Act, the U.S. Fish and Wildlife Service (USFWS) has oversight responsibility to review the actions of other agencies in relation to federally protected species and to establish species recovery programs. The National Park Service has the primary responsibility for protecting the Florida panther (as well as other listed

species) on lands under its jurisdiction. The Florida Fish and Wildlife Conservation Commission is responsible for implementing the USFWS panther recovery plan, and the National Park Service and the commission cooperate for overall wildlife management in Big Cypress.

The survival and recovery of the Florida panther is dependent on : (1) protection and enhancement of the extant population, associated habitats, and prey resources; (2) improving genetic health and population viability; and (3) reestablishment of at least two additional populations within the panther’s historic range (USFWS 1999). Accordingly, the agencies involved in panther management in south Florida have agreed that implementing the following management actions will improve panther recruitment:

- Reduce hunting pressure on panther prey species, especially deer and hogs.
- Improve habitat by using prescribed burns and habitat manipulation to increase deer browse.
- Regulate ORV use and other human activities more closely because of potential disturbance to panther habitat.
- Consider reintroducing panthers bred in captivity or translocating other Florida panthers to improve the genetic viability of the wild population.
- Continue and expand research on panther distribution, behavior, and health and on prey species status.

These actions are consistent with the “Florida Panther Revised Recovery Plan” (USFWS 1987a).

In 2008 the *Panther Recovery Plan* was updated with a third revision and released by the U.S. Fish and Wildlife Service (USFWS 2008). This 2008 plan includes the following recovery objectives:

- To maintain, restore, and expand the panther population and its habitat in south Florida and expand the breeding portion of the population in south Florida to areas north of the Caloosahatchee River.
- To identify, secure, maintain, and restore panther habitat in potential reintroduction areas within the historic range, and to establish viable populations of the panther outside south and south-central Florida.
- To facilitate panther recovery through public awareness and education.

The plan also identifies criteria for recovery and reclassification under the Endangered Species Act. The long-term criteria would require two separate, viable populations of at least 240 individual panthers (adults and subadults) that have been established and maintained for a minimum of 12 years. And, sufficient habitat quality, quantity, and spatial configuration to support these populations would need to be secured.

To work toward this long-term goal, the 2008 recovery plan identifies an interim goal to achieve and maintain a minimum of 80 panthers in each of two reintroduction areas within the historic range and to maintain, restore, and expand the south/south-central Florida subpopulation. The actions needed to achieve this interim goal are as follows:

1. Maintain, restore, and expand the panther population and its habitat in south Florida.
2. Expand the breeding portion of the population in south Florida to areas north of the Caloosahatchee River.
3. Identify potential reintroduction areas within the historic range of the panther.
4. Reestablish viable panther populations outside of south and south-central Florida within the historic range.

5. Secure, maintain, and restore habitat in reintroduction areas.
6. Facilitate panther conservation and recovery through public awareness and education.

As mentioned earlier, the National Park Service, the U.S. Fish and Wildlife Service, and the Florida Fish and Wildlife Conservation Commission are involved in panther research in Big Cypress. NPS efforts have concentrated on the distribution of panthers on NPS lands in the original Preserve south of I-75 and east of SR 29 and in Everglades National Park. The panther recovery program, under the auspices of the game commission and supported by the U.S. Fish and Wildlife Service, has focused on panther home ranges and movement patterns, physical condition and health, and breeding in captivity. In addition, the game commission has also been involved in studies of the condition and health of deer in Big Cypress as the panthers' main prey.

The Florida Fish and Wildlife Conservation Commission and the National Park Service have taken steps to reduce hunting pressure in Big Cypress and to enforce speed limits to reduce panther road kills. Hunting regulations have since been implemented, partially out of concern for panther protection. Several FFWCC commission enforcement personnel have been trained in the use of radar equipment and have been involved in speed limit enforcement on I-75 and U.S. 41.

The discovery of mercury contamination in some Florida panthers is a relatively new concern. In 1989 a dead panther was found in the East Everglades. A tissue analysis revealed that the dead animal had extremely high levels of mercury and might have died from mercury poisoning. Further blood and tissue analysis of live Florida panthers, as well as fish and raccoons in the region, showed a pattern of elevated mercury contamination. Release of mercury from organic soils into surface waters is the apparent source of the toxins. Mercury bioaccumulates through the aquatic food

chain into fish and then raccoons. All panthers with higher mercury levels primarily preyed on raccoons, rather than deer or hogs, which were scarcer in the panthers' home range. As a result of these studies, the Florida Panther Inter-agency Committee recommends that agencies manage habitat and public use to increase deer and, where appropriate, hogs or other non-contaminated prey. The intent is to shift panther predation away from contaminated prey species (Florida Panther Interagency Committee 1989).

Panthers are typically shy, secretive animals that normally avoid human interaction. Interactions with humans can affect panther behavior. A study was conducted between 1994 and 1998 by Janis and Clark to study the effects of hunting on panthers (*The Effects of Recreational Deer and Hog Hunting on the Behavior of Florida Panthers*, 1999). It centered on the panther population north of I-75, including the Bear Island Unit in the original Preserve. The U.S. Fish and Wildlife Service's "Biological Opinion" for the 2000 *Final Recreational ORV Management Plan* states the following on page 562 of the plan:

Janis and Clark (1999) surmise that the increase in the distance of panther locations from trails is "biologically minor" and probably related to prey behavior; i.e. white-tailed deer moving deeper into the forest to avoid ORV users. The decrease in panther use of the Bear Island Unit is balanced by an increase in use of private lands north of BICY [Big Cypress National Preserve] as "refugia." The authors assert that this pattern would be of serious concern if panther habitat on private lands were lost.

**West Indian Manatee.** The West Indian manatee (*Trichechus manatus*) was listed as federally endangered under the Endangered Species Act in 1967. Critical habitat for the West Indian manatee was designated by the U.S. Fish and Wildlife Service in 1976 (41 FR 41914), and corrected and augmented in 1977

(42 FR 47840-47845). As published in the *Federal Register* (50 CFR Part 17.95), critical habitat, as it applies to the Addition, is defined as

*all U.S territorial waters adjoining the coast and islands and all connected bays, estuaries, and rivers from Gordon's Pass, near Naples, Collier County, southward to and including Whitewater Bay, Monroe County.*

No specific primary or secondary constituent elements were included in the designation. Critical habitat for the manatee identifies specific areas occupied by the manatee that have those physical or biological features that are essential to the conservation of the manatee and/or may require special management considerations.

Interpretations of the critical habitat criteria contained in the *Federal Register* have led biologists to conclude that critical habitat in Big Cypress National Preserve is generally limited to open water creeks, canals, and estuarine areas south of U.S. 41. Within the Addition, critical habitat includes near-shore mangrove estuaries and creeks, as well as the canals along U.S. 41 and SR 29. Occupied critical habitat in the SR 29 canal (aka Barron River Canal) extends to the north beyond U.S. 41 as far as the first water control structure.

The West Indian manatee is one of the largest coastal mammals in North America. The West Indian manatee is an aquatic mammal with grey to grey-brown, thick, tough skin that is sparsely covered with small, thick hairs and is sometimes covered with barnacles and algae. The rounded body of the manatee has no hind limbs, but it has paddle-like forelimbs or flippers with three to four nails present on the dorsal surface of each flipper. The body tapers to a flattened tail.

This unusual marine mammal with its massive, seal-like body has been able to adapt well to its marine environment. Exact estimates of the historic manatee population are uncertain, but

overhunting during the 1700s to 1900s is believed to be responsible for reducing the manatee population to only a few relict groups (Hartman 1979). Manatees migrate seasonally to adapt to changing water temperatures. West Indian manatees roam in fresh, brackish, and marine waters throughout Florida, the Greater Antilles, Central America, and South America. Waters colder than 20 degrees Celsius increase the manatees' susceptibility to coldstress and cold-induced mortality. Because of this temperature restriction, manatees seek out warm water refuges to help reduce energetic maintenance costs. The West Indian manatee is one of the most endangered marine mammals in coastal waters of the United States.

The manatee occurs throughout the southeastern United States. The only year-round populations of manatees occur throughout the coastal and inland waterways of peninsular Florida and Georgia (Hartman 1974). During the summer, manatees may range as far north along the East Coast of the U.S. as Rhode Island, west to Texas, and, rarely, east to the Bahamas (USFWS 1996, Lefebvre et al. 1989). There are reports of occasional manatee sightings from Louisiana, southeastern Texas, and the Rio Grande River mouth (Gunter 1941, Lowery 1974).

Manatees frequently migrate throughout the waterways in south Florida. The south Florida ecosystem region is home to the most resident manatee populations and transient migrants in Florida. In south Florida, manatees are most prominent year-round in the following areas: Indian River, Biscayne Bay, Everglades and Ten Thousand Island area, Estero Bay and Caloosahatchee River area, and Charlotte Harbor area. Some of the largest winter aggregations (50 or more manatees) occur in south and central Florida (USFWS 1996). See Map 13: West Indian Manatee Habitat, Western Addition.

Manatees occur in both fresh- and saltwater habitats within tropical and subtropical regions. They depend on areas with access to natural springs or manmade warm water refugia and access to areas with vascular plants and freshwater sources (Humphrey 1992). Several factors contribute to the distribution of manatees in Florida. Between October and April, Florida manatees concentrate in areas of warmer water. When water temperatures drop below 21 to 22 degrees Celsius, they migrate to south Florida or form large aggregations in natural springs and industrial outfalls. Severe cold fronts have been known to kill manatees when the animals did not have access to warm water refuges.

During warmer months they appear to choose areas based on food supply, water depth, and proximity to fresh water. Manatees may not need fresh water, but they are frequently observed drinking fresh water from sewage outfalls and culverts.

The manatee occupies a prominent position in marine and estuarine systems as a prodigious grazer of submerged aquatic vegetation. It spends about five hours a day feeding, and in that time, it consumes about 4%–9% of its body weight (44 to 99 pounds or 20 to 45 kilograms /day) (Bengston 1983). Submerged aquatic vegetation, such as seagrasses, is a major component of the diet of manatees, and although manatees appear to tolerate marine and hyper saline conditions, they are most frequently found in fresh or brackish waters. Manatees inhabit both salt and fresh water of sufficient depth (4 feet 11 inches to usually less than 19 feet 8 inches or 1.5 meters to usually less than 6 meters) and may be encountered in canals, rivers, estuarine habitats, saltwater bays, and, on occasion, have been observed as much as 3.7 miles off the Florida gulf coast (USFWS 2005).

Map 13

# West Indian Manatee Habitat

## Western Addition Big Cypress National Preserve General Management Plan

National Park Service  
United States Department of the Interior  
DSC • October 2010 • 176/2008+

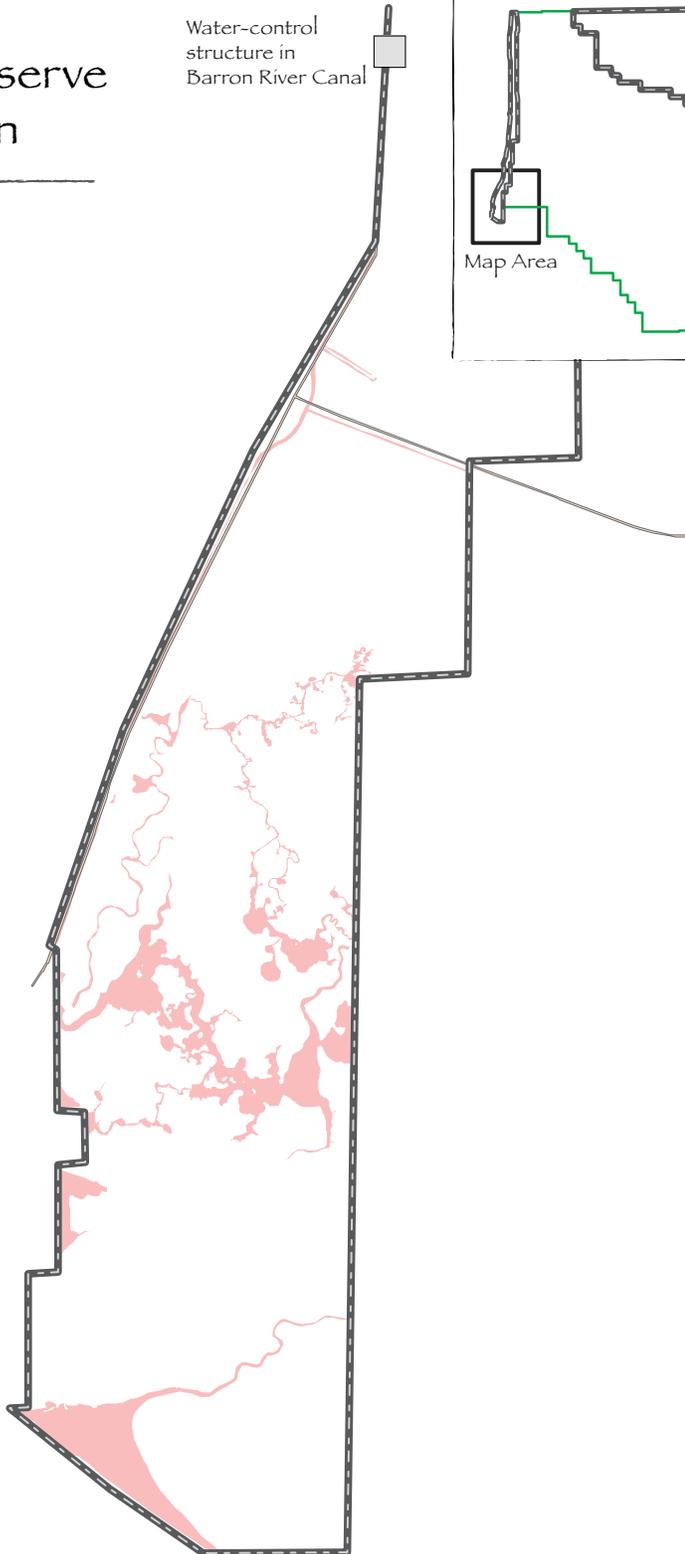
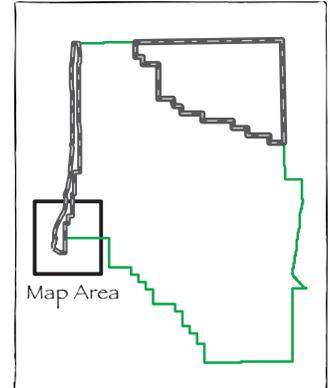
### Legend

-  Addition Boundary
-  Addition Manatee Habitat



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Water-control structure in Barron River Canal





Although there are no accurate estimates of manatee population size, the state Department of Environmental Protection aerial surveys determined that there were at least 2,639 manatees in Florida's waters in 1996, and a minimum of 1,709 in 1997. The synoptic (general) aerial survey for 2007 reported 2,817 manatees in Florida waters, and 3,807 manatees in 2009 (Fish and Wildlife Research Institute 2009). Although this has been the highest estimate of manatees since the surveys were started, the results of these surveys may vary because of such factors as sampling methodology, manatee behavior, and weather conditions.

The National Park Service, U.S. Fish and Wildlife Service, and the U.S. Geologic Survey are collaborators in manatee research and management in the Big Cypress. Winter aerial surveys have been conducted during the past five years; however, they have not been systematic surveys. Aerial surveys have not been very successful in observing manatees in the mangrove area between the Preserve headquarters and Everglades City. However, surveys are conducted in the canals near NPS headquarters and Wooten's Airboat Tours in Ochopee. Everglades National Park and the U.S. Fish and Wildlife Service have also counted manatees in the Addition between headquarters and Everglades City during their surveys. These data confirm that the SR 29 strip of the Addition is used by manatees.

Human activities have significantly affected manatees by eliminating or modifying suitable habitat, altering migratory access routes, increasing mortality, and decreasing abundance, all of which can affect manatee reproduction, recruitment, distribution, and behavior. The greatest current threat to manatees is the high rate of manatee mortalities caused by watercraft or propeller collisions. In addition to direct collisions with boats, secondary effects from boating activity include such stresses as disruption of normal breeding behavior, disruption of cow-calf bonding, interference with migration routes

and patterns, and the loss of feeding areas. The second most significant threat to manatees is the loss and degradation of habitat, due primarily to direct damage by aquatic recreational and commercial boating activity, coastal construction, and pollution from sewage discharge and stormwater runoff (Marine Mammal Commission 1992, Smith 1993). Other human-related threats include manatee death or injury from flood-control structures and navigational locks, entanglement in fishing line, entrapment in culverts, and poaching. These other threats accounted for 162 known mortalities between 1974 and 1993.

The U.S. Fish and Wildlife Service's recovery plan for the manatee established four objectives: (1) identify and minimize causes of manatee disturbance, injury, and mortality, (2) protect essential manatee habitat, (3) determine and monitor the status of manatee populations and essential habitat, and (4) coordinate recovery activities, monitor and evaluate progress, and update and/or revise the recovery plan (USFWS 1996).

**Red-cockaded Woodpecker.** The red-cockaded woodpecker (*Picoides borealis*) was listed as federally endangered under the Endangered Species Act in 1970. Critical habitat for the red-cockaded woodpecker has not been designated by the U.S. Fish and Wildlife Service. Lands in the Addition contain suitable habitat for the red-cockaded woodpecker.

The red-cockaded woodpecker is one of 22 species of woodpeckers native to North America. Adult red-cockaded woodpeckers are approximately 7 to 8 inches (18 to 20 centimeters) in length and have a wingspan that ranges between 1 foot 1 inch to 1 foot 3 inches (35 to 38 centimeters). The red-cockaded woodpecker is easily distinguished by its large, conspicuous white cheek patches, black cap and neck, and black-and-white barred back and wings (Jackson 1994).

The red-cockaded woodpecker's historic range encompassed the southeastern U.S. from eastern Texas and Oklahoma to New Jersey, and the bird was characterized as abundant in 19th-century literature. Throughout the 20th century, however, the species distribution within its historic range has become fragmented, and its total population numbers have decreased drastically due to the destruction of its habitat. The woodpecker is still widely distributed in the southeastern United States, but the few remaining colonies (a particular group of woodpeckers that use a set of cavity trees) are confined to scattered refuges.

The population in the Preserve is the southernmost and perhaps the largest in south Florida (NPS, 1981). The red-cockaded woodpecker can only survive in mature pine stands, usually 60 years old or more, that are infected with red-heart disease, a fungus that weakens the interior "heartwood" of a pine. This allows the birds to excavate cavities for roosting and nesting. The red-cockaded woodpecker typically nests between April and August in tree cavities located 20 to 50 feet above the ground. In the Preserve, nesting is usually over by mid-June (Schulze 2007).

The pine trees must be widely spaced and preferably have an open understory. Such stands are uneconomical from a forest products perspective, and most mature pinelands in the Southeast have been converted to plantations of young pines for the pulp and lumber industries, thus removing most woodpecker habitat (Lennartz et al. 1983) and causing population decline.

Beyond direct removal of mature pinelands, the woodpecker may also decline if remaining mature pinelands are not properly managed. The open understory is commonly maintained by periodic fire. However, if fires are too frequent, then the pine reproduction necessary to perpetuate the stand may be suppressed; if fires are not frequent enough, the understory may become too dense to maintain

the colony, or the fuel build-up may cause an intense fire that could destroy cavity trees (NPS 1981).

Red-cockaded woodpeckers forage in a wide variety of pine species and especially favor areas that contain large trees, which have a large surface area and loose bark. They feed on adults, larvae, and eggs of arthropods, especially ants and termites that they find by flaking bark from the tree. In prime habitat the forage area for the red-cockaded woodpecker surrounds the colony and consists of pine forests. But in Big Cypress, where pine forests are patchy, the forage area is large and includes prairies, swamps, and other vegetation communities. Recent studies show that forage areas in south Florida average more than 360 acres rather than 200 acres typical for most of the woodpecker's range (Nesbitt et al. 1983).

The red-cockaded woodpecker appears to be fairly tolerant of human activities as long as the colony is maintained. For instance, several active colonies in the original Preserve are near ORV trails, oil pads, and backcountry camps. There appears to be a limit, however, on the amount or types of activities that woodpeckers will tolerate; in other parts of the South, nesting failures have been attributed to noise from loud radio music and house construction, continuous chainsaw operation, and heavy interstate traffic (Jackson 1983).

In the 1990s there were 30–40 active red-cockaded woodpecker colonies in the original Preserve (NPS 1990c, NPS 2000). Currently, there are between 70 and 80 active colonies (Schulze 2007). A sample of the known colony sites is monitored each year during the breeding season by NPS staff to determine the status of the colonies.

There are no known colonies in the Addition, although red-cockaded woodpeckers have historically colonized the Addition. There are a few colonies near the southern boundary of the northeast Addition. The habitat in the Addition, especially in the Northeast Addition, is suitable for woodpeckers. Recent

management activities in this area have improved the quality of woodpecker habitat. These areas could be recolonized by the red-cockaded woodpecker in the future.

Management of the red-cockaded woodpecker in the original Preserve currently consists of prescribed burning, or allowing prescribed natural fire in mature pine stands known to support colonies, and restricting oil and gas activity to avoid disturbing these colonies. NPS staff from the Resource Management and Fire programs meet annually to determine prescribed fire needs. Oil and gas activity is prohibited near a colony to provide an undisturbed forage area around the colony. Management actions for this species within the Preserve include mechanical removal of fuel loads under cavity trees and reduction in midstory vegetation through prescribed fire. Annual work includes determining cluster status, observing nesting activity, making nesting cavities in trees, and banding nestlings.

Habitat fragmentation and/or loss are the primary threats to this species. Other range-wide threats to the red-cockaded woodpecker include cluster abandonment due to encroachment of mid-story vegetation. Genetic isolation may be a problem with the woodpecker throughout its range. Even though genetic problems have not been documented within the Preserve, the widely scattered habitat may preclude adequate genetic mixing. Environmental events such as wildfires, hurricanes, and inundation by water for extended periods have also affected pinelands that host woodpeckers.

There has been no documentation of the loss of trees used by the red-cockaded woodpecker due to compaction or injury along ORV trails. Abandonment of clusters due to disturbance by off-road vehicles also has not been observed.

**Wood Stork.** The wood stork (*Mycteria americana*) was listed as federally endangered under the Endangered Species Act in 1984.

Critical habitat for the wood stork has not been designated by the U.S. Fish and Wildlife Service. Lands within the Addition contain potential rookery habitat for the wood stork (Maps 14 and 15: Potential Wood Stork Rookery Habitat, Northeast and Western Addition). A large portion of the northeastern portion of the Addition contains the habitat parameters required to support nesting.

The wood stork is a large, long-legged wading bird, with a body length (head to tail) of 2 feet 9 inches to 3 feet 3 inches (85 to 115 centimeters) and a wingspan of 4 feet 11 inches to 5 feet 5 inches (150 to 165 centimeters). Their plumage is white, except for iridescent black primary and secondary feathers and a short black tail. On adult wood storks, the rough scaly skin of the head and neck is unfeathered and blackish in color. Their legs are dark with dull pink toes. The bill color is blackish.

Wood storks are birds of fresh water and brackish wetlands, primarily nesting in cypress or mangrove swamps. In the United States, wood storks historically nested in all coastal states between Texas and South Carolina (Wayne 1910, Bent 1926, Howell 1932, Oberholser 1938, Dusi and Dusi 1968, Cone and Hall 1970, Oberholser and Kincaid 1974). Currently, wood storks breed in Florida, Georgia, and coastal South Carolina. Wood storks usually construct their nests in medium to tall trees that are usually standing in water or in trees that are on dry land if the land is a small island surrounded by water. Their nests are large rigid structures usually found in the forks of large branches or limbs. Storks may add guano to the nest to stabilize the twigs (Rodgers et al. 1988). The nest may be constructed in branches that are only 3 feet 3+ inches (a meter) above the water or in the tops of tall trees.

The nesting season of wood storks varies geographically, but in Florida egg laying begins in October, and fledging of young birds occurs in February or March. The U.S. breeding population of the wood stork

declined from an estimated 20,000 pairs in the 1930s to about 10,000 pairs by 1960. Since 1978, fewer than 5,000 pairs have bred each year. The decline is believed to be due primarily to the loss of suitable feeding habitat, especially in south Florida rookeries, where repeated nesting failures have occurred despite protection of the rookeries. According to the *South Florida Multi-Species Recovery Plan*, under pre-drainage conditions wood storks formed colonies between November and January (December in most years regardless of annual rainfall and water level conditions). In response to deteriorating habitat conditions in south Florida, wood storks in the Everglades and Big Cypress basins have delayed the initiation of nesting to February or March in most years since the 1970s. This shift in timing is believed to be responsible for the increased frequency of nest failures and colony abandonment.

Wood storks feed in freshwater marshes, narrow tidal creeks, or flooded tidal pools, primarily on fish between 7.8 inches and 9.8 inches (2 and 25 centimeters) in length. Particularly attractive feeding sites are depressions in marshes or swamps where fish become concentrated during periods of falling water levels. Feeding areas in south Florida have decreased by about 35% since 1900 because of human alteration of wetlands. Additionally, levees, canals, and floodgates have greatly changed natural water regimes in south Florida.

The wood stork forages annually in Big Cypress when water levels provide concentrations of fish. Documented nesting in the Big Cypress was rare until 1996 when 45 colonies were reported (Jansen and Brooks 1996). The previous two consecutive years of high water and subsequent buildup of the prey base apparently provided ideal conditions in which to raise young. Wood stork nests have been found only sporadically in the Big Cypress since 1996. Observations since that time have not been systematic and have generally been conducted in conjunction with overflights and

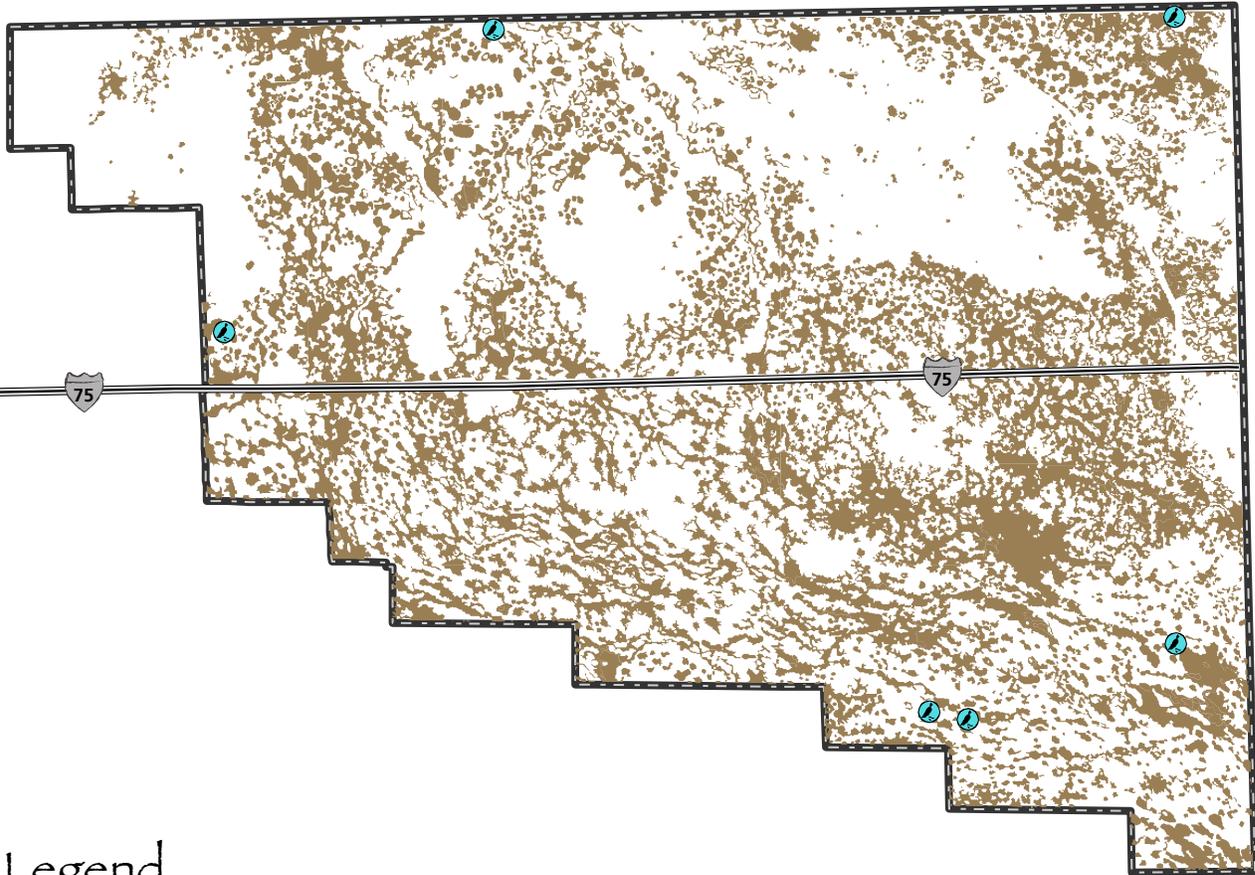
aerial surveys for the Florida panther. Historic wood stork nest sites have been randomly surveyed by NPS staff during the last 10 years, with no documented reoccupation of nest sites occurring in the Addition.

Preservation and/or restoration of natural hydrologic processes is critical to the survival of the wood stork, as it depends on open water to support its nesting, roosting, and foraging sites.

**Everglade Snail Kite.** The Everglade snail kite (*Rostrhamus sociabilis plumbeus*) was first listed as federally endangered under the Endangered Species Conservation Act (which preceded the Endangered Species Act) in 1967 (32 FR 4001). With a very low population at that time (only 10 snail kites were counted in Florida in 1965), the species was included in the first group of species to be listed under the act. Subsequent to the initial listing, critical habitat for the Everglade snail kite was designated by the U.S. Fish and Wildlife Service in 1977 (42 FR 40685) and augmented and corrected later that year (42 FR 47840). The designated critical habitat areas for the kite are east and north of Big Cypress National Preserve (along the western perimeter of Lake Okeechobee and the South Florida Water Management District's Water Conservation Areas 1, 2A, 2B, and 3A).

Because Water Conservation Area 3A is very close to the Preserve (abutting portions of the Preserve to the east), potential impacts to snail kite critical habitat should be considered. Also, in the *South Florida Multi-Species Recovery Plan*, the U.S. Fish and Wildlife Service recommends a reconsideration of the critical habitat boundaries for the Everglade snail kite as a "species-level recovery action" and identifies Big Cypress National Preserve as a potential area of inclusion in the critical habitat area.

***S2.1. Update the critical habitat designation for the Everglade snail kite. Critical habitat has not been modified since***



## Legend

-  Addition Boundary
-  Cypress Strands and Domes
-  Known Rookeries

N



0 .5 1 2 3 4 5 Miles

Map 14

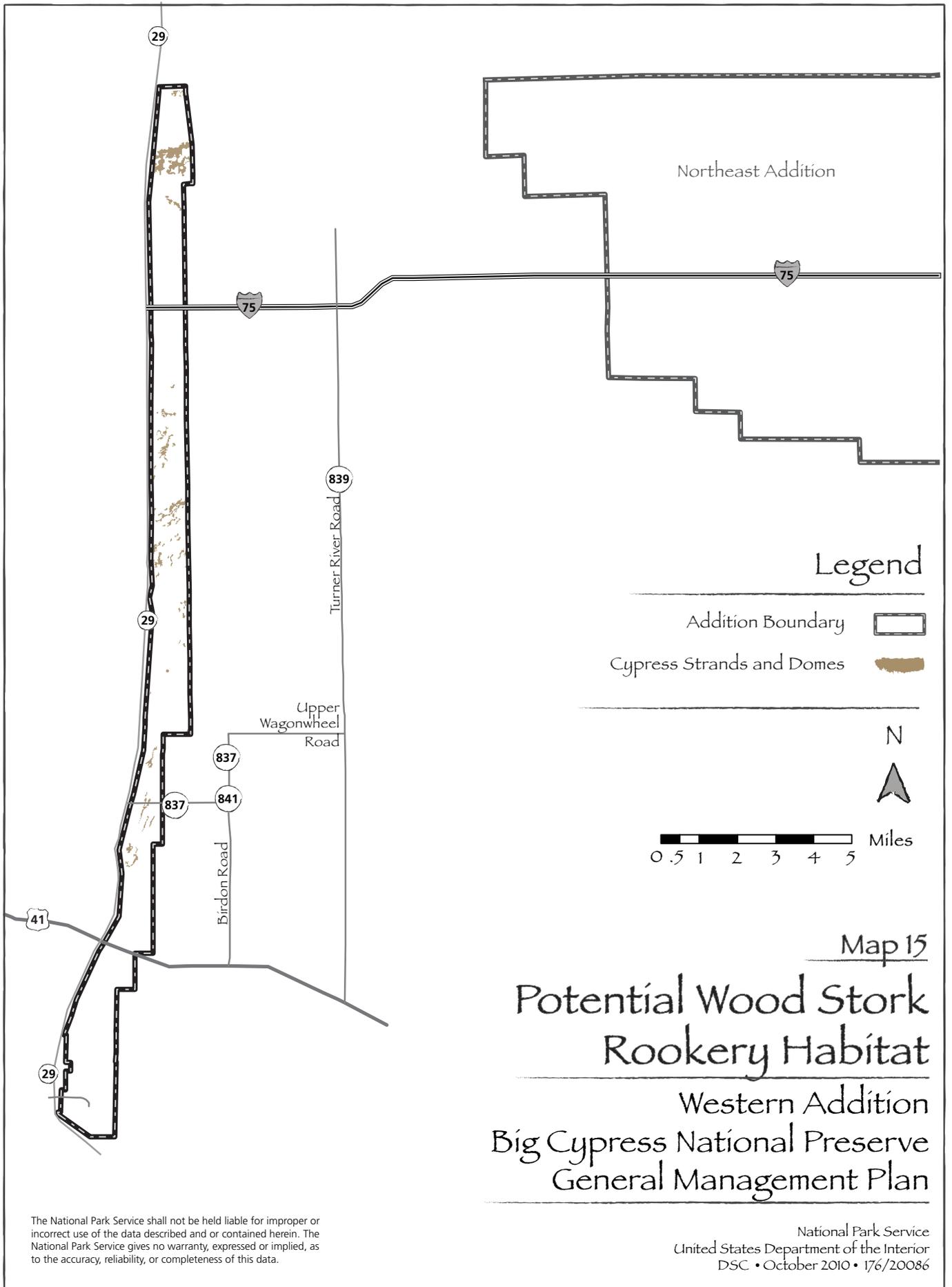
# Potential Wood Stork Rookery Habitat

Northeast Addition  
Big Cypress National Preserve  
General Management Plan

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*its original designation in 1977 and is in need of revision. Earlier publications correctly pointed out the importance of Lake Okeechobee and the Everglades as snail kite habitat. However, more recent information suggests that although restoration of Lake Okeechobee and the Everglades must be compatible with snail kite recovery, greater emphasis must be placed on larger wetland systems in the species' range and on smaller peripheral wetlands. Nesting of snail kites in Lake Kissimmee, Lake Tohopekaliga, and East Lake Tohopekaliga since the early 1980s is a significant change that should be considered in revising critical habitat. Although a portion of the St. Johns Marsh south of State Road 60 is included in the current critical habitat, the principal areas being used by snail kites north of that highway need to be included. Other areas outside of the Okeechobee/Everglades basin that should be considered for designation are the Big Cypress National Preserve and marshes surrounding the Corkscrew Swamp.*

The Everglade snail kite (or snail kite) is medium in size, with a wingspan of 43 to 46 inches (109-116 cm) and a body length of 14 to 16 inches (36-39.5 cm) (Sykes et al. 1995). It is most easily distinguished from other raptors by its narrow, curved bill, which it uses to extract its primary prey, the apple snail. Also, the tail of both sexes is square-tipped with a white base. Adult snail kites have red eyes, while juveniles have brown eyes (Brown and Amadon 1978, Clark and Wheeler 1987). The adult males are a uniform slate gray in color, whereas adult females are brown with cream-colored streaks from the face down to the breast. Immature snail kites tend to resemble adult females, with the facial/breast streaking being slightly more light brown than cream (Sykes et al. 1995).

The current range of the Everglade snail kite includes parts of south Florida, Cuba, and northwestern Honduras. However, the movement of birds between Florida and Cuba has never been confirmed (Sykes 1979,

Beissinger et al. 1983). Currently, the range and distribution of the Everglade snail kite in Florida is confined to areas with available habitat in the southern half of the state. This Florida range is much smaller than it was years ago when the snail kite was documented in areas of north Florida. Loss of habitat from urban development, agricultural operations, and hydrologic alterations is the primary cause for this reduction in range. Although the snail kite is not a migratory bird species, it is known to be somewhat nomadic within its range in response to habitat changes (i.e., hydrologic changes, food availability, etc.)

The habitat for the Everglade snail kite primarily consists of lowland freshwater marshes and the shallow littoral zones of lakes where an abundance of apple snails (*Pomacea paludosa*) can be found. The snail kite's diet predominantly consists of apple snails. The kite generally forages for the snail by flying low over the water surface or by perching on woody vegetation over open water. Thus the kite depends on sustaining healthy populations of apple snails. Sustained wetland flooding conditions and low-density emergent aquatic vegetation are important for snail reproduction.

However, even if apple snails are thriving in an area, the habitat value for the kite may be dramatically reduced if turbid or eutrophic water conditions exist, or if the kite's view of the water is obstructed by dense vegetation. In other words, the snail kite relies heavily on a clear view of the water subsurface. Thus, marshes or lakes with high nutrient levels can also yield diminished habitat value for the snail kites because nutrient-rich water often generates invasive, exotic plant growth. This impact from eutrophication can be two-fold. First, algal blooms that result from high nutrient levels can diminish water clarity, which in turn limits the kite's ability to locate subsurface apple snails. And, dense, nonnative growths such as cattail stands can quickly displace large areas of open water, which can fully eliminate foraging areas for the kite.

Also, the presence of interspersed shrubs or small trees in the emergent vegetation in the marsh or lake littoral zone is another important habitat feature for the snail kite. The kite uses this woody vegetation for foraging activities, roosting, and nesting. Kite roosting and nesting sites are predominantly located over open water. And, nests in shrubs or small trees are less susceptible to water fluctuations, waves, human disturbances, and predators than nests in emergent herbaceous vegetation. Thus, the nest sites in interspersed shrubs and small trees tend to be more successful than those in herbaceous vegetation.

As noted above, the very low Everglade snail kite population in the 1960s (less than 20) warranted its original listing as an endangered species. Subsequently, the snail kite population has grown to several hundred. However, the population counts vary considerably from year to year. For example, during a 10-year monitoring period from 1985 to 1994, the Everglade snail kite count went from 563 in 1986, to 325 in 1987, and back to 498 in 1988. This count period ended with a 1994 population estimate of 996 kites in Florida. The year-to-year fluctuations in counts is attributed to bird mortality, decreased nesting success, dispersal into new areas, or a combination of these factors. However, the potential for more accurate population estimates increases each year as the number of marked birds and their resightings increase.

According to the *South Florida Multi-Species Recovery Plan*, the U.S. Fish and Wildlife Service has an objective to restore the Everglade snail kite to a stable, self-sustaining population that would allow a status reclassification to threatened (USFWS 1999). This status change would occur if the 10-year average total population size is sustained above 650 kites (assuming various sustainability and year-to-year variation criteria are met). The U.S. Fish and Wildlife Service considers the Everglade snail kite a resilient species in a highly changeable environment.

However, given the limited distribution of the species, its specialized ecological niche, and the irreversible loss of its habitat in south Florida, the U.S. Fish and Wildlife Service believes that the snail kite does not have the potential to be elevated above the threatened status.

**American Crocodile.** The American crocodile (*Crocodylus acutus*) is one of two crocodilian species that are native to the United States. It was first listed as a federal endangered species under the Endangered Species Act in 1975 (40 CFR 44151). At that time, an estimated 100 to 400 nonhatchling crocodiles existed in Florida (Ogden 1978). Given its low numbers at the time, as well as rapidly growing disturbances to its habitat from human activities (e.g., recreation, hydrology alterations, and urban encroachment), critical habitat for the American crocodile was designated in 1979 (44 CFR 75076). The designated critical habitat for the crocodile includes most of Florida Bay and its perimeter lands, running from the Florida keys north and west to the southern portions of the Everglades.

Given the stabilization of crocodile numbers in Florida by the early 21st century, the U.S. Fish and Wildlife Service reclassified the American crocodile to threatened in the state of Florida in 2007. According to the U.S. Fish and Wildlife Service, the Florida crocodile population is between 1,400 and 2,000 individuals (not including hatchlings), with more than 90 documented nest sites in 2005 (USFWS 2007). However, the crocodile population in Florida continues to be susceptible to habitat loss from development and recreation, road mortality, and extreme weather such as hurricanes. And, through the remainder of its range, the crocodile remains listed as an endangered species. In addition to its south Florida range, the American crocodile inhabits the coastal wetlands and rivers of Cuba, Jamaica, the Caribbean coast from Venezuela to the Yucatan peninsula, and the

Pacific coast from central Mexico to northern Peru (Moler 1992).

The American crocodile is the larger of the two crocodylian species in Florida. Generally, in Florida, both the American crocodile and the American alligator coexist without conflict. The tolerance for the other species is maintained as long as food and essential and unique habitat attributes are available to both species. Most likely, the coexistence and tolerance of these two species result from species-specific habitat utilization (spatially or temporally), which depends on variations in the species' preferences for water salinity levels (USFWS 1999). In addition to its size, it can typically be distinguished from the adult alligator by its longer, narrower, tapered snout and its exposed fourth tooth of the lower jaw (when mouth is closed). Adult crocodiles in Florida are often more than 12 feet (3.8 meters) long (Moler 1992).

The habitat for the American crocodile is mainly associated with mangrove swamps and mangrove-lined creeks, rivers, and bays. However, the habitat use varies seasonally. During breeding and nesting season, adult crocodiles tend to occupy exposed shoreline areas along Florida Bay and nearby inland creek banks. Males generally move more inland than females during this time. In south Florida, breeding typically occurs from late February through March, when ambient air and water temperatures are high enough to trigger reproductive hormonal activity in the crocodiles. In nonnesting seasons, crocodiles generally prefer the lower saline waters of inland swamps, ponds, and creeks (Kushlan and Mazzotti 1989). Given this dependence on inland waterbodies with low salinity and brackish estuaries, the timing and frequency of inland freshwater flow deliveries to south Florida and Florida Bay are very important attributes of American crocodile habitat (USFWS 1999).

Female crocodiles usually locate their nests along the exposed shoreline of open water

bodies (e.g., Florida Bay), or along the banks of inland creeks in extreme south Florida. They typically select nest sites in well-drained, sandy soils at about the normal high water level. However, nests in other substrates, such as peat, marl, and rocky spoil piles, are not uncommon. The nesting success often depends on sustained soil moisture, but success can also be affected by flooding and egg predation. Because females must return to the nests to excavate the soil for the hatchlings, human presence during nest building, egg laying, and incubation tending can also adversely affect nest success. Research indicates that some females may abandon their nest if they are exposed to repeated human disturbances (Kushlan and Mazzotti 1989).

Once the hatchlings leave the nest site, they typically disperse to seek shelter, stable food sources, and brackish to freshwater in nursing areas that are generally more inland than their nest sites. The hatchlings are very susceptible to predation during this dispersal period (Kushlan and Mazzotti 1989). Also, a lack of available freshwater can adversely affect hatchling survival. Periods of low rainfall or long distances to available freshwater can be detrimental to crocodile hatchlings. Once the hatchlings reach the brackish or freshwater nursing areas in estuarine and inland mangrove forests, they typically feed on fish, crabs, snakes, and small invertebrates (USFWS 1999).

Generally, the American crocodile is primarily a nocturnal species, doing most of its active foraging between sunset and sunrise (Lang 1975, Mazzotti 1983). The diet of adult crocodiles generally consists of small mammals, fish, snakes, turtles, and crabs (Ogden 1978, Ross and Magnusson 1989).

**Eastern Indigo Snake.** The eastern indigo snake (*Drymarchon corais couperi*) was first listed as a federally threatened species under the Endangered Species Act in 1978. The listing was prompted by the snake's significant

population decline, which was caused by overcollecting for the domestic and international pet trade, as well as mortalities resulting from rattlesnake collectors gassing gopher tortoise burrows. With enforcement of the Endangered Species Act as well as the Lacey Act, exploitation for the pet trade has declined but still remains a concern (Moler 1992). And, although the gassing of tortoise burrows is still a threat to the eastern indigo snake, it is not the most serious threat to the snake. Instead, the displacement and fragmentation of habitat from urban development have become the biggest threats to the snake since the listing. However, no critical habitat areas have been designated for the snake to date.

The eastern indigo snake is a long, black, nonvenomous snake found in Florida and Georgia. With a length of up to 104 inches (265 cm), it is considered one of the longest snakes in the United States (Ashton and Ashton, 1981). The eastern indigo has large and smooth scales with a uniform shiny black coloration, except for red or cream tints on the throat, chin, or cheeks.

The eastern indigo snake is an active terrestrial predator that will eat any vertebrate small enough to be overpowered. Layne and Steiner (1996) documented several instances of indigos flushing prey from cover and then chasing it. An adult eastern indigo snake's diet may include frogs, toads, snakes (venomous as well as nonvenomous), lizards, turtles, turtle eggs, fish, juvenile gopher tortoises, small alligators, birds, and small mammals (Keegan 1944, Babis 1949, Kochman 1978, Steiner et al. 1983). Juvenile eastern indigo snakes eat mostly invertebrates (Layne and Steiner 1996).

Currently, the eastern indigo is primarily found in sandhill habitat in northern Florida and southern Georgia. However, the snake is also widely distributed throughout central and south Florida. With their general preference for upland habitats, large numbers of eastern indigos are not common in the wetland

complexes of the Everglades region (Duellman and Schwartz 1958, Steiner et al. 1983). Historically, the eastern indigo snake was found throughout Florida and in the coastal plain of Georgia, Alabama, and Mississippi (L'ding 1922, Haltom 1931, Carr 1940, Cook 1954, Diemer and Speake 1983, Moler 1985a).

Throughout most of its range, the eastern indigo uses a variety of habitat types, particularly because it needs a mosaic of habitats to complete its annual cycle. The habitats include pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and even human-altered habitats. They are especially common in the hydric hammocks throughout this region (Moler 1985a). In central and coastal Florida, eastern indigos are mainly found within many of the state's high, sandy ridges. In extreme south Florida, these snakes are typically found in pine flatwoods, pine rocklands, tropical hardwood hammocks, and mangrove forests (Kuntz 1977). In portions of south Florida, eastern indigos may also occupy agricultural sites and areas along canals and other artificial waterways.

Wherever the eastern indigo snake occurs in xeric habitats, it is closely associated with the gopher tortoise (*Gopherus polyphemus*), the burrows of which provide shelter from winter cold (Bogert and Cowles 1947, Speake et al. 1978, Layne and Steiner 1996). In the milder climates of central and southern Florida, eastern indigo snakes exist in a more stable thermal environment, where availability of thermal refuge may not be as critical to the snake's survival. However, even though thermal stress may not be a limiting factor throughout the year in south Florida, eastern indigo snakes still seek and use underground refuges in the region. On the sandy central ridge of south Florida, eastern indigos use gopher tortoise burrows more (62%) than other underground refuges (Layne and Steiner 1996). Other underground refuges

used by this species include burrows of armadillos, cotton rats (*Sigmodon hispidus*), and land crabs; burrows of unknown origin; natural ground holes; hollows at the base of trees or shrubs; ground litter; trash piles; and in the crevices of rock-lined ditch walls (Layne and Steiner 1996, Hyslop 2007).

Eastern indigo snakes range over large areas and into various habitats throughout the year, with most activity occurring in the summer and fall (Smith 1987, Moler 1985b, Speake 1993). In peninsular Florida, data on home ranges for females vary from 4.75 to 375 acres; while male home ranges vary from 4 to 818 acres (Moler 1985b, Layne and Steiner 1996, Bolt 2006, Dodd and Barichivich 2007). Summer home ranges tend to be much larger than winter home ranges. The eastern indigo's relatively large home range also makes it vulnerable to habitat loss, degradation, and fragmentation (Lawler 1977, Moler 1985b). Extensive tracts of wild land are the most important refuge for large numbers of eastern indigo snakes (Diemer and Speake 1981, Moler 1985b). Additional human population growth will increase the risk of direct mortality of the eastern indigo snake from property owners, domestic animals, and highway mortality. Pesticides that are introduced into the food chain may also be a hazard to the snake. Pesticides used on crops or for silviculture would pose a threat to the indigo (Speake 1993). Secondary exposure to rodenticides used to control rats may also occur (Speake 1993).

Declines in gopher tortoise populations are negatively affecting eastern indigo snake populations, especially in the northern areas of the snake's range. Gopher tortoises are declining due to loss of both quantity and quality of their habitat. Loss of tortoise habitat quantity is occurring from human population growth and development and conversion of native habitat to agriculture. The use of off-road vehicles in sandhill habitats of the tortoise can also destroy groundcover and soil stability (Lawler 1977).

In the southern parts of their range, eastern indigo snakes often move among the available habitat types. This is one of the reasons why the species is especially vulnerable to habitat fragmentation (Breininger et al. 2004, Hyslop et al. 2006). Large areas of natural habitats, protected from roads and the fragmentation associated with development, are needed to maintain viable snake populations (Layne and Steiner 1996, Breininger et al 2004).

During the past decade, the loss of natural areas in Florida has continued to rise dramatically (The Nature Conservancy 2006). The effects of habitat destruction and alteration on the eastern indigo snake are likely most substantial along the Florida coasts, in the keys, and along the high ridges of south-central Florida. Agricultural interests (principally citrus) continue to destroy large expanses of suitable natural indigo snake habitat throughout much of southern Florida. More roads create habitat fragmentation and increases in mortality when snakes try to cross highways (Andrews and Gibbons 2005, Bolt 2006). At some point, the size of fragmented habitat patches will become too small to support viable populations. It has been suggested that eastern indigo snake populations that occur on managed preservation lands of at least 2,500 acres, with few roads or human-altered habitats that increase habitat fragmentation and mortality, may have the best chance of long-term viability (Moler 1992, Breininger et al. 2004).

The U.S. Fish and Wildlife Service estimates that the eastern indigo population as a whole is declining in south Florida because of habitat destruction and degradation. Considering the small population of this species, additional threats to its survival or habitat could cause local extirpations. Current and future habitat fragmentation will probably result in a large number of isolated, small groups of indigo snakes. However, even with continued habitat loss, this species will probably persist in most localities where large, unfragmented pieces of natural habitat remain. According to the *South*

*Florida Multi-Species Recovery Plan*, the U.S. Fish and Wildlife Service has an objective to stabilize and increase the overall eastern indigo population and ensure that multiple healthy populations exist and are protected. If it is determined that sufficient, suitable habitat exists in south Florida for the eastern indigo snake population to stabilize or increase, delisting criteria would be considered.

### Major Game Species

Of the 13 game species in Big Cypress, white-tailed deer, wild turkey, and European feral hogs require special management consideration because of their importance to both recreational hunters and the endangered Florida panther. Hunting is currently prohibited in the Addition; however, it is anticipated that hunting will be permitted once the *General Management Plan* is completed and approved. The Addition is expected to become part of the adjacent Big Cypress State Wildlife Management Area. As in the original Preserve, hunting will be regulated according to the requirements, seasons, and bag limits established by the Florida Fish and Wildlife Conservation Commission. NPS staff would manage the hunts in the Addition, with assistance from the commission, and both NPS and commission staff will have the ability to enforce state hunting regulations. The current status of these three game species and their habitat is described below.

**White-tailed Deer.** The white-tailed deer (*Odocoileus virginianus*) is the most important game species in the Preserve and the Addition. In addition to being a popular large game animal, white-tailed deer are a prey species for the endangered Florida panther. The deer's food preference is the swamp lily (*Crinum americanum*), a monocot that grows in cypress and hardwood swamps (Labisky 2003). The decline of the swamp lily, as swamps are overrun with exotic plants such as melaleuca, would likely affect deer populations, and, consequently, the panther population.

Generally, deer browse in south Florida is poor because of low fertility and low palatability (Florida Game and Fresh Water Fish Commission [FGFWFC], 1959). In the later stages of plant succession woody plants and graminoids, which tend to be high in lignin and low in nutrition, occupy a site. Consequently, deer browse declines as the vegetation matures. The best deer browse occurs after disturbances that encourage new growth, because young shoots are relatively high in nutritional value and much more palatable. Recent fires in the Addition will likely improve deer browse and habitat in the near-term.

Although areas within the Preserve and the Addition host resident Florida panthers, the effect of panther predation on deer herds is unknown. McBride (1985) suggests a comparison with western cougar predation on mule deer.

Ackerman (1982) found that a cougar in Utah killed a mule deer about every 9.5 days, which equates to 39 mule deer per year per cougar. Although it is difficult to directly compare kill rates by cougars in Utah with Florida panthers, the scale of predation (e.g., tens of deer per year per panther) may be appropriate where deer are abundant. If this level of predation on deer is a valid assumption, then Florida panthers and hunters may be competing for the same deer. Studies of Florida panther stomach and fecal contents show wild hogs, rabbits, armadillos, and other small game are also preyed upon, but it is not clear if these prey are preferred or if panthers are forced to prey on smaller game because deer are lacking. If deer are the preferred prey, then predation probably exerts a significant influence on the deer population.

The Florida Fish and Wildlife Conservation Commission began collecting data on the deer herd in the original Preserve in 1984 to estimate the population size and assess the health and condition of the deer. Since the 1991 *General Management Plan* was

completed, the deer population in many areas of the original Preserve has increased. Factors influencing this increase include area closures, favorable environmental conditions, and changes in hunting regulations. Data collected from aerial surveys and counts have limitations and do not allow for accurate estimates of herd size.

Legal hunting does not seem to be a threat to deer populations in the Preserve, but the cumulative effect of legal and illegal hunting and of panther predation is unclear. The U.S. Fish and Wildlife Service expressed concern in the early 1990s that even legal hunting may be adversely affecting the panther through disturbance.

Annual surveys of white-tailed deer in the Addition have been conducted by the Florida Fish and Wildlife Conservation Commission since 2005 to gather baseline data that can be used to make hunting management decisions for the Addition once it is opened to public hunting. The surveys measure the abundance and distribution of white-tailed deer in the Addition. Two types of surveys were conducted in 2006: aerial surveys for recruitment data and land cruise surveys (night and morning) for population estimation. In general, deer observations were highest north of I-75. The survey results were highly variable, but in general habitat for white-tailed deer is considered to be of higher quality north of I-75 (Mihalco 2007). In 2008 the deer herd in the Northeast Addition north and south of I-75 was estimated to be 133 and 54, respectively (Joe Bozzo, Wildlife Biologist, Florida Fish and Wildlife Conservation Commission, pers. comm., December 2008). Typically, up to 33% of the game population can be harvested annually and remain sustainable.

**Wild Turkey.** Wild turkeys are an important prey resource for the Florida panther and are one of the principal game animals for hunting in the area. Wild turkeys are common in the region. Turkey density tends to fluctuate

widely from year to year due to environmental conditions (Powell 1965, Frye 1954). Turkey poult mortality is very high if heavy rains occur during April or May when young birds are susceptible to disease and drowning, but populations usually bounce back if conditions are favorable during the next breeding season (Powell 1965).

Turkey surveys in the Addition were initiated in 2006 by the Florida Fish and Wildlife Conservation Commission to gather baseline data that can be used to make hunting management decisions for the Addition. Eight sites (all of them north of I-75) were surveyed using digital remote cameras. Habitat north of I-75 is considered to be better than that in the south, supporting a greater number of turkeys. Approximately 230,000 acres were sampled with the placement of the eight cameras. A total of 518 turkeys were documented at four of the eight sites. Statistically, this yields a minimum population estimate of 14 birds (two adult gobblers, three juvenile gobblers, and nine hens) (FFWCC 2006).

**Feral Hogs.** Feral hogs (*Sus scrofa*) are second to deer in importance as game animals. European feral hogs were first introduced to Florida by Spanish explorers in the 16<sup>th</sup> century. In more recent years feral hogs have been managed by the state as a game animal and have been stocked in many areas of south Florida, including Big Cypress as late as 1975, to improve hunting. Illegal stocking of feral hogs in Big Cypress may also occur.

Mast-producing hardwood hammocks are probably the preferred habitat for hogs, followed by pinelands (because of their short hydroperiod), and during the dry season mixed-hardwood swamps (Schortemeyer et al. 1985). Belden et al. (1985) found that hogs tend to move into wetter vegetation types as the dry season progresses. As with deer, cypress prairies and prairies are probably the least productive vegetation for hogs (J. L. Schortemeyer, Florida Game and Fresh Water Fish Commission, pers. comm. 1986).

Wild hogs are known for their ability to rapidly reproduce. The U.S. Fish and Wildlife Service reports that in the Merritt Island National Wildlife Refuge near Cape Canaveral, hogs may produce 1.5 litters per year, with an average of 2.3 piglets at weaning (Ron Hight, U.S. Fish and Wildlife Service, pers. comm. 1986). These numbers could be higher for subtropical south Florida; however, the summer wet season may be a limiting factor for hog populations. Schortemeyer has observed hogs freely moving through 1 foot of water or less, but when water is deeper than 16 inches, their movement appears to be greatly restricted, confining the animals to higher ground and limiting available space and food (Schortemeyer et al. 1985). Conversely, a prolonged winter drought appears to reduce hog reproduction and increase hog movements and may cause direct mortality through dehydration (J. L. Schortemeyer, Florida Game and Fresh Water Fish Commission, pers. comm. 1986). Given these limits, the hog population in the Big Cypress may be constrained from large or rapid increases by environmental conditions. Data in the 1991 *General Management Plan* indicated that feral hog populations are very susceptible to hunting pressure.

In addition to being a popular game animal, feral hogs are a prey species for Florida panthers. An analysis of panther feces collected in the preserve showed that 15% of the samples contained hog remains (FGFWFC, Johnson and Belden 1984). The report cautioned, however, that the sample may have contained both panther and bobcat scats, which would probably lower the importance of hog remains in the analysis.

Some concerns have been raised about the impact of hogs as an exotic species on natural and cultural resources in the preserve. Hogs are known to uproot extensive areas in hardwood hammocks, and this activity could pose a threat to native plants, *Liguus* tree snail eggs, and archeological resources. Rooting could encourage exotic plants by providing

disturbed areas necessary for establishment. However, it has also been suggested that rooting exposes grubs and other foods for turkey, quail, and additional native wildlife and encourages browse plants for deer. Rooting also occurs during the dry season in marshes.

Other hog-related problems include diseases carried by hogs, possible competition between hogs and native wildlife, possible adverse effects on wild turkey nesting, and competition with deer for the annual mast crop (under-water shoots on trees) (Beckwith 1965); however, negative impacts from competition have not been quantified or confirmed. Hogs are known to be carriers of brucellosis, a disease that infects humans and could infect the Florida panther.

The current population of feral hogs in the area has declined in recent years and is currently very low. Data from the 2006 hunt conducted in the original Preserve indicated only four animals were taken by hunters, one during muzzle loading season and three during archery season. The reason(s) why hog numbers are so low is not well understood; however, it is suspected that increased hunting pressure by panthers may be a factor.

### Exotic and Nonnative Wildlife Species

Exotic species impact natural systems through unchecked predation or consuming and killing of native plant species. In many cases, exotic wildlife have no natural predators and can displace native species and multiply rapidly. More than 100 exotic animal species have been introduced into south Florida (Duever et al. 1986a). Sixty of these are believed to be breeding populations. At least 22 exotic species have been collected in the Preserve, 18 of which are known to be breeding populations. European feral hogs have probably the greatest impact of any exotics on native species. Other exotic mammals have limited distribution in the Addition, and apparently none has a

significant influence on native species. Other important exotics include the armadillo, several fish (walking catfish, black acara, spotted tilapia, and oscar), several insects (fire ants and lovebugs), and snakes.

For an example of exotic species impacting native species, the Mexican bromeliad weevil (*Metamasius callizona*) is known to attack various species of native plants in south Florida. Adult weevils consume plant leaves, and larval weevils bore into plant stems, which often combines to kill the plant.

The increasing number of exotic snakes found in south Florida has also been causing concern to biologists. Five Burmese pythons were discovered in Big Cypress in 2006, up from three in 2005 (*Naples Daily News* 2007). The Burmese python is native to India and southeast Asia and has flourished in the subtropical climate of south Florida.

In nearby Everglades National Park, more than 624 southeast Asian snakes have been found since 2000. In 2006 and 2007, more than 418 snakes were captured and/or removed from the Everglades. Populations of exotic snakes are known to be increasing in south Florida in recent years.

#### Completed and Ongoing Studies and Inventories Related to Natural Resources

The following studies/plans, some of which were done for the original Preserve, may be relevant to the Addition.

- trail stabilization — The National Park Service has gained knowledge about trail stabilization techniques through experience and experimentation that

would negate the need to conduct a research project/study (as recommended in the 2000 ORV plan) to answer questions about how to best stabilize trails. Field tests conducted on Concho Billie, Oasis, and Monument Trails have demonstrated successful treatments.

- topographic mapping — Some mapping of the original Preserve has been completed via *Comprehensive Everglades Restoration Plan* efforts.
- an inventory of reptiles and amphibians — This inventory has been completed.
- a small mammal inventory — This inventory is in progress and is in its second year.
- a fish inventory — This inventory has been completed.
- a vascular plant inventory — This inventory has been completed.
- water resources monitoring — Although an original research project has not been conducted regarding surface flow, water quality impacts, or wildlife effects, the Preserve has established permanent water quality and water stage monitoring stations in the Addition that could alert Preserve staff to changing conditions resulting from ORV use and other land uses as well.
- wildlife monitoring — Monitoring of wood storks and Florida panthers has been conducted annually since the mid 1990s.
- a game species inventory — The Florida Fish and Wildlife Conservation Commission is also conducting a game species inventory of the Addition that focuses on deer and turkeys.

## WILDERNESS RESOURCES AND VALUES

Wilderness resources and values are the attributes of an area that are physically present — they make up the wilderness character of an area.

### WILDERNESS RESOURCES IN THE REGION

There are three designated wilderness areas in the south Florida region:

- the Marjory Stoneman Douglas Wilderness (1,296,500 acres in Everglades National Park— the largest wilderness area in the state) managed by the National Park Service in Collier, Miami-Dade, and Monroe Counties
- the J.N. “Ding” Darling Wilderness (2,619 acres) managed by the U.S. Fish and Wildlife Service on Sanibel Island — Lee County
- the Florida Keys Wilderness (6,197 acres) managed by the U.S. Fish and Wildlife Service in the Florida Keys in Monroe County.

There is no designated wilderness in Big Cypress National Preserve.

### WILDERNESS RESOURCES IN THE ADDITION

There is currently no designated wilderness in the Addition; however, there are expansive areas that contain wilderness characteristics. Summarizing the Wilderness Act of 1964, wilderness resources and values are generally present if an area is untrammeled, undeveloped, natural, and has outstanding opportunities for solitude or primitive and unconfined types of recreation. General descriptions of the Addition’s wilderness

resources and values are presented below according to these categories, followed by a more detailed description of the wilderness characteristics present in specific areas of the Addition.

#### Untrammeled

An area is considered “untrammeled” if its natural processes are essentially unhindered and free from modern human manipulation or control. Portions of the Addition have never been significantly altered by human activities, and their natural processes continue to function in an essentially unhindered manner. This is especially true of the Mullet Slough and Kissimmee Billy Strand areas. Although portions of the Addition have been altered in the past by farming, grazing, road building, and other activities, some of these areas have since reverted to natural vegetative and wildlife communities and are now largely free of human manipulation or control. This is especially true in the Northeast Addition south of I-75. Areas north of I-75, as well as in the Western Addition, continue to be influenced by human activities and their natural communities depend on regular intervention.

#### Undeveloped

Although much of the natural landscape of the Addition has been modified over time by human activity, there are expansive areas that retain their primeval character and where the “imprint of man’s work is substantially unnoticeable.”

#### Natural

Natural systems in the Addition are affected by unnatural processes such as the alteration

of water systems and other human-induced impacts. Much of the Addition is impacted by the presence of exotic, nonnative plants, although the effect on a visitor's experience and perception of naturalness varies. Despite these effects, and particularly when compared to surrounding areas, the Addition contains a high degree of naturalness. However, regular intervention is necessary to maintain natural values and conditions.

### **Opportunities for Solitude**

The remote character of the Addition provides outstanding opportunities for solitude. No visitor facilities and services are present in the Addition, so visitation is relatively low and limited to self-guided activities such as hiking, biking, and bird-watching. The Addition is currently open mainly to foot and bike travel — it has never been legally open to public hunting and motorized use. Opportunities for solitude are compromised in popular areas, such as at access points, along maintained grades, and near private camps. Solitude may be compromised in areas that are near locations that have seasonal or year-round residences.

### **Opportunities for Primitive and Unconfined Types of Recreation**

The Addition's remote setting provides a backcountry environment that allows for the pursuit of many self-reliant recreational opportunities. Visitors can experience a sense of freedom and rugged individualism through a variety of recreational activities. The Addition provides outstanding opportunities for hiking on- and off-trail, scenic viewing, wildlife watching, fishing, camping, and exploration. Canoeing and kayaking is also possible in certain areas of the Addition.

### **Other Wilderness Values**

The Addition is also important for scenic, educational, and ecological resources and values. These values allow visitors to learn about and experience the contrasting scenery of the Addition's various plant communities, archeological resources, and water-dependant natural systems. All of these resources and values contribute to and enhance the wilderness character of the area.

## **AREA-SPECIFIC DESCRIPTIONS**

### **Northeast Addition, North of I-75**

This area is more fragmented than the area south of I-75, but it still contains a number of natural areas, best represented by Kissimmee Billy Strand. Kissimmee Billy Strand is mostly pristine, although it is bounded on the north by old roads and grades. However, aside from these man-made improvements, the strand is generally wild and free of trails. Natural processes predominate in the south and western portions of the northeast Addition, whereas the northern and eastern portions contain numerous camps, trails, and other permanent improvements. The L-28 Interceptor Canal and the oil/gas pipeline right-of-way are areas that have been substantially manipulated.

Areas east of Nobles Grade contain some evidence of past human disturbance; however, most of the area has healed considerably since 1996 (when acquired by the National Park Service) and is now considered wild and untrammled. Some remnant trails are present, but many have recovered significantly and today are substantially unnoticeable. A few smaller areas contain distinguishable remnants of human works, but they will likely be restored by natural processes over time and will become contributing elements to the wilderness character of this area.

The most frequently visited areas, where encounters with other visitors can be expected, are the mile marker 63 rest area on I-75, which provides access to the Florida National Scenic Trail, and the L-28 Interceptor Canal. Private camps and residences also exist in the Northeast Addition, and thus opportunities for solitude are diminished in these areas due to frequent access by private landowners.

#### **Northeast Addition, South of I-75**

Most of the northeast Addition south of I-75 is natural and largely free from the influences of man. This area is best represented by Mullet Slough, the largest pristine area within the Addition. Here, water quality is high, trails and roads are mostly nonexistent, and the slough's remoteness has allowed native communities to persist. Natural processes are mostly uninhibited south of I-75, with the exception of the camps and development that exist in the east near the L-28 Interceptor Canal. In the southwestern portion there are signs of disturbance from previous oil and gas operations, but these are limited mostly to

remnant roads and trails that have recovered significantly during the last 10 years. Today, they are mostly unnoticeable, and the area appears natural.

#### **Western Addition**

Most of the lands north of I-75 and south of U.S. 41 in the Western Addition are natural and largely free from the influences of man. The rest of the Western Addition includes those areas that surround improved private properties, roads, and former agricultural sites. Lands east of the Western Addition are owned by the National Park Service, and most are managed in a wilderness-compatible fashion, which contributes to the naturalness and ecological integrity of lands in the Western Addition

Opportunities for solitude in the Western Addition are reduced due to the presence of developed areas along the highway corridors, such as near Miles City, Copeland, Carnestown, and Everglades City, and near popular areas like Bear Island Grade.

## CULTURAL RESOURCES

### OVERVIEW

Big Cypress National Preserve and the Addition are in the Glades region (an area defined by hardwood and pinewood hammocks, sawgrass, and dwarf cypress interspersed with shallow freshwater marshes and prairies) of south Florida. The limited vegetation of this region is a result of thin soils underlain by limestone bedrock. This region also includes the Everglades and portions of the Atlantic coast, the Ten Thousand Islands, and the Florida Keys. Human habitation of the Glades region can be traced back to the late Pleistocene or Lithic era. Paleo-Indian populations migrating throughout North America probably arrived in south Florida sometime before 13,000 years ago. Florida's environment was substantially different during this period. Its land area was approximately twice the state's current size, and the climate was significantly cooler and drier. The story of human activity in Florida during this period is not well understood, due in part to the fact that much of the area occupied by humans was inundated by rising sea levels that occurred with the retreat of the continental ice sheets that began around 12,000 to 13,000 years ago. This change in global glaciations signaled the end of the Pleistocene era.

The prehistoric periods of human culture represented by sites in south Florida include (1) the Paleo-Indian, (2) the Archaic period, which spanned roughly 8,000 BC to 500 BC, and (3) the Glades Tradition, which extends into the historic period, spanning 500 BC to 1760 AD. The historic periods of human culture begin with the initial Spanish contact in 1513 and continue through the 20<sup>th</sup> century and the creation of Big Cypress National Preserve.

There are fewer than 100 Paleo-Indian archeological sites in Florida, and none

located within the boundary of Big Cypress National Preserve or in the Addition. In all likelihood, most sites associated with the Paleo-Indians of this era are submerged beneath the state's coastal waters. However, at least one area within the Addition, Deep Lake, has the potential for association with this prehistoric period.

The Archaic period that followed the Pleistocene is divided into three distinct divisions; early, middle, and late. The Archaic cultures of south Florida are distinguished by progressively more diversified hunting, fishing, and gathering; the creation of more permanent settlements, increasingly sophisticated tools, trade networks, and in the late Archaic the appearance of pottery. A few Archaic period sites have been identified within Big Cypress National Preserve. None have yet been discovered in the Addition, but additional survey work remains to be done.

The Glades period or Glades tradition succeeded the Archaic period and incorporates both the end of the prehistoric period in south Florida and the first historic documentation of indigenous culture in south Florida. The Glades tradition witnessed the introduction of decorated pottery and woodworking as well as the introduction of European trade goods such as metal implements and trade beads. Spanish explorers documented the extant tribal cultures, which included the Calusa, Tekesta, and Key Indians.

The Spanish established forts and settlements along the Florida coast, raided the tribes for slaves, and sought to convert the indigenous peoples to Christianity. The Spanish managed to retain some control of Florida despite repeated incursions by the English and French. Following the end of the Seven Years' War in 1763, Spain ceded Florida to Great Britain. At the end of the American Revolution in 1783, the British returned

Florida to Spain. The Spanish maintained at least nominal control of Florida while the British and the Americans tried to assert control over the region. The United States officially acquired Florida in 1821. American expansion into Florida led to the establishment of ports and towns, the introduction of the plantation system, and a policy of Indian removal, which in turn triggered prolonged and intense conflict with the Seminoles.

The Seminoles trace their origins back to bands of the Creek confederacy that had migrated into Florida in the 18<sup>th</sup> century to escape Indian removal. Escaped black slaves from the colonies and then the United States found refuge among the Seminoles. Continued conflict over American expansion and repeated attempts to remove the Seminoles from Florida led to a series of three wars fought between 1817 and 1858. Many Seminoles were killed during the fighting or removed to Indian Territory in present-day Oklahoma. Others sought refuge in the Everglades and Big Cypress swamp. The Seminoles managed to maintain a presence even as Americans ultimately asserted control over the rest of Florida.

American dominance in Florida was defined in large part by the ascent of southern “cracker culture.” This distinctly southern cultural group shaped the history of Florida in the 19<sup>th</sup> century and the transition to the 20<sup>th</sup> century. The pace of modern development in Florida greatly accelerated in the 20<sup>th</sup> century. Farming, ranching, logging, oil and gas exploration, and land development opened areas that earlier European contact had left relatively undisturbed. The completion of the Tamiami Trail road in 1928 connected the Atlantic and Gulf coasts at the cities of Miami and Tampa and opened the interior to motor touring and eventually other forms of recreation. The Big Cypress area has for generations been home to a wide range of recreational activities, such as hunting, fishing, trapping, boating, and hiking. The establishment of Big Cypress National Preserve in 1974

recognized the importance of these activities to the inherent values of the Preserve.

Despite changes in use, development, and access, the Seminoles maintained a presence in the Big Cypress. Under the authority of the Indian Reorganization Act, a number of Seminoles officially organized as the Seminole Tribe of Florida in 1957. Other Seminoles incorporated and formed the Miccosukee Tribe of Indians of Florida in 1962. The establishing legislation for Big Cypress National Preserve recognizes special access rights for both tribes for “usual and customary use and occupancy . . . within the Preserve, including hunting, fishing, and trapping on a subsistence basis and traditional tribal ceremonials.”

## ARCHEOLOGICAL SITES

Fifty-seven archeological sites have been identified in the Addition. These resources are associated with the Archaic and Glades periods in the Preserve’s cultural chronology. Most of these sites are earth middens, which are refuse piles commonly made up of cultural artifacts, and faunal remains. The remaining sites are classified as surface scatters (1), two sand mounds, a sand burial mound, a village site, and a home site. In field surveys conducted in the Addition, researchers from the NPS Southeast Archeological Center have made preliminary determinations about the chronology of these sites.

Of the 57 sites, 10 have been determined to be prehistoric; 23 are determined to be Native American sites; and 22 are associated with the Glades cultural period. Five sites span a range of historic periods and contain artifacts representing Native American and Seminole cultures. The chronological periods of two sites at Deep Lake are unknown. More precise determinations of the chronological periods of the sites in the Addition will require additional research.

## **Deep Lake**

Although no archeological work has yet been conducted within Deep Lake, the potential for scientific archeological resources within the watery environs of the lake is great. Classic sinkholes like this are rare in south Florida. Only four others like it are known in south Florida, and two of these are exceptionally significant archeological sites. Archeological evidence from two other south Florida limestone sinkholes indicates that they served as watering holes during much of the Paleo-Indian and Archaic periods. Archeologists have recovered evidence of Paleo-Indian and Archaic-period use of these water sources from the submerged ledges of the sinkhole. The artifacts recovered were radiocarbon dated to between 8,000 BC, and 11,500 BC. It is clear from the presence of human remains at the site and the radiocarbon dated artifacts that water levels were well below present levels at approximately 11,000 BC. It is likely that the limestone sinkholes, including Deep Lake, served as much needed sources of freshwater to south Florida's inhabitants when it was a scarce commodity elsewhere. Researchers speculate that Deep Lake may also retain resources dating from the earliest periods of human occupation in south Florida

and is therefore viewed as having enormous archeological potential.

## **ETHNOGRAPHIC RESOURCES**

Ethnographic resources are a 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. Traditionally associated peoples are defined as contemporary neighbors or ethnic or occupational groups that have been associated with a park unit for two or more generations (40 years) and whose interests in the park unit began prior to the park unit's establishment. The Seminole and Miccosukee tribes are both recognized in the enabling legislation as peoples traditionally associated with Big Cypress National Preserve.

Some resources within the Addition have traditional associations with the Seminole and Miccosukee tribes. Information relating to these ethnographic resources will be collected through collaborative research between the National Park Service and designated tribal representatives.

## VISITOR USE AND EXPERIENCE

### OVERVIEW

#### South Florida

South Florida offers a variety of recreational activities ranging from developed recreation to primitive and unconfined, natural recreational pursuits. Before the 1920s, south Florida was relatively wild and undeveloped. Beginning in the 1920s, many newcomers began recreating and moving to south Florida to enjoy the warm, semitropical environment and the pristine, sandy beaches. Most of the population and human development in south Florida is now within 15 to 20 miles of the coastline, and the area has become extensively developed. Since the 1920s, the population in Florida has continued to rapidly grow, and today Florida is the fourth most populous state in the United States, with a total population of 17.8 million residents. Owing largely to the unique semitropical environment, the diverse range of recreational opportunities and reputed character, Florida continues to experience intense and concentrated visitation by vacationers every year. Because of the increasing population and visitation, the demand for additional and new recreational opportunities also continues to be a major factor.

The seven southernmost Florida counties — Broward, Collier, Hendry, Lee, Miami-Dade, Monroe, and Palm Beach Counties — measure 10,104 square miles, accounting for 18.7% of Florida's land mass, yet contain 36% of Florida's total population, totaling 6,416,981 (U.S. Census Bureau, 2005). Within this land mass, Big Cypress National Preserve and Everglades National Park, both administered by the National Park Service, account for 3,483 square miles, or 34.4% of the land within the southernmost portion of this seven-county area. These NPS-administered lands represent the largest contiguous area of relatively undeveloped land in the entire

southeastern United States, which is immediately adjacent to one of the highest population concentrations in the country.

Although the traditional developed and semi-developed recreational activities involving south Florida beaches remain the dominant attraction to vacationers, many of the wilder, interior recreational experiences are gaining interest by residents and visitors. Also, the U.S. Census Bureau estimates that the population within this seven-county area is expected to grow to 9,292,316 by the year 2030, an increase of 2.9 million persons. It is likely that demands for recreational opportunities will also increase as the population grows.

#### The Addition

There are no developed facilities in the Addition to support visitor use, and Interstate 75 is a limited access highway. Visitor use in the Addition is currently limited to hiking, biking on Nobles and Bear Island grades, fishing, backcountry camping, nonmotorized boating in the main portion of the Addition, and motorized boating in the canals and estuarine area near Everglades City. No data specific to visitor use of the Addition is available. The Addition will remain closed to hunting and motorized recreational access until a final management decision is reached and a "Record of Decision" is signed and published in the *Federal Register*.

ORV trails have been mapped and assessed as part of this process to identify sustainable trails for visitors seeking ORV access opportunities. Also as part of this document, a wilderness study was conducted to identify suitable lands for proposal as designated wilderness within the Addition for visitors seeking opportunities for solitude or primitive and unconfined types of recreation within the backcountry.

### The Original Preserve

This *General Management Plan* is for the Big Cypress Addition. The following description of the original Preserve is given to provide a relative comparison between the Addition and the original Preserve. The potential demand for recreational opportunities in the Addition is likely to be very similar to that occurring within the original Preserve. (see table 14).

The original Preserve is a large, wet, relatively flat and undeveloped land named for the extensive expanses of cypress trees. Big Cypress National Preserve consists of great stands of cypress forest swamps, marl wet prairies, marshes, and shallow freshwater sloughs. These natural resources offer visitors relatively natural, primitive and unconfined types of visitor experiences compared to the popular developed beach and resort experiences common in south Florida. The primary visitors to Big Cypress during the 1970s and 1980s were hunters, ORV users, and owners of improved properties (privately owned in-holdings) (Big Cypress *General Management Plan* 1991). Since the 1990s, hiking, canoeing, wildlife viewing, bird-watching, photography, bicycling, camping, picnicking, and general sightseeing have all emerged as substantial visitor use activities in addition to the previously mentioned activities. Because of the general lack of developed visitor facilities, the Preserve does not typically have visitation by the general public compared to most units managed by the National Park Service. Because of the primitive nature of the Preserve, visitation typically requires careful planning, fortitude, and self-reliance. The number of visitors seeking opportunities for solitude or primitive and unconfined types of recreation within the backcountry has increased within the Preserve as a whole. Visitation to Big Cypress National Preserve has gradually increased over the past 15 years as the American public has become more informed about the recreational opportunities available.

**TABLE 14: PRESERVE VISITATION BY YEAR**

Year	Total Recreation Visits
1989	81,157
1990	127,790
1991	159,172
1992	212,682
1993	234,830
1994	294,307
1995	365,463
1996	424,920
1997	462,553
1998	474,895
1999	503,110
2000	505,062
2001	409,771
2002	449,481
2003	400,902
2004	385,194
2005*	768,687
2006	825,857
2007	822,864

\* A change was made in data collection methodology.

SOURCE: NPS Public Use Statistics Office, 2008

To support these emerging visitor uses within the original Preserve, interpretive activities are offered to visitors in the Oasis, Concho Billie, Bear Island, and Turner River areas where ORV trails are sometimes used as access into the Preserve. Guided bicycle trips, canoe tours, environmental education programs, and activities, as well as swamp walks and hikes up the Florida Trail, are offered each winter season from mid-December through early April.

ORV users assign considerable importance to the opportunities provided by their ORVs to access and explore the Preserve’s back-country. Considerable work is performed by NPS staff to construct and maintain ORV access points, ORV trails, and campsites within the original Preserve every year.

To enhance recreational opportunities, improvements are gradually being made to

campgrounds, access points, and picnic areas. Safety and visitor amenity improvements associated with the U.S. 41 project have increased visitor opportunities by providing easy walking on boardwalks, interpretive and educational panels, and safe parking in designated areas adjacent to the main highway.

Day use visitor facilities currently available in the original Preserve include the Oasis Visitor Center, two picnic areas at the Kirby Storter Roadside Park and the H.P. Williams Roadside Park, a canoe landing, and an interpretive trail on Loop Road. Overnight visitor use facilities include two developed campgrounds at Monument Lake and Midway, and six primitive campgrounds located at Bear Island, Burns Lake, Pinecrest, Mitchell's Landing, Pink Jeep, and Gator Head. Future projects will add interpretive trails, and improved parking in many areas.

## RECREATIONAL OPPORTUNITIES

The primary recreational activities within the original Preserve include the following:

- frontcountry driving, sightseeing, and visitor centers
- walking and hiking
- bird-watching and wildlife viewing
- paddling
- motorboating
- camping
- bicycling
- ORV riding
- hunting, fishing, and frogging
- opportunities to experience peace and quiet in a natural environment

These primary activities are described below in greater detail. Although other recreational activities may occur, these listed activities account for the dominant types of use. Within the Addition, current recreational opportunities are limited to walking and hiking, bird-watching and wildlife viewing, paddling,

limited motorboating, camping, and opportunities to experience peace and quiet in a natural environment. Because of the similarity of resources in the Addition and the original Preserve, descriptions of activities within the original Preserve have been included for purposes of comparison. All of these activities have been proposed for the Addition, including those that do not currently occur there.

### Frontcountry Driving, Sightseeing, and Visitor Centers

Several major highways transect or run adjacent to the Big Cypress National Preserve Addition. Interstate 75, also known as Alligator Alley, crosses the northern portion of the Preserve for approximately 30 miles, about 19 of which are within the Addition and are currently used almost solely as a nonrecreationally based travel corridor. Although this highway is the primary transit route between Fort Lauderdale and Naples, it does offer views into the undeveloped land in Big Cypress.

U.S. 41, also known as the Tamiami Trail, is a paved highway that crosses the southern portion of the Preserve for about 36 miles, 1 mile of which is in the Addition. Preserve headquarters, the Big Cypress Swamp Welcome Center, and the Oasis Visitor Center are on U.S. 41 in the original Preserve. The Big Cypress Swamp Welcome Center and the Oasis Visitor Center offer interpretive displays, printed materials and books for sale, and wildlife viewing platforms. Currently, no visitor centers exist in the Addition.

State Road (SR) 29 is a paved highway that runs north/south along the western border of the Big Cypress National Preserve Addition for approximately 29 miles. Wildlife underpasses have been and are being constructed under Interstate 75 and SR 29 to protect animals and drivers, specifically the Florida panther, from being killed in automobile accidents.

A graded dirt administrative road known as Bear Island Grade exists in the northwestern corner of the Addition and provides access into the Bear Island Unit from SR 29. Other graded roads in the Addition include Bundschu Grade and Nobles Grade, each extending approximately 4 miles into the Addition, north of Interstate 75, although neither of these routes is maintained. Numerous unimproved jeep and ORV trails exist in the Addition and are fully described in the trails section of this chapter.

Unpaved, graded, gravel-based roads in the original Preserve include the approximately 24-mile Loop Road (south of U.S. 41), the approximately 23-mile Turner River Road, the 10-mile Birdon Road, the almost 3-mile Wagonwheel Road that crosses the Addition for almost 1 mile, and the 3-mile access road to the Burns Lake site. Other than the main paved highways, the three unpaved roads listed previously, and several rights-of-way to private in-holdings, no public access roads exist within the Big Cypress National Preserve Addition.

### **Walking and Hiking**

Walking is the primary method of accessing places in the Addition. Although there are no designated trails or pathways and no facilities in the Addition, existing, nonmaintained roads or trails serve as primary access routes for visitors. Cross-country travel in the Addition is difficult due to the heavily forested and swampy environment, but this is the only method of accessing the deep backcountry.

Within the original Preserve, the Florida National Scenic Trail received national designation in 1983. The trail is currently incomplete but is planned to extend approximately 1,300 miles from Big Cypress National Preserve to Gulf Islands National Seashore in Florida's western panhandle. The trail, which is the only designated hiking trail longer than 2.5 miles in the original Preserve,

provides backcountry hiking experiences to visitors. Section 1 of this trail (Oasis to the original Preserve boundary) was established by the Florida Trail Association in the early 1970s. Section 1 begins at the visitor center trailhead and now extends about 35 miles to a rest area along Interstate 75. A temporary trail informally follows Nobles Grade, a nonmaintained road north of Interstate 75, up to the Preserve boundary. The official location and designation of this section of the trail in the Addition is pending the completion of this *General Management Plan*.

### **Bird-watching and Wildlife Viewing**

The size and relatively pristine condition of the Addition offers a wide variety of bird-watching and wildlife viewing opportunities. Most bird-watching and wildlife viewing activities in the Addition consist of individual ventures, as well as formal and informal organized group outings. Within the original Preserve, formal wildlife observation platforms are located at the H.P. Williams Picnic Area, Kirby Storter, the Big Cypress Swamp Welcome Center, and at the Oasis Visitor Center. Bird-watching opportunities are even greater in the original Preserve because of the larger acreage and greater accessibility along roads, developed trails, boardwalks, and in both frontcountry and backcountry areas. Within the Big Cypress Addition, wildlife viewing and bird-watching opportunities are relatively primitive in nature and self-directed because no infrastructure has been provided.

### **Paddling**

Most paddling opportunities in the Addition are in the vicinity of Everglades City and Plantation Island. Within the original Preserve, most paddling opportunities are south of U.S. 41 where accessible water routes provide deep enough water. Within the original Preserve, the Turner River Canoe Trail and the Halfway Creek Canoe Trail

provide the opportunity for nonmotorized paddling experiences. Other areas are open to all boats. In the Addition, the lakes and streams adjacent to Everglades City and Plantation Island are open to paddlers and provide a coastal marsh and mangrove experience.

### **Motorboating**

Motorboating in the original Preserve and in the Addition is generally restricted to the deeper water estuarine environments south of U.S. 41 outside of Everglades City. Motorized vessels are regulated by the Florida Fish and Wildlife Conservation Commission, who serves as the state boating law administrator, and by the U.S. Coast Guard navigation rules. All vessels must comply with applicable federal and state laws.

Motorboat use in the Addition is generally restricted to smaller vessels because of the shallow waters and tight turning radiuses in the creeks and open waters. As a result, the most common vessels are class A boats, less than 16 feet in length, and class I boats, 16 feet to less than 26 feet. Occasionally, class II boats, 26 feet to less than 40 feet overall length, operate in the Addition, but because of the relatively confined conditions, use by this boat class is less frequent and generally restricted to the more open, deeper water locations. The most common boat types in use are traditional single hull or pontoon boats powered by outboard motors. In some deeper, more open creeks, larger 40-60 passenger jet driven boats are occasionally operated. Airboat use in the Addition is prohibited by regulation. Airboats are defined as a vessel that is supported by the buoyancy of its hull and powered by a propeller or fan above the water line. All commercial boat operations are currently prohibited within the Addition.

### **Camping**

**Backcountry Camping.** Backcountry camping is the only type of camping allowed in the Addition, and such camping is subject to Preserve backcountry camping regulations. The Park Service maintains regularly updated and published backcountry regulations.

**Developed Campgrounds.** No developed campgrounds currently exist in Addition. In the original Preserve, two developed campgrounds (Monument Lake and Midway), and six primitive campgrounds (Bear Island, Burns Lake, Pinecrest, Mitchell's Landing, Pink Jeep, and Gator Head) exist.

### **Bicycling**

Bicycling in the Addition is currently allowed on Nobles and Bear Island grades. In the original Preserve, bicycling occurs along many of the gravel roads and on several of the ORV trails. Because of the rough condition of many of the ORV trails in the original Preserve regarding the relatively large deep ruts and standing water, these trails are oftentimes not conducive to bicycle use.

### **Horseback Riding**

Horseback riding (equestrian use) in the Addition is currently allowed; however, this activity is rare due to the fact that the substrate and hydrology of the area tend to self-limit participation by equestrians. Certain roads and grades in the Addition can accommodate horse travel. Horseback riding is allowed as a dispersed activity in the backcountry of the original Preserve; however, use is also infrequent.

**TABLE 15: SUMMARY OF OVERNIGHT VISITS BY YEAR AT THE NATIONAL PRESERVE**

Year	Total Visits	Tent Campers	RV Campers	Back-country Campers	Total Overnight Stays
1989	81,157	2,591	5,847	1,117	9,555
1990	127,790	2,938	12,919	2,532	18,389
1991	159,172	2,897	15,714	5,267	23,878
1992	212,682	1,295	16,112	7,824	25,231
1993	234,830	2,659	18,450	18,786	39,895
1994	294,307	1,803	10,682	11,123	23,608
1995	365,463	2,702	12,034	8,701	23,437
1996	424,920	3,529	10,886	12,959	27,374
1997	462,553	3,518	9,929	12,836	26,283
1998	474,895	2,503	7,096	15,093	24,692
1999	503,110	3,031	13,270	10,158	26,459
2000	505,062	6,210	15,179	12,294	33,683
2001	409,771	6,626	15,582	14,326	36,534
2002	449,481	4,684	12,126	13,063	29,873
2003	400,902	3,272	10,330	12,292	25,894
2004	385,194	2,936	6,671	11,715	21,322
*2005	768,687	10,661	31,000	9,798	51,459
2006	825,857	3,706	12,422	11,814	27,942
2007	822,864	3,845	13,240	18,783	35,868
2008	813,790	3,524	10,383	11,679	25,586

\* A change was made in data collection methodology

**Off-Road Vehicle (ORV) Use**

ORV use by the general public is currently prohibited within the Addition, although some of the alternatives in this document propose ORV use in the Addition.

The use of off-road vehicles is a popular recreational activity in the original Preserve, and great interest has been expressed for allowing this activity to occur in the Addition. Enabling legislation states that motorized vehicular access will be limited and regulated in the Preserve. In the original Preserve, several types of off-road vehicles are used to access the swampy backcountry. These include street-legal four-wheel-drive vehicles (4 x 4s), light-weight all-terrain cycles (ATCs), swamp buggies, and airboats. Recreational activities that can involve the use of off-road vehicles in the Preserve include hunting,

fishing, trapping, bird-watching, general exploring, and recreational driving.

Within the Addition, no data on ORV numbers could be located for the years prior to 1988, when this land was privately owned. Within the original Preserve, no data on ORV numbers could be located for years prior to 1980, when the National Park Service implemented a mandatory registration for all ORVs operated in the Preserve. Within the original Preserve, NPS ORV permit data from 1980 to 2008 are presented in table 16. Tracked vehicles were banned in 1988 based on research that showed they produced more adverse impacts than other ORV types (Duever et al. 1981).

Within the original Preserve, ORV permit numbers have ranged from 633 in 1995 to 2,271 in 1999, 1,702 in 2006, and 2,000 in 2008. Fluctuations in the number of ORV permits

issued each year primarily reflect water levels within the Preserve, with fewer registered vehicles in the wetter years (e.g., 1995) when portions of the Preserve were closed to hunting.

In the original Preserve, ORV use is heaviest during the fall, winter, and spring hunting seasons. The greatest use is on opening weekends of hunting seasons and holidays. Accurate data on ORV-related visitation are

**TABLE 16: NUMBERS OF ORVs REGISTERED FOR USE IN BIG CYPRESS NATIONAL PRESERVE, 1980 TO 2008**

Year	ATV	Swamp Buggy	Street Legal	Airboat	Totals
1980	361	180	176	130	871 <sup>a</sup>
1981	1,154	508	347	195	2,252 <sup>a</sup>
1982	1,042	162	464	166	1,853 <sup>a</sup>
1983	1,012	174	404	133	1,737 <sup>a</sup>
1984	1,020	155	410	115	1,706 <sup>a</sup>
1985	300	143	345	96	891 <sup>a</sup>
1986	300	586	165	238	1,324 <sup>a</sup>
1987	456	794	348	328	1,980 <sup>a</sup>
1988	507	810	393	371	2,082
1989	512	756	398	323	1,989
1990	580	733	334	261	1,908
1991	812	773	315	274	2,174
1992	872	773	314	296	2,255
1993	842	735	270	331	2,178
1994	584	559	193	250	1,586
1995	303	135	108	87	633
1996	682	586	205	234	1,707
1997	967	625	202	277	2,071
1998	1,053	667	219	255	2,194
1999	1,131	670	220	250	2,271
2000 <sup>b</sup>					
2001 <sup>c</sup>					
2002	437	192	90	76	1,754
2003	528	222	121	87	1,699
2004	574	241	107	73	1,652
2005	743	487	146	77	1,444
2006	615	416	111	67	1,702 <sup>d</sup>
2007	972	491	185	83	1,753
2008	1,097	572	221	110	2,000

- a. Includes counts for tracked vehicles until this vehicle type was banned in 1988.
- b. *Recreational ORV Management Plan* finalized for original Preserve, and data is not immediately available.
- c. Data is not immediately available.
- d. 2006: Because of missing information in the database, the total is higher than the number of vehicles.

unavailable, although several efforts have been made to gather such information. Duever et al. (1986a) attributed the substantial increase in ORV trails visible in aerial photographs from 1953 to 1973 to increased recreational ORV use, primarily associated with hunting. They further estimated that approximately 2,540 to 4,000 ORV-related hunters may be present in the original Preserve at peak use times (weekends) during the hunting season. A 1970 study estimated 40,000 person-days of use per year in the entire Big Cypress region.

**ORV Trail Mapping.** ORV trails in the Addition are currently closed to public recreational ORV use and have had limited use in years preceding federal ownership and management. Intensive trail mapping has been conducted as part of a general inventory of Addition trails. Between 2005 and 2007, NPS staff carefully studied existing maps, aerial photography, and verbal accounts of Addition trails to determine where sustainable trails were located. Identified routes were then field verified to confirm existence and rate condition of the trail and evaluate if the trail was sustainable for public use. Although many miles of tracks exist in the Addition, the key was to determine the trails that could be included in a designated trail system and be sustained in a manner that would not degrade Preserve resources. This effort resulted in identifying sustainable trails, meaning trails capable of withstanding repeated use without irreparable resource damage. The criteria for evaluating sustainability included the following:

- the degree of improvement to the ground surface
- soil and substrate type identified by vegetation type
- trail width
- degree of previous disturbance such as rutting of trail surface
- apparent relative level of past use
- presence of water on trail

This effort attempted to map all known existing trails. Approximately 244 miles of trails were assessed (see Map 7: Conceptual ORV Trails). Of the 253 miles assessed, approximately 135 miles were determined to be sustainable ORV trails.

The Addition offers the National Park Service an opportunity to study the Big Cypress landscape largely in the absence of active ORV traffic. This circumstance presents a relative baseline for which to compare the effects of ORV traffic in the original Preserve to conditions in the Addition where off-road vehicles are not permitted. Off-road vehicles have largely been absent from the Addition since 1988, and prior to 1988 use was relatively low and confined to certain trails.

**Characteristics of Off-Road Vehicles.** The following paragraphs describe the typical types of off-road vehicles that would be expected to be used (and regulated) in the Addition.

*Street Legal 4 x 4s* — Street-legal, four-wheel-drive off-road vehicles and trucks that are commercially manufactured and sold are very restricted in the extent of their access within the original Preserve. These vehicles require the driest driving conditions and rarely venture very far into the Preserve's backcountry. As a group, this ORV type is the heaviest, with a mean weight of 4,431 pounds (based on 1996/97 permit data from the Preserve). On average, they comprise approximately 12% of the ORV permits registered with the National Park Service in the original Preserve, although this varies from year to year.

*All-Terrain Cycles (ATCs)* — Small, commercially manufactured motorized all-terrain cycles are 50 inches or less in width, have a dry weight of 900 pounds or less, are designed to travel on three or more low pressure tires, have a seat designed to be straddled by the operator, and use a

handlebar steering control. These cycles tend to be restricted to drier terrain, as they lack the clearance required for deeper water and mud. They are also limited in their ability to carry camping gear and supplies on extended overnight backcountry trips. They are typically less expensive to purchase and maintain, easier to transport, and can penetrate wooded areas more easily than other ORV types. These vehicles are the smallest and lightest off-road vehicles used in the Preserve; current four-wheel drive models range in weight from 400 to 600 pounds. On average, all-terrain cycles comprise about 50% of the Big Cypress National Preserve ORV permits.

**Swamp Buggies** — Swamp buggies include a wide variety of custom-designed and –built vehicles. These vehicles have a wide range of configurations based on the frames, engines, number of axles, and wheel sizes used. Their weights range up to 7,160 pounds, with an average of 3,629 pounds. These vehicles are less restricted in their access than street-legal vehicles and all-terrain cycles, and they can carry several individuals and supplies deep into the backcountry on extended trips. Swamp buggies tend to be more expensive to build and maintain, less reliable, and require substantially larger trailers to transport to and from the area than other ORV types. These vehicles are not street legal. Swamp buggies annually comprise approximately 33% of the ORV permits.

**Other Vehicle Types** — Currently, the above-listed vehicle types are the only types of wheeled off-road vehicles approved and permitted for use in the Preserve. As emerging technologies produce new types of off-road vehicles that do not specifically match the above three descriptions, the National Park Service will consider these new types of vehicles for inclusion in the ORV program

as part of an adaptive management aspect of the *Recreational ORV Management Plan*.

Use patterns in the original Preserve management zones are directly influenced by terrain characteristics. Airboats can most easily negotiate the marshes and wet prairies south of U.S. 41 and the Loop Road. Wheeled vehicles are used more frequently in shallow marl soils, sandy soils, and the drier upland areas north of U.S. 41 where permitted in the original Preserve. Swamp buggies are less restricted, although in forested areas they are constrained by the width of the corridor through the trees, the size of the vehicle, and tire size. All-terrain cycles are less confined to trails and can move faster but cannot traverse the marl or mucky soils as well as the swamp buggies. Street legal four-wheel-drive vehicles require mostly dry conditions and infrequently travel very far into the Preserve backcountry.

**Characteristics of ORV Users and Visitation.** The Big Cypress National Preserve 2000 *Final Recreational ORV Management Plan* gives specific information and statistics related to ORV use in the Preserve. A description is provided here regarding general characteristics of ORV use at Big Cypress.

Off-road vehicles have customarily been used for hunting-related activities, although participation in a wide variety of nonhunting recreational activities has been observed more frequently during the past decade. ORV riding is usually considered a social activity. The use of off-road vehicles is central to many visitors' enjoyment of the Preserve. Seeing wildlife, the ability to reach a favorite destination, sharing activities with friends and family, and reaching a favorite hunting spot are the primary reasons cited for using off-road vehicles. Although users are deeply attached to certain places, such as hunting camps or favored hunting spots, they also assign considerable importance to the opportunity provided by their vehicles to roam and explore the Preserve's backcountry.

Many recreational outings are reported to produce long-lasting benefits and valued experiences. An analysis of information from focus group discussions suggests that Preserve ORV users are similar to ORV users in other parts of the country. Specifically, they

- travel in groups
- prefer little managerial intervention
- see themselves as skilled risk takers and identify with others like themselves
- say the ORV experience is a way to release stress, revitalize spirits, and gain a sense of purpose
- want to protect the natural environment
- enjoy opportunities for social bonding
- value the ORV as a means to achieve solitude and immersion in nature

Based on information from a larger survey of ORV permit holders, many of the most significant benefits depend on their specific activities and/or on specific places. The connections between users, activities, and places must be taken into consideration when selecting ORV management actions.

### Hunting, Fishing, and Frogging

The original Preserve has been designated by the state as a wildlife management area, and the National Park Service permits hunting, frogging, and fishing by the public in accordance with state laws and regulations. Hunting is currently prohibited within the Addition. Fishing is permitted within the Addition subject to applicable laws and regulations.

The National Park Service and the Florida Fish and Wildlife Conservation Commission have concurrent jurisdiction for enforcing game and fish laws in the Preserve. Although the National Park Service has authority to manage wildlife within the Preserve, the Park Service has assigned the management of

hunting to the commission. The commission consults with the National Park Service before issuing regulations that affect hunting and fishing within Big Cypress National Preserve. Likewise, the National Park Service consults with the commission before establishing any temporary or permanent closures or public use limits.

Hunting is a popular recreational activity in the original Preserve. Hunting seasons run from September through April. Deer, turkey, and feral hogs are the principal species hunted. The primary weapons include rifles, shotguns, bows, and muzzle-loading guns. Bird dogs and waterfowl retrievers are the only dogs permitted for hunting. Although many hunters use off-road vehicles to get to hunting areas, many other hunters access the original Preserve on foot.

The *General Management Plan / Final Environmental Impact Statement* (NPS 1991) describes the types of hunting, different hunting opportunities, general regulations, and permit program. The Florida Fish and Wildlife Conservation Commission publishes updated regulations specific to the Big Cypress Wildlife Management Area related to open seasons, game types, quotas, weaponry, and other pertinent regulations annually.

To hunt in the original Preserve, hunters are required to purchase Florida state hunting licenses and wildlife management area stamps. When hunting regulations are established within the Addition and hunting activities are allowed, state hunting licenses and wildlife management area stamps would also be required in the Addition.

Big Cypress National Preserve is home to the endangered Florida panther. Because the Florida panther is listed as a federal endangered species, hunting regulations in the Preserve are relatively restrictive due to the associated direct and indirect disturbance of the panther by hunting activities, and because

white-tailed deer and feral hogs are important prey for the panther.

The Florida Fish and Wildlife Conservation Commission regularly publishes regulations for the following activities:

- deer hunting
- turkey hunting
- hog hunting
- migratory bird hunting
- small game hunting
- frogging
- fishing

## NATURAL SOUND PRESERVATION

### Soundscape

The Addition's soundscape is comprised of both natural ambient sounds and a variety of human-created sounds. The natural soundscape exists in the absence of human-created sound and is considered a resource. This resource is an aggregate of all natural sounds that occur in the Addition. Examples of sounds found in the natural soundscape include sounds produced by birds, frogs, and insects to define territories or attract mates; sounds created by animals to detect and avoid predators or other danger; and sounds produced by physical processes such as wind in the trees, rain falling, or thunder.

The National Park Service will preserve, to the greatest extent possible, the natural quiet and natural sounds associated with physical and biological resources and will restore to the natural condition wherever possible those soundscapes that have become degraded by unnatural sounds (noise). Human-caused sounds at Big Cypress National Preserve are largely created by motorized vehicles and mechanical equipment. Some examples include vehicles; motorized watercraft; heavy equipment; construction activity; oil and gas development; aircraft; and electronic devices.

The magnitude of noise is usually described by its sound pressure. Human-caused sounds in the Addition are currently limited to highway noise and aircraft overflights since ORV use is currently not permitted in the Addition and no oil and gas activity currently exists. Since the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to some common reference level, usually described in decibels (dB). See table 17 for examples of sound levels.

Ambient sound has been described as the continuous background sound environment. The range in ambient soundscapes can vary considerably among locations or by time in a single location. Ambient sound levels in the original Preserve generally range between 24 dBA and 40 dBA (dBA refers to the "A" frequency weighted decibel scale), depending on the contribution of noise by insects. Acoustic monitoring was conducted in the original Preserve in the summer of 2008 by the John A. Volpe National Transportation Systems Center (Volpe). These data are currently being evaluated.

Noise is generally defined as unwanted sound. Sound can become noise due to factors such as loudness, pitch, and duration or when it occurs at unwanted times, comes from an unwanted source or sources, interrupts or interferes with a desired activity, or is perceived to be a disturbance. With respect to Preserve visitors, what constitutes unacceptable noise will depend on visitor sensitivities and expectations.

When evaluated against the natural soundscape, all human sound is considered noise. This does not, however, mean that all human sounds are inappropriate or unacceptable. In the context of Big Cypress National Preserve, noise evaluations must consider management guidance such as enabling legislation and Preserve purpose, management zoning, resource sensitivity, impacts from the activity, and desired future conditions for resources and visitor experiences.

**TABLE 17: SOUND LEVELS FOR COMMONLY EXPERIENCED SITUATIONS**

Reference Sound	A-weighted Decibels Level
Whispering at 5 feet	20
Quiet residential area	40
Distant bird calls	45
Wind through trees	///
Normal conversation at 5 feet	60
Helicopter landing at 200 feet	80
Steam train whistle at 100 feet	90-100
Jet aircraft takeoff at 500 feet	100

Sources: League for the Hard of Hearing 2005

There are no absolute standards that define unacceptable levels, duration, or qualities of environmental noise. The Forest Service (1980b) has established subjective audibility guidelines to assess noise impacts for various recreational opportunities. These guidelines are included in table 18, and they relate recreational opportunities to the corresponding acceptable level above ambient sound levels. The U.S. Department of Energy suggests that there is a “strong likelihood of individual complaints” when the intruding noise is greater than 10 dB above ambient sound levels. But, typical forest background noise levels are around 40 dBA, and 50 dBA in campgrounds,

small towns, or quiet suburban communities (EPA 1980).

**Noise from Off Highway Vehicles**

The increased popularity and widespread use of off-road vehicles on federal lands in the 1960s and early 1970s prompted the development of a unified federal policy for such use (*GAO/RCED-95-209 Off Highway Vehicle Use on Federal Lands*). Executive Order 11644 was issued in February 1972

**TABLE 18: ACCEPTABLE LEVELS ABOVE AMBIENT SOUND LEVELS FOR VARIOUS RECREATIONAL OPPORTUNITIES**

Recreational Opportunity	Acceptable dB Level
appropriate for primitive recreational area; intruding noise not detectable	0
appropriate for trail camps; will not wake most sleepers; intruding noise normally not detectable	5
appropriate for undeveloped roadside camps and those accessible by four-wheel drive and all-terrain vehicles	10
appropriate for roadside camps accessible by highway vehicles	20
appropriate for highly developed campgrounds in a quiet, suburban neighborhood	40

Source: U.S. Forest Service 1980b

*to establish policies and provide for procedures that will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users on those lands, and to minimize conflicts among the various uses of those lands.*

Executive Order 11989 was issued in May 1977 and contained three amendments to EO 11644. Although these amendments lifted restrictions on the use of military and emergency vehicles on public lands during emergencies, they otherwise strengthened protection of the lands by authorizing agency heads to (1) close areas or trails to off-road vehicles causing considerable adverse effects and (2) designate lands as closed to off-road vehicles unless the lands are specifically designated as open to them. (*GAO/RCED-95-209 Off Highway Vehicle Use on Federal Lands*) Off-road vehicles and motorized watercraft such as motor boats all produce noise that may adversely affect the Addition soundscape and visitor experiences. Noise levels emitted from off-road vehicles and motorized watercraft vary depending on many factors such as engine size, type of motor, vehicle type, speed, gearing ratio, and many other factors.

The Noise Control Act of 1972 provides authority for the U.S. Environmental Protection Agency (EPA) to establish limits and regulations pertaining to acceptable sound levels and to develop procedures by which vehicle sound is measured. Regulations for boating and water use activities established by the National Park Service prohibit vessels from operating at more than 82 decibels measured at 82 feet from the vessel (36 CFR 3.7).

### **Influence of Off-road Vehicles on the Addition Soundscape**

ORV use in backcountry areas with relatively low, natural ambient sound levels is generally considered undesirable by those engaged in

non-ORV activities such as hiking, camping, and bird-watching. ORV use does affect the natural soundscape and the impact is best described using the “audibility” criterion. The criterion level for audibility is the sound level at which an ORV can be discerned from the background by the listener or the minimum level at which it is detectable. “Audibility distances” can be calculated for various types of vehicles in recreation areas with low ambient natural sound levels. Audibility distances for ORV noise are on the order of 0.5-2 miles, but may differ given changes in background and human noise levels, vegetation cover, and type of ORV used.

### **Influence of Other Human Noise Sources on the Addition Soundscape**

Natural sounds generally predominate throughout the Addition. There can be human-caused noise in the backcountry, such as sounds related to NPS management activities, recreation activities, and potentially oil and gas drilling operations. Most human-caused sounds are usually confined to developed areas along major roads and are mobile and temporary in nature.

Activities in adjacent lands and airspace may also affect the Addition’s natural soundscape. Commercial, private sector, military, and NPS aircraft all impact natural soundscapes. Highway traffic on roads that cross the Addition is an additional source of noise that affects the natural soundscape.

**Oil and Gas Development Noise.** Preserve soundscapes can be affected by oil and gas development, including geophysical operations, drilling, production, abandonment, and reclamation and may affect the soundscape in the Addition in the future. But, oil and gas activity does not currently exist in the Addition. Detailed information for noise impacts associated with these activities is described in the report “Oil and Gas Technology and Associated Environmental Effects” prepared

by Tetra Tech, Inc. for the National Park Service in 1987.

Noise levels associated with drilling operations in Big Cypress National Preserve were documented by Vibra-Tech South Corporation in 1986. The study was conducted for Exxon Company in December 1985 during typical rotary drilling operations and conductor casing drive hammer operations at the Collier 2B4 well. Noise levels were recorded at varying distances from the operation, ranging from 10 feet to 12,000 feet. During conductor casing drive hammer operations, decibel levels were highest within 10 feet of the drilling rig (93 dBA) and lowest (40 dBA or less) at distances of 10,000 feet or greater from the rig. During rotary drilling operations, 85 dBA was recorded 10 feet from the rig and 40 dBA or less was recorded 9,200 feet from the drilling operation. It is important to note that the noise level recording equipment used in this study had a minimum detection limit of 40 dBA. Using 40 dB as a maximum ambient level, noise from rotary drilling operations can be detected up to 8,500 feet (1.61 miles) from a rig, and noise generated from a conductor casing drive hammer operation can be detected up to 9,200 feet (1.74 miles) from a rig in the preserve. By applying the U. S. Forest Service's acceptable level of 10 dB above ambient sound, which if exceeded would likely result in public complaints, the threshold distance for rotary drilling operations is at least 2,400 feet (0.45 mile) and nearly 8,500 feet (1.61 miles) for conductor casing drive hammer operations.

**Aircraft Noise.** Natural soundscapes throughout the Addition are affected by aircraft noise from a variety of overflight sources. These include high-altitude, commercial jet traffic; military activity; general aviation; NPS administrative operations, such as resource management, prescribed fire activities, emergency response and facility maintenance; municipal and commercial air traffic from surrounding counties; and the air flight training operating out of the Dade-

Collier Training and Transition Airport known locally as the Jetport. The National Park Service resource management and prescribed fire activities are the predominate source of aircraft noise. In addition, another source of aircraft noise is from the 1,260 annual air tour flights over the Preserve.

In order to minimize aircraft noise, The Federal Aviation Administration (FAA) recommends a minimum altitude of 2000 feet. The FAA also limits and regulates noise levels generated by aircraft as authorized under 14 CFR Part 36, "Noise Standards: Aircraft Type and Airworthiness Certification." To be certified for operation within the United States, all aircraft must meet established noise limits based on aircraft type, speed capabilities, operational category (commercial, agricultural, etc.), and age of aircraft. Propeller-driven aircraft, jet aircraft, and helicopters are all included.

Helicopter use is of particular interest within the Addition because this type of aircraft is often used to access the backcountry. The acoustical impact of a helicopter is a function of the size and the type of engine used as well as the movement of the rotor blades through the atmosphere as they produce lift. Turbine-powered helicopters are generally quieter than piston powered helicopters with muffled engine exhausts. Turbine-powered helicopters produce sounds often no louder than familiar surface transportation vehicles.

**Highway Noise.** Interstate 75 provides the main interstate access route between Fort Lauderdale/Miami and Tampa Bay. This highway creates a considerable impact on the natural soundscape in the northern portion of the Addition as a result of the nearly constant traffic. To a lesser degree, Highways 29 and 41 also impact the natural soundscape within the Addition. The level of highway traffic noise depends on (1) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of the traffic. Generally, the loudness of traffic noise is increased by

heavier traffic volumes, higher speeds, and greater numbers of trucks. Vehicle noise is a combination of the noises produced by the engine, exhaust, and tires. The loudness of traffic noise can also be increased by defective mufflers or other faulty equipment on vehicles. As a person moves away from a highway, traffic noise levels are reduced by distance, terrain, vegetation, and natural and man-made obstacles (FHWA 1995). A 61-meter (about 200-foot) width of dense vegetation, for example, can reduce noise by 10 decibels, which cuts the loudness of traffic noise in half (FHWA 1995).

### **Visitor Responses to Noise**

An overwhelming majority of public comments to date have indicated that the use of

off-road vehicles in the Addition would create impacts to natural resources and to opportunities for visitors to experience solitude. Although ORV riders enjoy being able to easily access the deep backcountry of the original Preserve, the use of these vehicles impacts the natural soundscape and solitude that many non-ORV users seek. Although most hunters at Big Cypress use some form of off-road vehicle to access prime hunting areas, many hunters have expressed their displeasure with off-road vehicles in disturbing wildlife and their personal recreational experience. Other visitors have commented on the noise disturbance created by Interstate 75, which can be heard thousands of feet into the interior of the Addition.

## SOCIOECONOMIC ENVIRONMENT

### OVERVIEW

Collier County is the primary geographic unit for analysis of the socioeconomic impacts. When data permit, specific impacts on Everglades City, the Big Cypress Seminole Indian Reservation, and the Miccosukee Indian Reservation will also be discussed in this section.

Collier County is in southwest Florida's Gulf Coast, about 150 miles south of Tampa and 100 miles west of Fort Lauderdale. Its principal city is Naples. The county's land area is 2,025 square miles, and the Preserve encompasses most of the eastern half of the county. Much of the county's population lives in unincorporated areas along the Gulf Coast near Naples. Many Preserve employees live in the Naples area because the Preserve headquarters is about 35 miles southeast along U.S. 41.

The two other incorporated cities in Collier County are Marco Island and Everglades City. Marco Island is south of Naples, around 30 miles from Preserve headquarters. Everglades City is the closest incorporated area to the Preserve, less than 10 miles from headquarters. A discussion of demographic and economic data for Everglades City is included in this section because the city caters to visitors to both Everglades National Park and Big Cypress National Preserve. Public services and infrastructure in the Everglades City area include the following:

- fire protection — Ochopee Fire Control District
- police protection — Collier County Sheriff

- health care — several hospitals and clinics are in Naples and Marco Island
- educational infrastructure — Everglades City School (K–12, approximately 150 students)

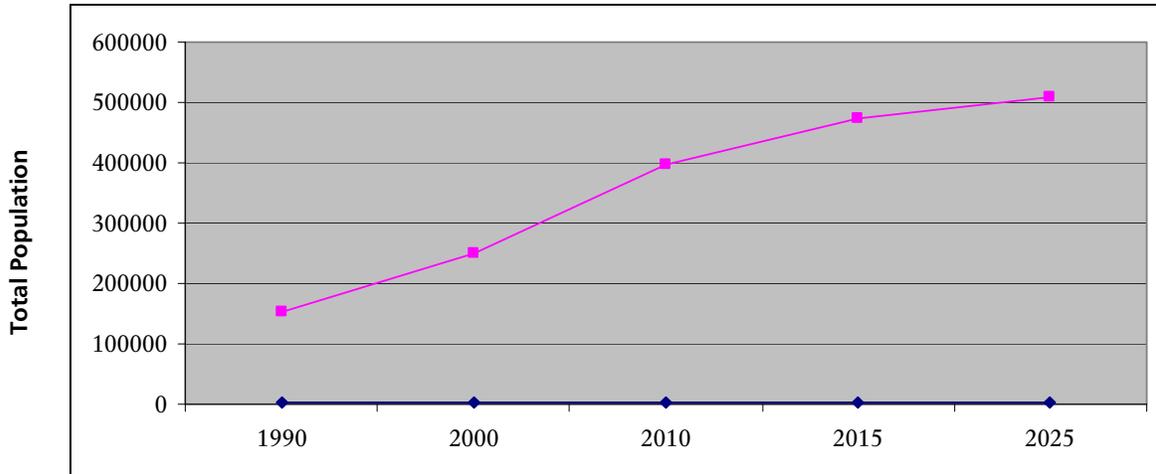
The Big Cypress Seminole Indian Reservation borders the Northeast Addition to the north, and the Miccosukee Indian Reservation borders the Northeast Addition on the east. There is very little census data on the Miccosukee Reservation.

### DEMOGRAPHICS

#### Collier County

**Population.** The U.S. Census Bureau (*Census*) reports that the population of Collier County in 1990 was 152,099, rising to 251,377 in 2000 and estimated to be 314,649 in 2006. The compound annual growth rate of Collier County's population from 1990 to 2006 was 4.6%, with a 65.3% increase in total population during this period — or about 100,000 people.

According to *Census* 2000 data and the University of Florida's Bureau of Economic and Business Research (BEBR) projections from 2000, the population of Collier County is expected to continue growing rapidly. The bureau projects that population will increase to 397,434 in 2010, 474,192 in 2015, and 507,388 in 2025 (see figure 2). Based on these estimates, the average annual growth rate from 2006 to 2025 is expected to average 2.5%.



Source: 2000 U.S. Census Bureau and Bureau of Economic and Business Research

**FIGURE 2: TOTAL POPULATION: COLLIER COUNTY**

**Age Distribution of Population.** Table 19 displays the breakdown of Collier County’s population by age group based on 2000 and 2006 *Census* data. The data reveal that from 2000 to 2006 the four fastest growing age groups were the 85-year and older, 75-84 year, 9-year and under, and 20-34 year categories. These population age groups grew at average annual rates of 10.9%, 6.0%, 5.6%, and 5.5%, respectively during this period. The slowest growing age groups between 2000 and 2006 were the 65-74 year, 55-64 year, and 35-44 year categories, which grew at rates of .8%, 2.1%, and 3.0%, respectively.

The table reveals that the Collier County population is fairly evenly distributed with most age categories representing around 9% to 12% of the total population.

**Everglades City**

**Population:** According to the *Census*, the population of Everglades City was 321 in 1990 and 479 in 2000, for an average annual growth rate of 4.1%. Recent Everglades City population projections were provided by

**TABLE 19: AGE DISTRIBUTION IN COLLIER COUNTY**

Age Category	2000	2006	Compound Annual Growth Rate (CAGR)	% of 2006 Population
9 years and under	27,885	37,507	5.6%	11.9%
10-19 years	27,059	32,474	3.1%	10.3%
20-34 years	39,970	55,051	5.5%	17.5%
35-44 years	33,458	39,845	3.0%	12.7%
45-54 years	29,515	36,920	3.8%	11.7%
55-64 years	31,977	36,199	2.1%	11.5%
65-74 years	35,088	36,736	.8%	11.7%
75-84 years	21,060	29,917	6.0%	9.5%
85 years and over	5,365	10,000	10.9%	3.2%

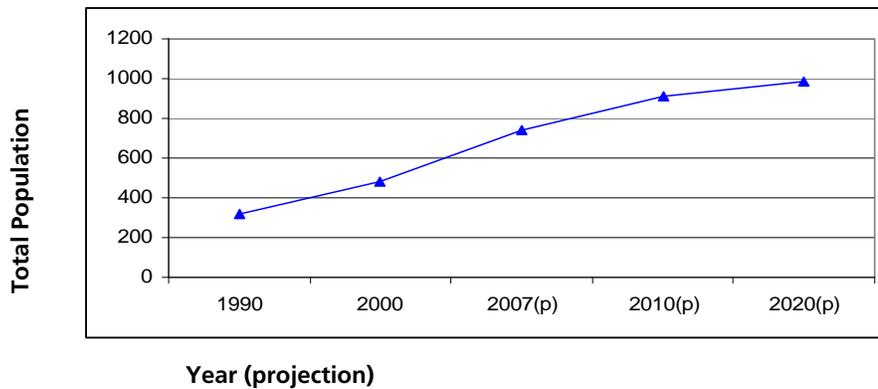
Source: U.S. Census Bureau

Collier County’s Comprehensive Planning Department. According to department forecasts, the population was estimated to be 741 in 2007 and reach 982 in the year 2020. This translates into an average annual growth rate of 2.2% over the period 2007 to 2020. This rate is in line with the 2006 to 2025 estimated population growth rate for Collier County of 2.5% (see figure 3).

**Age Distribution of Population.** As indicated in table 20, more than 60% of the population in Everglades City is over the age of 44. Only 12.9% of the population is under the age of 20, while persons 20-44 represent about 22.1% of the total population.

**Big Cypress Seminole Reservation**

**Population:** The *Census* reported that in 2000, the total population of the Big Cypress Seminole Indian Reservation was 142. This estimate is used as a basis for population growth rate calculations by the Bureau of Economic and Business Research. This bureau and Collier County Comprehensive Planning Department estimated a reservation population of 201 in 2004 and expect slow growth in the future. The most recently reported population projections for Big Cypress Indian Reservation, as calculated by this bureau, indicate that in 2010 there will be an estimated total population of 209, increasing to 222 in 2020. The estimated average annual growth



Source: U.S. Census Bureau and Collier County Comprehensive Planning Department

**FIGURE 3: TOTAL POPULATION: EVERGLADES CITY**

**TABLE 20: AGE DISTRIBUTION OF EVERGLADES CITY POPULATION**

Age Category	2000	% of 2000 Population
9 years and under	26	5.4%
10-19 years	36	7.5%
20-34 years	55	11.5%
35-44 years	51	10.6%
45-54 years	66	13.8%
55-64 years	80	16.7%
65-74 years	110	23.0%
75-84 years	34	7.1%
85 years and over	21	4.4%

Source: U.S. Census Bureau, 2000

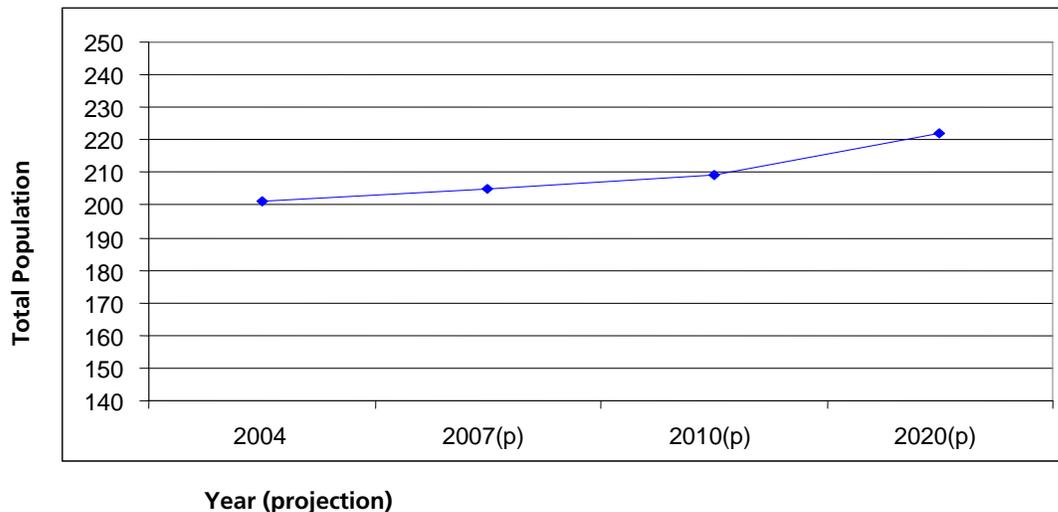
rate of the reservation during the period 2007 to 2020 is estimated to be 0.61% (see figure 4).

**Age Distribution of Population.** Based on *Census 2000* data, 75.3% of the population of the Big Cypress Seminole Reservation is under the age of 44 (see table 21). Within this age range, the largest population is in the 9 years and under category, followed by the 20 to 34 age category. These two age categories represent 46.4% of the total population.

**ECONOMY AND EMPLOYMENT**

**Collier County**

**Employment.** According to *Census* estimates, in 2006, Collier County’s labor force consisted of 144,905 workers. Of these workers, 140,184 were employed and 4,721 were unemployed, for an unemployment rate of 3.9%. Figure 5 compares the unemployment rates of Collier County and the state of Florida from 1990 to 2006. The figure reveals that unemployment rates steadily declined in Collier County during the period 1992 to 2000 — from a high



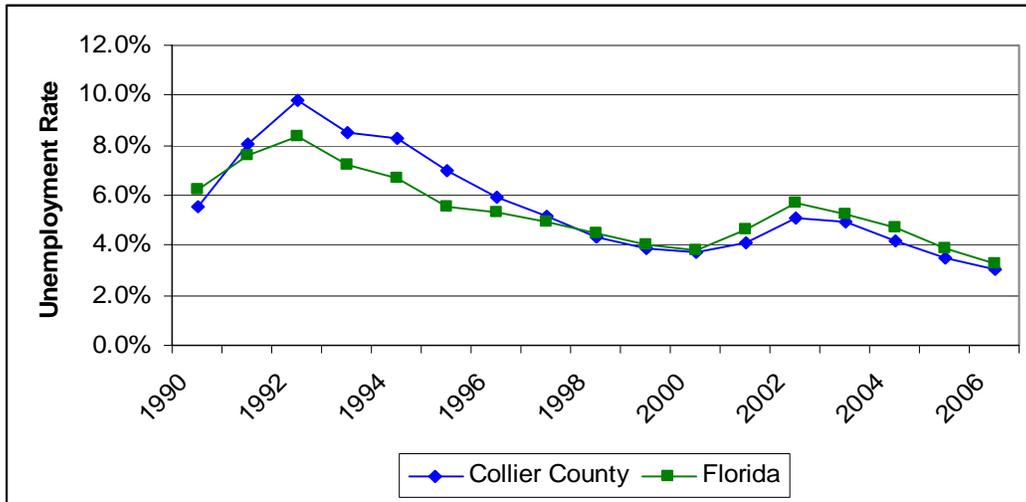
Source: U.S. Census Bureau 2000 and Collier County Comprehensive Planning Department

**FIGURE 4: TOTAL POPULATION: BIG CYPRESS SEMINOLE INDIAN RESERVATION**

**TABLE 21: AGE DISTRIBUTION OF BIG CYPRESS INDIAN RESERVATION**

Age Category	2000	% of 2000 Population
9 years and under	35	24.6%
10-19 years	22	15.5%
20-34 years	31	21.8%
35-44 years	19	13.4%
45-54 years	12	8.5%
55-64 years	9	6.3%
65-74 years	4	2.8%
75-84 years	8	5.6%
85 years and over	2	1.4%

Source: U.S. Census Bureau, 2000



Source: U.S. Bureau of Labor Statistics

**FIGURE 5: UNEMPLOYMENT RATE: STATE OF FLORIDA AND COLLIER COUNTY**

of nearly 10% to about 4% in 2000. Unemployment increased in 2001 and 2002 during a period of national recession, but fell consistently every year after 2002 and reached a 16-year low of 3.0% in 2006.

Table 22 reveals that the construction industry employed the largest share of Collier County workers in 2006, accounting for 19.5% of the workforce. The educational/ healthcare/social assistance, retail trade, and the arts/entertainment/recreation/ accommodation/ food service industries also employed a relatively large share of workers in 2006, at 13.9%, 13.6, and 11.8% of the Collier County workforce respectively. Together, these four industries employed about 58.7% of the Collier County workforce, or 82,329 workers. From 1990 to 2006 the arts/entertainment/ recreation/accommodation/ food service industry had the most rapid employment growth, increasing at an average annual rate of 13.5%. Employment in the construction and educational/healthcare/ social assistance industries grew relatively rapidly during this

period, increasing at an average rate of 7.6% and 6% per year, respectively. Overall employment grew by an average annual rate of 4.6% in Collier County during the period 1990 to 2006, with the total number of employed workers increasing from around 68,449 in 1990 to 140,184 in 2006.

With respect to work location and travel to work, the 2000 *Census* data reveals that the total number of workers who commuted to work was 126,328. Of this amount, 98,913 people drove alone in a car, truck, or van and 13,505 people carpooled. About 1,245 workers used public transportation, 3,330 people walked to work, 4,103 people used other means of transportation, and 5,232 people worked from their homes. The mean travel time to work was 24.0 minutes, indicating that most employees lived far enough away from their work location to have to use some form of motorized transportation.

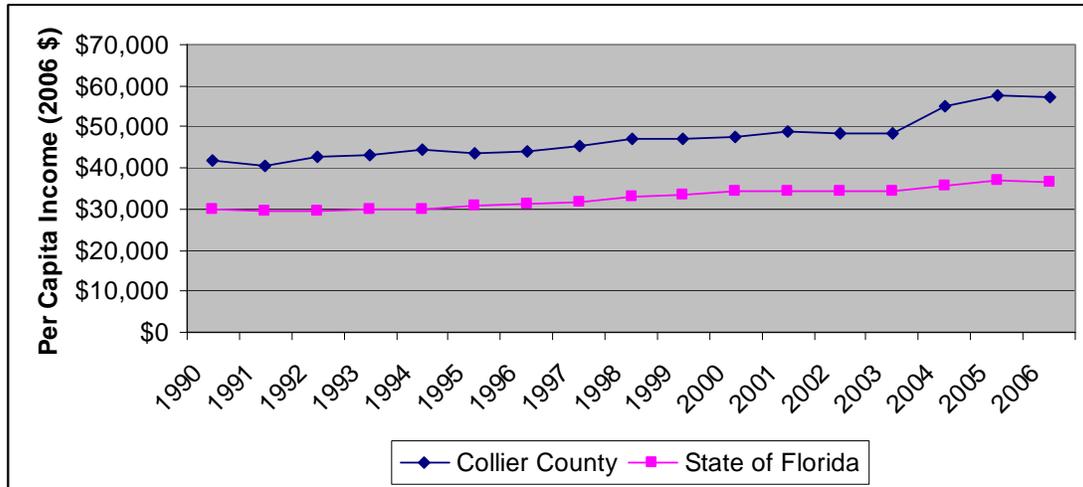
**TABLE 22: EMPLOYMENT BY INDUSTRY: COLLIER COUNTY**

	Employees (1990)	Employees (2006)	% of 2006 Employees	Compound Annual Growth Rate (1990–2006)
Wholesale trade	1,960	3,991	2.8%	4.5%
Information	n/a	1,768	1.3%	n/a
Agriculture, forestry, fishing, hunting, and mining	5,431	2,861	2.0%	-3.9%
Manufacturing	3,342	3,709	2.6%	0.7%
Public administration	2,545	5,615	4.0%	5.1%
Transportation, warehousing, and utilities	3,600	3,952	2.8%	.6%
Other services (except public administration)	4,811	7,958	5.7%	3.2%
Finance, insurance, real estate and rental and leasing	7,219	12,716	9.1%	3.6%
Professional, scientific, management, administrative, and waste management services	7,584	15,285	10.9%	4.5%
Retail trade	13,630	18,997	13.6%	2.1%
Arts, entertainment, recreation, accommodation, and food services	2,201	16,603	11.8%	13.5%
Educational services, health care, and social assistance	7,609	19,428	13.9%	6.0%
Construction	8,517	27,301	19.5%	7.6%
<b>Total</b>	<b>68,449</b>	<b>140,184</b>	<b>100.0%</b>	<b>4.6%</b>

Source: U.S. Census Bureau, *Census* 1990, and 2006

**Personal Income.** According to the U.S. Bureau of Economic Analysis, in 2006 Collier County had a per capita personal income of \$57,446, significantly higher than the statewide average of \$36,720. Figure 6 displays trends in per capita personal income in Collier County compared to the state during the period 1990 to 2006 in constant 2006 dollars (net of inflation). The figure reveals that per capita personal income at the county and state

level have trended together during this 15-year period, yet Collier County per capita personal income has remained consistently higher, at around \$13,500 above state per capita personal income levels. In real terms, per capita personal income has increased in Collier County at an average annual rate of 2.0% over the period, compared to 1.3% for the state of Florida.



SOURCE: U.S. Bureau of Economic Analysis (BEA)

**FIGURE 6: PER CAPITA PERSONAL INCOME (CONSTANT \$2006): FLORIDA AND COLLIER COUNTY**

**Composition of Collier County Economy.** Table 23 displays the approximate economic output for each industry category in Collier County in 2004. The table reveals that the largest economic sectors are the financial/insurance, construction, accommodation/recreation, and professional service industries, which together produce 54.6% of all goods and services in Collier County. The service sector comprises about 52.4% of the Collier County economy, while goods-producing industries and wholesale/retail trade represent about 24.8% and 11.4% of total economic

output respectively. The state, local, and federal government together represent about 4.7% of the total economic output in the county. The table shows that in 2004 the total economic output for Collier County was \$17.1 billion, of which approximately \$8.9 billion represented the value of services performed, \$4.2 billion reflected goods produced, \$1.9 billion reflected wholesale and retail sales, and \$802 million represented goods and services provided by federal, state, and local governments.

**TABLE 23: ESTIMATED ECONOMIC OUTPUT BY SECTOR IN COLLIER COUNTY, 2004**

Sector	2004 Output	% of Total
Information	\$435,108,000	2.5%
Transportation and warehousing, and utilities	\$485,707,000	2.8%
Agriculture, forestry, fishing and hunting, and mining	\$525,501,000	3.1%
Wholesale trade	\$539,910,000	3.2%
Manufacturing	\$553,130,000	3.2%
Other services, except public administration	\$591,153,000	3.5%
Public administration	\$802,074,000	4.7%
Owner-occupied dwellings	\$1,149,480,000	6.7%
Educational services, health care, and social assistance	\$1,273,309,000	7.5%
Retail trade	\$1,395,235,000	8.2%
Professional, scientific, and management, and administrative and waste management services	\$1,709,351,000	10.0%
Arts, entertainment, recreation, accommodation, and food services	\$1,714,814,000	10.0%
Construction	\$2,686,321,000	15.7%
Finance and insurance, real estate, and rental and leasing	\$3,221,944,000	18.9%
<b>TOTAL OUTPUT</b>	<b>\$17,083,037,000</b>	<b>100.0%</b>

Source: Minnesota IMPLAN Group (MIG), 2004 Collier County Data Set

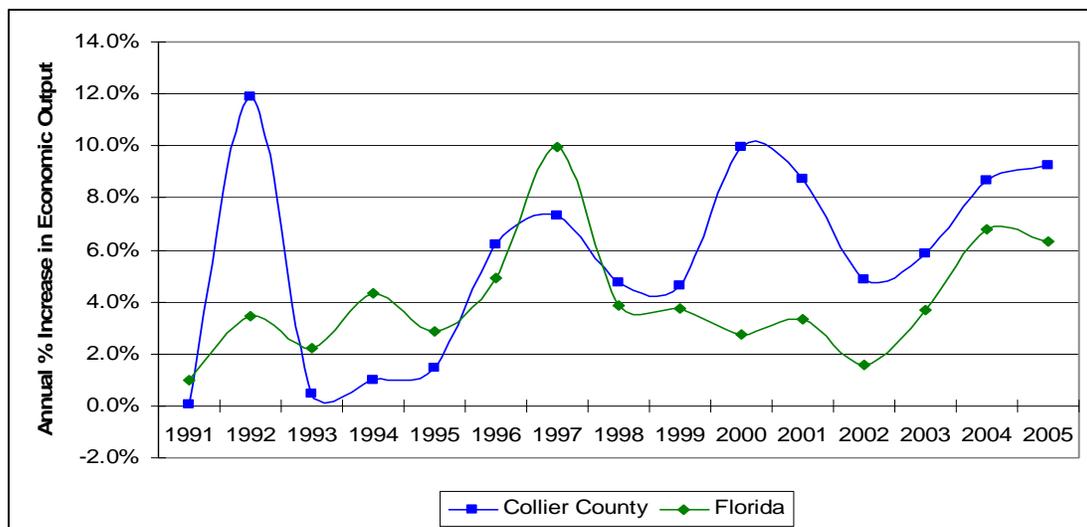
Economic output in Collier County increased by an average annual rate of 5.6% over the period 1990 to 2005, compared to 4.0% for Florida as a whole. More recently, during the period 2000 to 2005, economic growth in Collier County increased at an average annual rate of approximately 7.5%. Whereas economic growth has remained relatively constant over time for Florida, around 4%, an increase in the economic growth rate from 5.6% to 7.5% suggests an acceleration and expansion of economic growth in Collier County (as specified from a study conducted by the National Ocean Economics Program).

During the period 2000 to 2005, the county typically produced between 1.5% and 1.8% of the total Florida gross state product (GSP), which represents the total value of all goods and services produced in Florida in a given year. During this same period, Collier County typically ranked 15<sup>th</sup> out of 67 counties in Florida in terms of the amount of production of goods and services. Figure 7 displays the annual change in economic output for Florida and Collier County during the period 1990 to 2005. The figure reveals that, as expected, changes in economic output in Collier County have generally tracked with economic growth trends observed at the state level. However,

percentage changes in annual economic output have been consistently greater in Collier County relative to Florida beginning in 1998 and continuing to 2005. Following the economic downturn in 2001–2002, economic output rebounded and expanded in Collier County during the period 2003 to 2005. In 2005, growth slowed in Collier County and actually declined slightly in Florida. Despite the recent slowdown in growth in 2005, the long-term trend in economic growth for Collier County suggests that growth and economic expansion will continue into the future.

### Everglades City

**Employment.** Of the 479 residents in Everglades City in the year 2000, 424 were over the age of 16 and only 200 were part of the civilian labor force, based on data provided by the *Census*. In 2000, 197 workers were employed in Everglades City. The city had a very low unemployment rate in 2000 of 1.5%. As demographic data from the *Census* suggests, a large portion of the city's population are older residents who are likely retired, which



Source: National Ocean Economics Program

**FIGURE 7: ANNUAL CHANGE IN ECONOMIC OUTPUT: FLORIDA AND COLLIER COUNTY (\$2005)**

explains why the labor force is relatively small compared to the population. From 1990 to 2000 employment increased by 11.9%, or by an average annual rate of 1.1%. However, the number of persons not part of the labor force nearly tripled during this period, increasing at an average rate of 11.3% per year. This indicates that Everglades City is likely becoming a community increasingly composed of retirees.

In terms of mode of travel to and from work, 118 employees traveled alone in a car, truck, or van, and 33 carpooled. Around 33 workers either walked or used other means of transportation, and the remaining 11 individuals worked from their homes.

Table 24 indicates that a significant portion of the Everglades City workforce is employed in the arts/entertainment/recreation/ accommodation and food services industries, together representing 29.4% of the workforce in 2000. Agricultural/mining and transportation/ utilities industries also employ a relatively large number of workers in Everglades City,

representing a combined total of about 30% of the workforce.

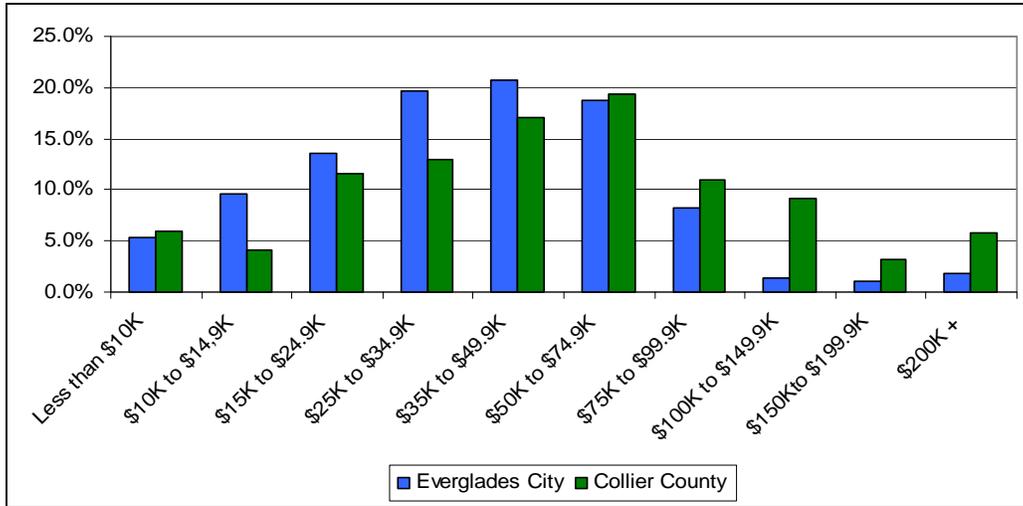
**Personal and Household Income in Everglades City.** According to the 1990 and 2000 *Censuses*, per capita income in Everglades City was \$16,394 in 1990 and \$20,535 in 2000, for an average annual increase of 2.2%. Figure 8 displays the percentage of total households in Everglades City by income bracket in comparison to Collier County, based on *Census 2000* data.

In comparing Everglades City to Collier County, *Census* data shows that Everglades City's average household income is skewed slightly more towards the lower household income brackets. The median household income for Everglades City was \$36,667, which was significantly lower than the Collier County median income of \$48,289. As for the per capita income comparisons in 2000, the data reflects the same conclusion. Per capita income in Everglades City was \$20,535 — considerably lower than per capita income in

**TABLE 24: EMPLOYMENT BY INDUSTRY IN EVERGLADES CITY**

	Employees (1990)	Employees (2000)	% of 2000 Employees	CAGR (1990-2005)
Manufacturing	5	0	0.0%	-100.0%
Information	n/a	0	0.0%	n/a
Professional, scientific, management, administrative, and waste management services	10	3	1.5%	-11.3%
Construction	9	5	2.5%	-5.7%
Wholesale trade	6	6	3.0%	0.0%
Other services, except public administration	34	7	3.6%	-14.6%
Finance, insurance, real estate, and rental and leasing	5	8	4.1%	4.8%
Educational, health and social services	18	14	7.1%	-2.5%
Retail trade	27	19	9.6%	-3.5%
Public administration	16	19	9.6%	1.7%
Agriculture, forestry, fishing and hunting, and mining	10	29	14.7%	11.2%
Transportation and warehousing, and utilities	28	29	14.7%	0.4%
Arts, entertainment, recreation, accommodation, and food services	8	58	29.4%	21.9%
<b>Total</b>	<b>176</b>	<b>197</b>	<b>100%</b>	<b>1.1%</b>

Source: U.S. Census Bureau, 1990 and 2000



Source: U.S. Census Bureau, 2000

**FIGURE 8: HOUSEHOLDS BY INCOME BRACKETS: COLLIER COUNTY AND EVERGLADES CITY, 2000**

Collier County, at an estimated \$31,195. *Census* data for Everglades City beyond the year 2000 are currently unavailable.

**Composition of Everglades City Economy.** Output by industry sector for Everglades City was estimated based on the ratio of the number of employees in Everglades City to that of Collier County. Table 25 displays estimates of economic output by sector.

Economic output in Everglades City in 2004 was estimated at \$19.6 million. The table reveals that the largest economic sector in Everglades City is the arts, entertainment, recreation, accommodation, and food services sector, which together produced an estimated \$5.8 million in 2004.

The total economic output of Everglades City in 2004 represented approximately 0.11% of total 2004 county economic output.

**TABLE 25: ESTIMATED ECONOMIC OUTPUT BY SECTOR IN EVERGLADES CITY**

Sector	2004 Output	% of Total Output
Manufacturing	\$0	0.0%
Information	\$0	0.0%
Professional, scientific, management, administrative, and waste management services	\$298,600	1.5%
Construction	\$497,600	2.5%
Wholesale trade	\$597,200	3.0%
Other services (except public administration)	\$696,700	3.6%
Finance, insurance, real estate, and rental and leasing	\$796,200	4.1%
Educational, health and social services	\$1,393,400	7.1%
Retail trade	\$1,891,000	9.6%
Public administration	\$1,891,000	9.6%
Agriculture, forestry, fishing and hunting, and mining	\$2,886,300	14.7%
Transportation and warehousing, and utilities	\$2,886,300	14.7%
Arts, entertainment, recreation, accommodation, & food services	\$5,772,700	29.4%
<b>TOTAL OUTPUT</b>	<b>\$19,607,000</b>	<b>100.0%</b>

Source: Minnesota IMPLAN Group (MIG), 2004 Collier County Data Set; 2000 *Census*

## VISITOR USE AND ECONOMIC IMPACT

### Visitation Data

Table 26 presents NPS data on recreational visits to the Preserve during the 1997 to 2007 period.

**TABLE 26: RECREATION VISITS, 1997–2007**

Year	Recreation Visits
1997	462,553
1998	474,895
1999	503,110
2000	505,062
2001	409,771
2002	449,481
2003	400,902
2004	385,194
2005	768,687
2006	825,857
2007	822,864
2008	813,790

SOURCE: NPS Public Use Statistics Office

The table shows that the number of recreation visits to the Preserve was generally in the 400,000 to 500,000 range during 1997 to 2004. In 2005 the Preserve changed its counting methods, adding visitor counts from the Oasis Visitor Center parking lot and vehicle counts from the east and west ends of the Loop Road. This change contributed to the higher visitation figures in 2005-2008.

### Visitor Activities

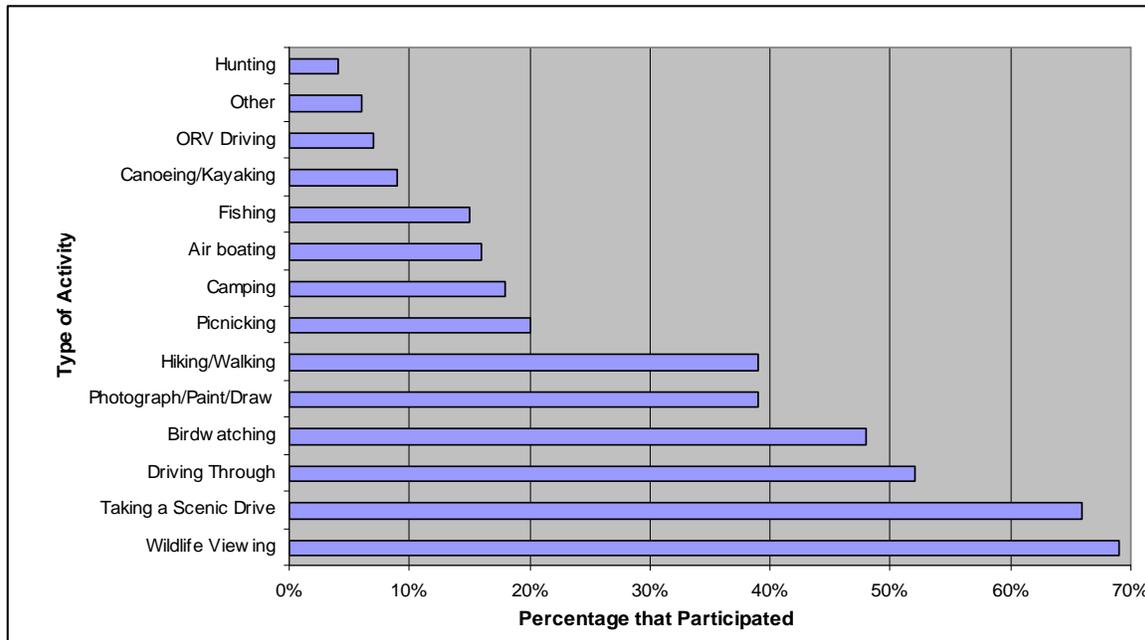
The Visitor Services Project and Cooperative Park Studies Unit of the University of Idaho conducted a general visitor survey for Big Cypress National Preserve in 2007. The park studies unit gathered a large sample of randomly selected visitor groups (N= 634) and requested that the visitors complete questionnaires in order to analyze Preserve visitation and use patterns. The survey indicated that the most common visitor group activities were viewing wildlife (69%), taking a scenic drive

(66%) driving through the Preserve to reach another destination (52%), and bird-watching (48%). Hiking and photography/painting/drawing were also popular activities, at 39%. A smaller portion of visitors participated in more traditional forms of outdoor recreation, including picnicking (20%), camping (18%), airboating (18%), and fishing (15%). Only 9% of the visitors surveyed planned to canoe or kayak, and only 4% planned to hunt. About 7% of visitors interviewed had plans to drive off road vehicles within the Preserve. Around 6% of visitors participated in “other” types of activities, which may include biking and horseback riding. The percentages reported exceed 100% because visitors can participate in more than one of these activities. Figure 9 depicts the activities participated in by Preserve visitors.

**Response Concerning the Addition.** Visitors surveyed were also asked their opinions and preferences concerning the Big Cypress Addition. Of the visitor groups interviewed, 52% noted that they would be likely to visit the Addition on the next trip, with 36% not sure about visiting, and 13% not likely to visit. Also, 30% reported that they would be more likely to visit the Addition if there was an outfitter or guide available, with 37% not being sure and 34% not likely.

In terms of activities that visitors would like available in the Addition, hiking, camping, wildlife viewing, fishing, canoeing, bird-watching, biking, and hiking were the most frequently mentioned.

**ORV and Camp User Survey.** In addition to the visitor study, the University of Idaho conducted a survey for Preserve ORV and camp users in 2007. In total, 520 questionnaires were successfully sent to a random sample of registered ORV holders or camp owners, generating 240 respondents (a 46.2% response rate). Of the total respondents, 57% had visited the Preserve five or more times in the past 12 months, which corresponds to the fact that 95% of respondents live in Florida



Source: Park Studies Unit, University of Idaho, Spring 2007 Report

**FIGURE 9: GENERAL VISITOR ACTIVITIES AND USE, 2007**

(and thus have relatively easy access to the Preserve). In terms of average group size, 30% were in groups of five or more, 40% were in groups of three or four, and 30% were in groups of one or two.

In terms of length of stay, 38% spent less than one day at the Preserve during their last visit, with 62% staying more than one day.

Of the 38% that stayed less than one day, 54% stayed seven or more hours, 23% stayed five or six hours, 12% stayed three or four hours, and 11% stayed one or two hours. Of the 62% that stayed more than one day, 32% stayed three days, 31% stayed two days, 22% stayed four or five days, and 16% stayed six days or more. As a whole, 56% of respondents stayed overnight away from home in the area, with 44% returning home.

As shown in figure 10, activities most frequently participated in during respondents last visit to the Preserve were ORV driving (72%), camping (49%), hunting (45%),

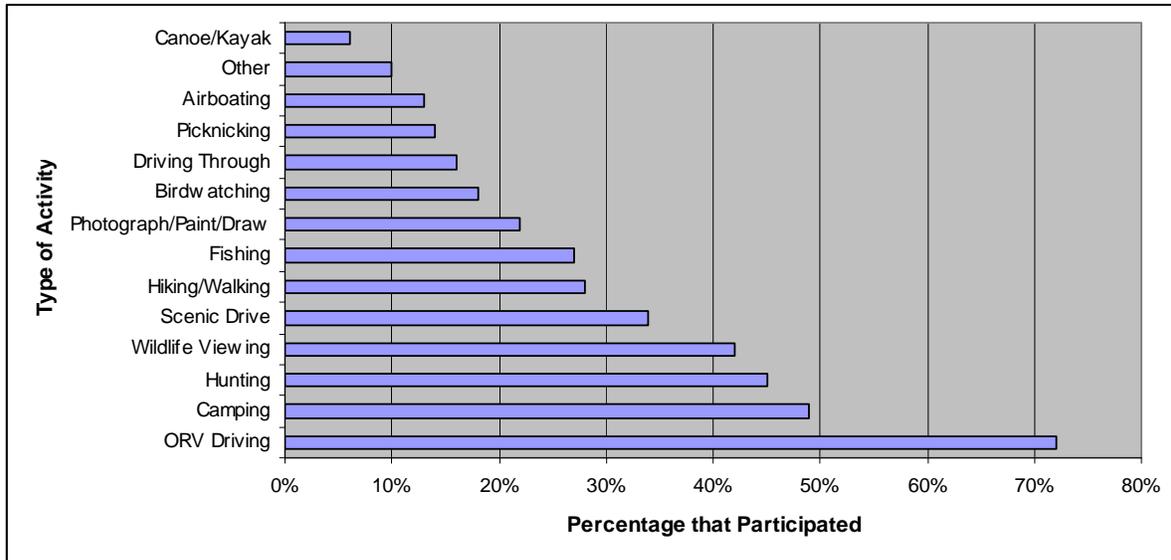
wildlife viewing (42%), and taking a scenic drive.

For most respondents (92%), the Preserve was the primary destination on their most recent trip.

#### Visitor Group Size and Length of Stay

According to the results of the 2007 visitor study, approximately 76% of all Preserve visitors spent less than a day at the Preserve, and 71% of those spent less than four hours at the Preserve. For the 24% that stayed more than one day in the Preserve, 30% spent seven or more days. The average length of stay for all visitors (for those staying less than one day and those staying more than one day) was 1.6 days. The average length of stay for those staying more than one day at the Preserve was 4.3 days.

The study further shows that 48% of respondents were in groups of two or more,



SOURCE: Park Studies Unit, University of Idaho, Spring 2007 Report

**FIGURE 10: 2007 ORV PERMIT HOLDER AND CAMP OWNER ACTIVITY AND USE**

44% were in groups of four or more, and just 8% were visiting the Preserve alone. The average group size for respondents was 2.8 people.

visiting the area to see other attractions, 19% to visit friends and/or relatives, 2% for business; and 21% for other reasons.

**Visitor Spending and Trip Purpose**

Based on the 2007 visitor survey, average visitor group expenditures were \$1,073, with a median expenditure of \$370. The average total expenditure per person was \$484.

As shown in table 27, visitors — as a total of overall spending — spent the most on noncamping overnight accommodations outside the Preserve (36%), restaurants and bars (18%), and groceries and take-out food (11%). Visitors as a whole spent the least amount of money on donations to the Preserve (1%), commercial airboat tours, and on commercial guided tours to the backcountry (2%).

Of total nonlocal visitors, only 22% of respondents noted that they were in the area for the primary purpose of visiting the Preserve. Approximately 36% said they were

**TABLE 27: EXPENDITURE CATEGORIES**

Types of Expenditures	% of Total Spending
Hotels, motels, cabins, and bed-and-breakfasts	36%
Restaurants and bars	18%
Groceries and take-out food	11%
Gas and oil	9%
All other purchases	8%
Other transportation costs	6%
Camping fees	5%
Admission, recreation, and entertainment	3%
Commercial guided tours to the backcountry	2%
Commercial airboat tours	1%
Donations to the preserve	1%
<b>TOTAL</b>	<b>100%</b>

Source: Park Studies Unit, University of Idaho, Spring 2007 Report

## NPS OPERATIONS AND MANAGEMENT

### ADMINISTRATIVE ORGANIZATION

The original Preserve is divided into six management planning units — the Bear Island, Corn Dance, Deep Lake, Loop, Stairsteps, and Turner River units. These units encompass about 582,000 acres. The Addition was established in 1988 and consists of two areas — the northeastern section that straddles Interstate 75, and the western section that parallels the north/south portion of SR 29. The two areas of the Addition encompass about 147,000 acres. Currently, NPS operations in the Addition are focused on gathering baseline information and fire/natural resource management activities, such as exotic plant management. Operations will not be fully extended to manage the Addition to the same level as the original Preserve until this *General Management Plan* is finalized and a “Record of Decision” is published in the *Federal Register*.

The Preserve, including the Addition, is administered by a superintendent and a deputy superintendent. NPS headquarters is in the southwestern portion of the Preserve at Ochopee, Florida.

### NPS OPERATIONS AND MANAGEMENT

NPS staffing in 2007 was 77 employees. Currently, very minimal dedication of staff time is given to manage the Addition because visitation is minimal and a final management plan has yet to be concluded. Because the Addition makes up about 20% of the entire Preserve, active management for these lands will require additional staff and equipment.

Management of Big Cypress National Preserve, including the Addition, is organized into the following divisions: Visitor and Resource Protection, Interpretation, Resource

Management, Administration, Fire and Aviation, and Maintenance.

#### Visitor and Resource Protection Division

The Visitor and Resource Protection Division is primarily responsible for law enforcement activities and enforces laws and regulations intended to safeguard visitors and resources. In addition to law enforcement, this division is responsible for search-and-rescue operations and emergency medical services Preserve-wide. Rangers make routine visitor contacts to ensure that Preserve regulations and concurrent state hunting and fishing regulations are understood and being met, to check for safety and resource violations, and to respond to or direct visitor inquiries to appropriate NPS staff. The recreational fee program, ORV special use permit program, and various components of the overall special use permit program are also managed by the division.

#### Interpretation Division

The Interpretation Division is responsible for educating and offering visitors opportunities to understand the significance of the Preserve and to ensure the protection and enjoyment of associated resources. This includes educating visitors, stakeholders, and the general public about these resources, including the natural systems in the south Florida ecosystem; cultural resources; wilderness and scenic values; scientific opportunities; and the role of the Preserve in local, regional, and national contexts. NPS staff fulfill these responsibilities through formal education and orientation programs, interpretive programs, curriculum-based educational programs, and interpretive media. Personal services include staffing of the visitor centers, ranger-led walks and canoe trips, talks and evening programs, demonstrations and special events, and informal contacts

with visitors. This division is also responsible for supervision of publications and materials available at bookstores and sales outlets, exhibits and audiovisual media, the website, and electronic media.

### **Resource Management Division**

The Resource Management Division manages the Preserve's natural and cultural resources. This program includes the management of all natural resources in the Preserve to ensure the preservation of fundamental physical and biological processes, as well as individual species, features, and plant communities. This division lacks a cultural resource manager and uses the Southeastern Archeological and Conservation Center for technical assistance and guidance on the management of cultural resources. This division administers the Preserve's geographic information system (GIS) database and all cooperative research and research permits in the Preserve.

### **Administration Division**

The Administration Division is responsible for the Preserve's budget and financial accounting, property management, personnel management, procurement, contracting, mail services, administrative filing, and management of the Preserve-wide computer systems.

### **Fire and Aviation Division**

The Fire and Aviation Division is responsible both for fire-fighting activities and for restoring the natural fire regime to areas where fires naturally occur. The effects of fire on natural ecological systems will also be actively monitored by division staff where fires occur.

### **Maintenance Division**

The Maintenance Division is responsible for the operation and maintenance of all NPS facilities and equipment, including buildings and maintained grounds; utility systems such as water, sewer, and solid waste management; employee housing; roads; parking areas and trailheads; trails; and picnic areas. This division is also responsible for fleet management.

## **NPS FACILITIES**

NPS facilities are primarily designed to provide safe, enjoyable, and educational access and support to visitors who come to experience Big Cypress National Preserve. Facilities are typically located in areas that can sustain visitation while protecting resources, natural systems, and the generally wild character that was intended upon designation of these federally managed lands.

### **Public Facilities**

**Trails and Trailheads.** Within the Addition there are currently no designated trails or developed trailheads. A temporary route of the Florida National Scenic Trail has been designated through the Addition.

Within the original Preserve, there are officially designated and maintained trails for hiking, bicycling and ORV use. NPS staff patrols, maintains, and repairs all trails. Trail use is divided primarily between ORV riders and hikers, with limited use by bicyclists. The *Recreational ORV Management Plan* (completed in 2000) reflects existing use and associated impacts in the original Preserve.

**Roads.** Within the Addition, the only NPS-managed road used by standard highway vehicles is that portion of the Loop Road that is in Monroe County. Interstate 75 crosses the

northern portion of the Preserve for about 30 miles, 19 miles of which are in the Addition.

U.S. 41, also known as the Tamiami Trail, is a paved highway that crosses the southern portion of the Preserve for about 36 miles, 1 mile of which in the Addition.

State Road 29 is a paved highway that runs north/south between Immokalee and Everglades City and is immediately adjacent to the western border of the Addition for about 29 miles.

### **Visitor Information**

Within the Addition visitor information is limited to way-finding signs. No waysides or visitor information is available.

Within the original Preserve, visitor information is provided at the Oasis Visitor Center, the Big Cypress Swamp Welcome Center, and at a series of waysides along U.S. 41.

**Camping.** Backcountry camping is the only type of camping allowed in the Addition and is subject to NPS backcountry camping regulations and guidelines. No developed campgrounds currently exist in the Addition.

Within the original Preserve camping opportunities range from developed campgrounds to backcountry camping.

### **Administrative Facilities**

**Offices, Storage, and Buildings.** The NPS Fire Operations Center is in the Addition on SR 29 at Copeland. This facility provides office space for fire management staff and equipment storage. A fire station is also located at Deep Lake.

All other NPS operations are based out of facilities in the original Preserve. There is limited space in these facilities to accommodate additional staff. It is at least an hour's drive from these facilities to access the northeast portion of the Addition from Interstate 75.

**Preserve Housing.** Within the Addition there is no housing for NPS staff. There is staff housing in the original Preserve, primarily NPS headquarters and the Oasis Visitor Center. Housing is provided to law enforcement, fire management, and seasonal staff.



# CHAPTER 4

## ENVIRONMENTAL CONSEQUENCES



## INTRODUCTION

The National Environmental Policy Act requires that environmental documents discuss the environmental impacts of a proposed federal action, feasible alternatives to that action, and any adverse environmental effects that cannot be avoided. In this case, the proposed federal action would be the adoption of a *General Management Plan/ORV Management Plan/Wilderness Study* for the Big Cypress National Preserve Addition (the Addition). This chapter analyzes the environmental impacts of implementing the four alternatives on natural resources, cultural resources, visitor experience, the socioeconomic environment, and NPS operations and management. The analysis is the basis for comparing the beneficial and adverse effects of implementing the alternatives.

Because of the general, conceptual nature of the actions described in the alternatives, the impacts of these actions are analyzed in general, qualitative terms. Thus, this environmental impact statement should be considered a programmatic analysis. For the purposes of analysis, it is assumed that all of the specific actions proposed in the alternatives would occur during the life of the plan.

This environmental impact statement generally analyzes several actions, such as the development of recreational facilities (including ORV trails and trailheads), the construction of facilities for visitor orientation and NPS operations, and the designation of lands as wilderness. If and when proposed site-specific developments or other actions are ready for implementation following the approval of the general management plan, appropriate detailed environmental and cultural compliance documentation would be prepared. This compliance would be in accordance with the National Environmental Policy Act of 1969 and the National Historic

Preservation Act of 1966, both as amended, and would meet requirements to identify and analyze each possible impact for the resources affected.

This chapter begins with a description of the methods and assumptions used for each impact topic. Impact analysis discussions are organized by alternative and then by impact topic under each alternative. The existing conditions for all of the impact topics that are analyzed were identified in the “Affected Environment” chapter. All of the impact topics retained for detailed analysis are assessed for each alternative.

The analysis of the no-action alternative (continue current management) identifies the future conditions in the Addition if no major changes to facilities or NPS management occurred. The three action alternatives are then compared to the no-action alternative to identify the incremental changes that would occur as a result of changes in Addition facilities, uses, and management. Impacts of recent decisions and approved plans, such as the *Commercial Services Plan* (NPS 2009), are not evaluated as part of this environmental analysis, except as part of cumulative impact analysis. Although these actions would occur during the life of the general management plan, they have been (or would be) evaluated in other environmental documents.

Cumulative impacts are discussed under each alternative and are identified when this project is considered in conjunction with other actions occurring in the region. The discussion of cumulative impacts is followed by a conclusion statement. The key impacts of each alternative are briefly summarized at the end of the “Alternatives, Including the Preferred Alternative” chapter in table 11.

## METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

The planning team based the impact analysis and the conclusions in this chapter mostly on the review of existing literature and studies, information provided by experts in the National Park Service and in other agencies, and staff insights and professional judgment. The team's method of analyzing impacts is further explained below. It is important to remember that all the impacts have been assessed assuming that mitigative measures will be implemented to minimize or avoid impacts. If mitigative measures described in the "Alternatives, Including the Preferred Alternative" chapter were not applied, the potential for resource impacts and the magnitude of those impacts would increase.

The environmental consequences for each impact topic were identified and characterized based on impact type (adverse or beneficial), intensity, context, and duration. Cumulative effects are discussed later in this section.

*Impact intensity* refers to the degree or magnitude to which a resource would be beneficially or adversely affected. Each impact was identified as negligible, minor, moderate, or major, in conformance with the definitions for these classifications provided for each impact topic (see table 28, page 251). Because this is a programmatic document, the intensities were expressed qualitatively.

*Context* refers to the setting within which an impact may occur, such as the affected region or locality. In this document most impacts are either localized (site-specific) or Addition-wide.

*Impact duration* refers to how long an impact would last. The planning horizon for this plan is approximately 20 years. Unless otherwise specified, in this document the following terms are used to describe the duration of the impacts:

*Short term:* The impact would be temporary in nature, lasting one year or less, such as the impacts associated with construction and/or disruption of visitor use to an area of the Addition.

*Long term:* The impact would last more than one year and could be permanent in nature, such as the loss of soil due to the construction of a new facility. Although an impact may only occur for a short duration at one time, if it occurs regularly over a longer period of time the impact may be considered to be a long-term impact. For example, the noise from a vehicle driving on a road would be heard for a short time and intermittently, but because vehicles would be driving the same road throughout the 20-year life of the plan, the impact on the natural soundscape would be considered to be long term.

Effects also can be direct or indirect. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later or farther away, but are still reasonably foreseeable. This document discloses and analyzes both direct and indirect effects, but does not differentiate between them in the discussions.

The impacts of the action alternatives describe the difference between implementing the no-action alternative and implementing the action alternatives. To understand a complete "picture" of the impacts of implementing any of the action alternatives, the reader must also take into consideration the impacts that would occur in the no-action alternative.

## NATURAL RESOURCES

Analysis of natural resources (surface water flow, water quality, wetlands, soils, floodplains, vegetation, federally threatened and endangered species, major game species,

wilderness resources and values, and energy requirements and conservation potential) was based on research, knowledge of the area's resources, and the best professional judgment of planners, resource specialists, and biologists who have experience with similar types of projects. The definitions for impact intensity of all impact topics are included in table 28, page 251; additional considerations used in characterizing the severity or intensity, as well as the duration, of certain impact topics (floodplains, federally threatened and endangered species, and wilderness resources and values) are discussed below.

It should be noted that the impacts of developing a minimal amount of secondary trails was considered and included as part of the impact analysis conducted on the conceptual ORV trail system.

### Floodplains

The "Floodplain Management Guideline" (NPS 1993) and the extent of alteration to natural hydrologic processes were used to determine the intensity of impacts for floodplains.

### Federal Threatened and Endangered Species

The environmental consequences for federal threatened and endangered species are described in such a way that meets the requirements of the National Environmental Policy Act and the Endangered Species Act (ESA). The required elements of a "Biological Assessment" have been integrated into the environmental impact analysis included in this chapter. A separate biological evaluation form was also prepared and submitted as required by the local USFWS Ecological Services office. The action area for cumulative impact analysis on special status species is identified in the cumulative impacts section. Impacts for federal threatened and endangered species are characterized according to impact type, intensity, context, and duration. Within this

document, the ESA determinations of *no effect*, *not likely to adversely affect*, and *likely to adversely affect* are based on impact intensity equivalents as identified in table 28. The definitions in table 28 refer to changes in critical habitat designated under the Endangered Species Act — this applies only to the West Indian manatee because it is the only federal listed species among those retained for analysis that has designated critical habitat.

The definitions of these ESA determination categories are based on the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service guidance for implementing Section 7 consultation under the Endangered Species Act (USFWS 1998).

*No effect* — the appropriate conclusion when the action agency determines its proposed action will not affect a listed species or designated critical habitat.

*Not likely to adversely affect* — the appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect or evaluate insignificant effects; or (2) expect discountable effects to occur.

*Likely to adversely affect* — the appropriate finding in a biological assessment (or conclusion during informal consultation) if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial (see definition of "is not likely to adversely affect"). In the event the

overall effect of the proposed action is beneficial to the listed species, but is also likely to cause some adverse effects, then the proposed action “is likely to adversely affect” the listed species. If incidental take is anticipated to occur as a result of the proposed action, an “is likely to adversely affect” determination should be made. An “is likely to adversely affect” determination requires the initiation of formal section 7 consultation.”

At the time of writing this plan, information and data that could be used to analyze impacts on the Florida panther from increases in ORV use were limited. The National Park Service and U.S. Fish and Wildlife Service have commissioned an analysis of historical data regarding ORV use and panther biology in Big Cypress National Preserve, including an analysis of more than 160,000 hunter check-in forms. This data should provide additional insight into the effects that hunting and ORV use had on panthers in the Bear Island Unit. The study will provide evidence regarding correlations and patterns of past ORV use and panthers over time. The study is being conducted by Robert Fletcher and Kyle McCarthy of the University of Florida, and it is anticipated that it will be completed by the end of 2010.

Additionally, the National Park Service and U.S. Fish and Wildlife Service have been working collaboratively to further evaluate the relationship between the Park Service’s proposed ORV trail system and important characteristics of Florida panther habitat through geographic information system (GIS) analysis. The U.S. Fish and Wildlife Service intends to use the results of this analysis to assist them in evaluating potential impacts on the panther.

The National Park Service and U.S. Fish and Wildlife Service agreed that these data would be useful in evaluating potential impacts on the Florida panther from the actions included in this plan and that the U.S. Fish and Wildlife Service will use these data in developing their “Biological Opinion.”

## **Wilderness Resources and Values**

The National Park Service compared the management actions of each alternative with the wilderness eligibility criteria identified in the Wilderness Act to determine how those values might be affected. A short-term impact would last less than five years following the implementation of an alternative. A long-term impact would last longer than five years after implementing the alternative. Impacts were classified as adverse if they would adversely affect wilderness values or integrity. Conversely, impacts were classified as beneficial if they would enhance wilderness values or integrity.

## **CULTURAL RESOURCES**

Potential impacts (direct, indirect, and cumulative effects) are described in terms of context (are the effects site-specific, local, or even regional?), duration (are the effects short term (impact lasting less than one year), long term (impacts lasting more than one year), or permanent?), and intensity (is the degree or severity of effects negligible, minor, moderate, or major). Because definitions of intensity (negligible, minor, moderate, or major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this environmental impact statement.

**Impacts on Cultural Resources and Section 106 of the National Historic Preservation Act:** In this environmental impact statement, impacts on cultural resources are described in terms of type, context, duration, and intensity, which is 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 comply with the requirements of both the National Environmental Policy Act and 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.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected national-register-listed or -eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion 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 actions proposed in 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 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.

A Section 106 summary is included in the impact analysis sections. 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.

### Archeological Resources

The intensity of impacts (see table 28, page 251) on an archeological resource would depend upon the potential of the resource to yield important information, as well as the extent of the physical disturbance or degradation.

### Ethnographic Resources

The intensity of impacts on an ethnographic resource (see table 28) would depend on the importance of the resource to an ongoing cultural tradition, as well as the extent of physical damage or change.

### VISITOR USE AND EXPERIENCE

This impact analysis considers various aspects of visitor use and experience for the following recreational uses in the Addition: motorized (ORV) use, nonmotorized use (including hiking, horseback riding, and bicycling), and hunting (including fishing and frogging). Camping opportunities and experiences are addressed within each of these user categories. Impacts on natural soundscapes and the effects on the user are also addressed within each of the recreational use categories. The analysis is based on how visitor use and

experiences would change with changes in the application of management zones in the alternatives. The analysis is primarily qualitative rather than quantitative due to the conceptual nature of the alternatives.

Impacts were determined using existing and projected visitor use data, information on recreational trends, and the professional judgment of NPS staff. For analysis purposes, impact intensities for all visitor experience topics were defined as in table 28.

## SOCIOECONOMIC ENVIRONMENT

The following section of the report describes the economic impacts of changes in visitor spending associated with each of the proposed alternatives, as well as the inputs, methodology, and assumptions employed to perform such an analysis. Under each alternative, a quantitative and qualitative analysis was conducted to trace the flow of visitor spending in the region (limited to Collier County) to identify changes in county sales, employment, and housing, as well as economic activity associated with the Seminole and Miccosukee tribes.

To effectively determine changes in visitor spending under each of the proposed alternatives, various baseline data was gathered concerning recent visitor trends and local economic conditions to project future demand and expenditure impacts. The majority of this information was derived from the 2007 Big Cypress National Preserve Visitor Study (conducted by the University of Idaho), NPS visitation statistics, data from IMPLAN input-output modeling software, interviews conducted with businesses within Collier County, general demographic and tourism data on Collier County, and construction and staffing projection estimates provided by NPS staff.

### Money Generation Model (MGM)

For the purpose of this analysis, the NPS-developed Money Generation Model (MGM)

was used to measure the direct and indirect economic impacts of visitor activity in and around the Addition. The model calculated direct expenditure impacts through the compilation and computation of various inputs, such as average length of stay, daily expenditure rates, and attendance rates for projected Preserve visitors under each of the proposed alternatives. Indirect or induced expenditures were also considered within the model to determine multiplier effects in the local economy, including factors like sales, personal income, jobs, and value added.

The short form of the MGM model was employed, which divides Preserve visitors into four category segments: local day users, non-local day users, motel users, and camp users. Local day users are defined as visitors living within Collier County. Nonlocal day users are visitors living outside Collier County who are not staying overnight within county limits. Motel users are visitors who are staying in a hotel, motel, bed and breakfast, or cabin outside the Preserve but within Collier County. Camp users are visitors who are camping either inside the Preserve or outside the Preserve but in Collier County.

**Changes in Visitor Spending.** The number of additional visitors coming into the Preserve as a result of increased recreational and resource opportunities — the primary variable input within the model — was estimated under each alternative to calculate projected changes in total visitor spending within Collier County. In particular, visitor spending adjustments (based on increased visitation estimates) were determined to be attributable to increases in the following:

- **Informational resources** through the creation of visitor contact centers
- **ORV access** through the addition of new permits and the creation of multiple trails for such use
- **Camping opportunities** through the creation of additional overnight backcountry campsites

- **Hiking, biking, paddling, and horseback riding opportunities** through the creation of additional trails for such use
- **Partnership opportunities** through the provision of boat tours, canoe rentals, and guided hiking trips

Projected changes in visitor spending as a result of each alternative were expected to produce varying degrees of economic changes to Collier County. In particular, impacts on county sales, employment, and housing, as well as economic activity associated with the Seminole and Miccosukee tribes were examined as a result of such expenditure changes. The economic impacts of visitor spending were expected to primarily occur outside the Preserve, where the bulk of purchasable goods and services (i.e., food, lodging, gas, and retail), housing, and labor are located. Areas where the Preserve might directly benefit from visitor spending would likely be minimal and attributable to revenues derived from additional ORV and camping permits, as well as partnership opportunities.

Another initial assumption was that alternative B and the preferred alternative would generate the largest increases in visitor spending due to greater opportunities for recreation and resource use in the Preserve relative to the other alternatives. Alternative A was expected not to produce any impact at all, because resources and recreational opportunities at the Preserve would remain the same. Alternative F was assumed to produce smaller impacts than alternative B and the preferred alternative because recreational and resource opportunities would be increased to a lesser degree.

Due to projected increases in Preserve visitation under the action alternatives, an increase in the number of overnight visitors was also expected to occur. Logically, the provision of camping opportunities in the Addition would likely raise the number of total overnight visitors within the Preserve. Additionally, the number of visitors staying overnight outside the Preserve (but within Collier County) was also expected to increase

under some of the proposed alternatives, particularly for new visitors coming to participate in ORV use or in some of the proposed partnership opportunities.

A select number of motels, hotels and private campgrounds in the nearby vicinity were contacted to discuss potential increases in occupancy rates under each of the proposed alternatives. Although respondents did not provide specific occupancy projections, there appeared to be a general consensus that offering greater recreation and resource access within the Preserve would translate into higher occupancy rates for overnight accommodations. In ranking recreation and resource opportunities, increased ORV and camping access were cited as activities most likely to attract new visitors to stay overnight in the area. Offering boating expeditions, guided tours to the backcountry, and canoe/kayak rentals were cited as the next activities likely to draw new overnight guests. Providing greater trail access for hiking, paddling, biking, and horseback riding were generally viewed as activities least likely to attract new visitors to stay overnight in the area.

Based on respondents' comments, alternative B and the preferred alternative would most likely attract new visitors to stay overnight in the area, with alternative A having no impact on occupancy rates and alternative F producing a negligible impact.

**Impacts of Capital Expenditures.** One-time capital expenditures associated with construction were also estimated under each alternative and served as a variable input within a modified version of the MGM model called the MGM2Operate. Rather than focusing on visitor spending, this version of the model evaluated short-term impacts as a result of changes in construction costs on employment, housing, sales, and economic activity associated with the Seminole and Miccosukee tribes. Changes in construction costs were determined by estimating the total cost of building facilities, trails, and other related structures in the Addition needed to accommodate the various recreational and

resource opportunities proposed under the alternatives. The percentage of construction activity that remained within Collier County was also projected, which considered how much of the economic impacts were contained within the local area.

### Long-Term Versus Short-Term Economic Impacts of Visitor Spending

For this analysis, impacts of visitor spending were divided into long-term and short-term impacts. Long-term impacts are defined as the net changes in the local economy (Collier County) over an extended period of time due to sustainable, yet variable, changes in visitor spending under each alternative. Short-term economic impacts are defined as the net changes to the local economy (Collier County) due to one-time capital construction expenditures incurred under each alternative.

**Long-Term Impacts.** Changes to employment, housing, sales, and economic activity associated with the Seminole and Miccosukee tribes were analyzed under long-term impacts of visitor spending. The cumulative impacts of these changes represent potentially new stabilized or equilibrium levels of economic activity in Collier County.

- **Employment changes** were divided into two categories: direct and indirect employment. Direct employment refers to additional staff needed as a result of operating and maintaining new facilities, trails, and services in the Addition, as well as new employment created in the tourist industry as a result of direct visitor spending. Indirect (secondary) employment refers to changes in employment due to changes in county sales, income, or employment in tourist-related industries supplying goods and services to tourist-related businesses, as well as changes in employment as a result of direct employee spending. Most new jobs created were assumed to be attributable to hiring additional staff to operate and maintain new facilities, trails, and services offered in the Addition, as

well as additional employees hired at businesses located in the area that provide accommodation, food, entertainment, and retail services.

- **Housing changes** were analyzed under the assumption that new employees arriving from outside the area, as a result of direct and secondary employment changes, would need to secure long-term housing accommodations. Naples and Marco Island appear to be the most viable options for new employees relocating from outside the area due to their larger population size and availability of residential housing relative to the surrounding area. It was assumed that housing changes, at the county level, would be minimal or insignificant, as there appears to be a large enough labor pool to draw from within the county (particularly for secondary employment changes).
- **Sales** are defined as the change in total annual taxable sales of local goods and services as a result of changes in visitor spending. Specific industries in Collier County that are expected to realize the most significant economic gains (i.e., largest percentage of increased sales) under the four alternatives and over the long term are: 1) accommodations and food services; 2) retail and trade, and; 3) arts, entertainment, and recreation. These industries are some of the fastest growing sectors in Collier County and currently account for roughly 18% of total economic output.
- **Economic impacts on the Seminole and Miccosukee tribes** were also analyzed due to their close proximity to the Preserve and importance to the region. Changes in economic activity associated with the two tribes was based on the assumption that new visitors to the area, as a result of increased recreation and resource opportunities in the Addition, would generate positive economic gains at both reservations. Because the Seminole and Miccosukee reservations offer a variety of goods and services that cater to tourists as well as locals — such as food, lodging, and a variety of recreational activities — new

visitors traveling to and from the Preserve would have incentive to make a stop at either one or both of these sites. Additionally, proposed partnership opportunities in the Preserve, such as offering guided tours in the Addition, could produce substantive impacts for the tribes if they became third-party vendors.

**Short-Term Impacts.** Changes to county employment, housing, and sales, as well as economic activity associated with the Seminole and Miccosukee tribes were also analyzed under short-term impacts of one-time capital expenditures due to construction activity. These capital expenditures include the improvement and building of facilities, trails, and infrastructure in the Addition under each alternative, as well as the acquisition of necessary equipment, materials, and labor. Impacts from these expenditures would cease to occur once construction is completed. Although a moderate number of construction and material-producing industries exist in Collier County, primarily in the Naples region, it was assumed a significant portion of economic impacts will not remain within county boundaries due the strong, diversified, and competitive business and labor force located outside the area.

- **Employment changes**, as a result of construction activity, were also divided into direct and secondary categories. Direct employment refers to temporary changes in employment within the construction industry due to one-time capital expenditures as a result of construction activity in the Addition. Secondary employment refers to changes in employment created by industries supplying goods and services to the construction industry, as well as by changes due to direct employment spending. It was assumed that not all direct and indirect employees would come from Collier County. For example, while many of the construction laborers might be locally based, specialized professional jobs, such as engineers and architects, would likely come from other areas of the state or country.

- **Housing changes** were also analyzed under short-term impacts. Because Collier County already has a relatively large labor pool to draw from in regards to the construction industry (a sector that already employs approximately 20% of the labor force), it is unlikely that the county as a whole will experience any substantial short-term housing impacts. That said, specific areas such as Naples and Marco Island might see a marginal impact in the demand for housing as a result of new employees (particularly in the professional fields) residing in the area during the construction period.
- **Sales** are defined as the change in total annual taxable sales of local goods and services as a result of changes in one-time capital expenditures in the Addition. Specific industries that are expected to realize the most substantial amounts of change under the four alternatives and over the short term are construction; manufacturing; and transportation, warehousing, and utilities. These three industries currently account for about 22% of total economic output of Collier County (based on 2004 data).
- **Economic impacts for the Seminole and Miccosukee tribes** were evaluated to determine the effects on the two reservations as a result of construction activity under each alternative. It was assumed that construction employee spending changes, due to adjustments in both direct and secondary employment as a result of construction activity, would generate some degree of economic gains to the reservations over the short term. Such changes would be attributable to these new temporary employees spending money at the reservations on various goods and services, such as gaming, food, and other recreational activities.

#### **Organization of Impact Categories, Thresholds, and Overall Benefits**

For both long-term and short-term impacts, the consequences of implementing each

alternative were further organized into direct, indirect, and cumulative effects; order-of-magnitude (thresholds); and overall value to the local economy.

**Direct, Secondary, and Cumulative Effects.**

To identify where changes would occur within the local economy under each alternative, impacts were divided into direct, secondary, and total effects:

- **Direct effects** trace the changes in employment, housing, and economic output within Collier County, as well as assess specific changes economic activity for the Seminole and Miccosukee tribes, as a result of changes in visitor spending or one-time capital expenditures.
- **Secondary effects** are the sum of indirect effects (differences in economic output in county sectors that provide goods and services to county sectors that cater to tourists) and induced effects (increased economic activity derived from direct employee spending changes as a result of visitor spending).
- **Cumulative effects** are the incremental impacts on the social and economic environment in Collier County as a result of each of the alternatives when added to other past, present, and reasonably foreseeable actions.

**Impact Thresholds.** To discern the degree of impact as a result of implementing each alternative, the following order of magnitude scale was used.

- **Neutral effects** would be actions that do not produce any changes at all to the social and economic environment.
- **Negligible effects** would be below detectable levels or detectable only through direct means with no discernable effect on the character of the social and economic environment.
- **Minor effects** would be detectable, but localized in geographic extent or size of population affected and not expected to

alter the character of the established social and economic environment.

- **Moderate effects** would be readily detectable across a broad geographic area or segment of the community and could have an appreciable effect on the social and economic environment.
- **Major effects** would be readily apparent, affect a large segment of the population across the entire community and region, and would have substantial effect on the social and economic environment.

**Nature of Impact.** Lastly, to determine whether short-term or long-term impacts produce positive or negative gains for Collier County as a whole, effects were classified as either adverse or beneficial, as follows:

- Adverse impacts would diminish the established social and economic environment.
- Beneficial impacts would improve the established social and economic environment.

## NPS OPERATIONS AND MANAGEMENT

The impact analysis evaluated the effects of the alternatives on NPS operations, including staffing, infrastructure, maintenance, visitor facilities, and services.

The analysis focused on how NPS operations and facilities might vary with the different management alternatives. 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.

**TABLE 28: IMPACT THRESHOLD DEFINITIONS**

<b>Impact Topic and Duration</b>	<b>Negligible</b>	<b>Minor</b>	<b>Moderate</b>	<b>Major</b>
<b>NATURAL RESOURCES</b>				
<b>Surface Water Flow</b>	An action would have no measurable or detectable effect on the timing or intensity of surface water flows.	An action would have measurable effects on the timing or intensity of surface water flows.	An action would have clearly detectable effects on the timing or intensity of surface water flows and potentially would affect hydrologic connectivity, organisms, or natural ecological processes. The impact would be visible to visitors.	An action would have substantial effects on the timing or intensity of surface water flows and potentially would affect hydrologic connectivity, organisms, or natural ecological processes. The impact would be easily visible to visitors.
<b>Water Quality</b>	An action would have no measurable or detectable effect on surface water quality.	An action would have measurable effects on surface water quality. Water quality effects could include increased or decreased loads of sediment, debris, chemical or toxic substances, or pathogenic organisms.	An action would have clearly detectable effects on surface water quality and potentially would affect organisms or natural ecological processes. The impact would be visible to visitors.	An action would have substantial effects on surface water quality and potentially would affect organisms or natural ecological processes. The impact would be easily visible to visitors.
<b>Wetlands</b>	No measurable or perceptible changes in wetland size, integrity, or continuity would occur.	The impact would be measurable or perceptible, but slight. A small change in size, integrity, or continuity could occur due to indirect effects such as construction-related runoff. However, the overall viability of the resource would not be affected.	The impact would be sufficient to cause a measurable change in the size, integrity, or continuity of the wetland or would result in a small loss or gain in wetland acreage.	The action would result in a measurable change in all three parameters (size, integrity, and continuity) or a loss or gain of large wetland areas. The impact would be substantial and highly noticeable.
<b>Soils</b>	The action would result in a change in a soil, but the change would be at the lowest level of detection, or not measurable.	The action would result in a detectable change, but the change would be slight. There could be changes in a soil's profile in a relatively small area, but the change would not increase the potential for erosion.	The action would result in a clearly detectable change in a soil. There could be a loss or alteration of the topsoil in a small area, or the potential for erosion to remove small quantities of additional soil would increase.	The action would result in the permanent loss or alteration of soils in a relatively large area, or there would be a strong likelihood for erosion to remove large quantities of additional soil as a result of the action.

Impact Topic and Duration	Negligible	Minor	Moderate	Major
<b>Floodplains</b>	Impacts would occur outside the regulatory floodplain as defined by the <i>Floodplain Management Guideline</i> (100-year or 500-year floodplain, depending on the type of action), or no measurable or perceptible change in natural hydrologic processes or aquatic habitat would occur.	Actions in the regulatory floodplain would potentially interfere with or improve natural hydrologic processes or aquatic habitat in a limited way or in a localized area. Levee maintenance that would protect development areas from flooding and road and trail construction that would alter natural sheet flow are example actions that would have minor adverse impacts. Removing flood protection devices or small facilities would have beneficial impacts.	Actions within the regulatory floodplain would interfere with or enhance natural hydrologic processes or aquatic habitat in a substantial way or in a large area. Examples of moderate adverse impacts would include modification of natural watercourses or canals in multiple locations or development of small-scale recreational facilities in the floodplain.	An action would greatly alter or improve a floodplain, natural hydrologic process, or aquatic habitat. Examples of major adverse impacts would include substantial modification of natural watercourses or canals in multiple locations or development of facilities in the floodplain.
<b>Vegetation (all vegetation types, including exotics/nonnative plants)</b>	The action might result in a change in vegetation, but the change would not be measurable or would be at the lowest level of detection.	The action might result in a detectable change, but the change would be slight. This could include changes in the abundance, distribution, or composition of individual species in a local area, but would not include changes that would affect the viability of vegetation communities. Changes to local ecological processes would be minimal.	The action would result in a clearly detectable change in a vegetation community and could have an appreciable effect. This could include changes in the abundance, distribution, or composition of nearby vegetation communities, but would not include changes that would affect the viability of plant populations in the Addition or Preserve. Changes to local ecological processes would be of limited extent.	The action would be severely adverse to a vegetation community. The impacts would be substantial and highly noticeable, and they could result in widespread change. This could include changes in the abundance, distribution, or composition of a nearby vegetation community or plant populations in the Addition or Preserve to the extent that the population would not be likely to recover. Key ecological processes would be altered, and “landscape-level” (regional) changes would be expected.

Impact Topic and Duration	Negligible	Minor	Moderate	Major
<p><b>Wildlife:</b>  <b>Federal Threatened and Endangered Species (Florida Panther, West Indian Manatee, Red-cockaded Woodpecker, Wood Stork, Everglade Snail Kite, American Crocodile, Eastern Indigo Snake)</b></p>	<p>There would be no effect on the species. There would be no observable or measurable impacts on the species, their habitats (including designated critical habitat), or the natural processes that sustain them. This impact intensity would equate to a determination of “no effect” under Section 7 of the Endangered Species Act.</p>	<p><u>Adverse:</u> The effects of the action would be discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated). Individuals may temporarily avoid areas. Impacts would not affect critical periods (i.e., breeding, nesting, denning, feeding, resting) or habitat. In addition, essential features of critical habitat would not be impacted. This impact intensity would equate to a determination of “not likely to adversely affect” under Section 7 of the Endangered Species Act.</p> <p><u>Beneficial:</u> Impacts would result in slight increases to viability of the species in the Addition because species-limiting factors (i.e., habitat loss, competition, and mortality) would be kept in check. This impact intensity would equate to a determination of “not likely to adversely affect” under Section 7 of the Endangered Species Act.</p>	<p><u>Adverse:</u> Individuals may be impacted by disturbances that interfere with critical periods (i.e., breeding, nesting, denning, feeding, resting) or habitat; however, the level of impact would not result in a physical injury, mortality, or extirpation from the Addition. Some essential features of designated critical habitat would be reduced; however the integrity of the habitat would be maintained. This impact intensity would equate to a determination of “likely to adversely affect” under Section 7 of the Endangered Species Act.</p> <p><u>Beneficial:</u> Impacts would result in improved viability of the species, population structure, and species population levels in the Addition, because species-limiting factors (e.g., habitat loss, competition, and mortality) would be reduced. This impact intensity would equate to a determination of “not likely to adversely affect” under Section 7 of the Endangered Species Act.</p>	<p><u>Adverse:</u> Individuals may suffer physical injury or mortality, or populations may be extirpated from the Addition. Essential features of designated critical habitat would be reduced, affecting the integrity of the designated unit. This impact intensity would equate to a determination of “likely to adversely affect” under Section 7 of the Endangered Species Act.</p> <p><u>Beneficial:</u> Impacts would result in highly noticeable improvements to species viability, population structure, and species population levels in the Addition, because species-limiting factors (e.g., habitat loss, competition, and mortality) would be nearly eliminated. This impact intensity would equate to a determination of “not likely to adversely affect” under Section 7 of the Endangered Species Act.</p>

Impact Topic and Duration	Negligible	Minor	Moderate	Major
<p><b>Wildlife: Major Game Species</b></p>	<p>The action might result in a change in game species, but the change would not be measurable or would be at the lowest level of detection.</p>	<p>The action might result in a detectable change, but the change would be slight. This could include changes in the abundance or distribution of individual game species in a local area, but not changes that would affect the viability of local game populations. Changes to local ecological processes would be minimal.</p>	<p>The action would result in a clearly detectable change in a game population and could have an appreciable effect. This could include changes in the abundance or distribution of local game populations, but not changes that would affect the viability of regional game populations. Changes to local ecological processes would be of limited extent.</p>	<p>The action would be severely adverse or exceptionally beneficial to a population. The effects would be substantial and highly noticeable, and they could result in widespread change and be permanent. This could include changes in the abundance or distribution of a local or regional population of a game species to the extent that the population would not be likely to recover (adverse) or would return to a sustainable level (beneficial). Important ecological processes would be altered, and “landscape-level” (regional) changes would be expected.</p>
<p><b>Wilderness Resources and Values</b></p>	<p>An action would have no discernable effects on wilderness resources and values.</p>	<p>An action would have detectable effects on wilderness resources and values, affecting the ability for a small area to meet wilderness eligibility criteria or improving and protecting its wilderness characteristics.</p>	<p>An action would have clearly detectable effects on wilderness resources and values, affecting the ability of an area to meet wilderness eligibility criteria or improving and protecting its wilderness characteristics. The impact would be visible to visitors.</p>	<p>An action would have substantial effects on wilderness resources and values, eliminating the characteristics that make substantial areas eligible as wilderness or improving and protecting its wilderness characteristics. The impact would be easily visible to visitors.</p>

Impact Topic and Duration	Negligible	Minor	Moderate	Major
<b>CULTURAL RESOURCES</b>				
<b>Archeological Resources</b>	Impacts would be at the lowest levels of detection — barely perceptible or measurable. For purposes of Section 106, the determination of effect would be no adverse effect.	Impacts would be perceptible and measurable, and would remain localized and confined to archeological site(s) with low to moderate data potential. For purposes of Section 106, the determination of effect would be no adverse effect.	Impacts would be sufficient to cause a noticeable change, and would generally involve one or more archeological sites with moderate to high data potential. For purposes of Section 106, the determination of effect would be adverse effect.	Impacts would result in substantial and highly noticeable changes, involving archeological site(s) with high data potential. For purposes of Section 106, the determination of effect would be adverse effect.
<b>Ethnographic Resources</b>	Impact(s) would be barely perceptible and would neither alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs. For purposes of Section 106, the determination of effect would be no adverse effect.	Impact(s) would be slight but noticeable but would neither appreciably alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs. For purposes of Section 106, the determination of effect would be no adverse effect.	Impact(s) would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group's practices and beliefs, even though the group's practices and beliefs would survive. For purposes of Section 106, the determination of effect would be adverse effect.	Impact(s) would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of practices and beliefs, to the extent that survival of a group's practices and/or beliefs would be jeopardized. For purposes of Section 106, the determination of effect would be adverse effect.

Impact Topic and Duration	Negligible	Minor	Moderate	Major
<b>VISITOR USE AND EXPERIENCE</b>				
<p><b>Recreational Uses</b></p> <p>Motorized Use (ORVs)</p> <p>Nonmotorized Use (including hiking, horseback riding, and bicycling)</p> <p>Hunting (including fishing and frogging)</p>	<p>Visitors would likely be unaware of any effects associated with implementation of the alternative.</p> <p>There would be no noticeable changes in visitor use and/or experience or in any defined indicators of visitor satisfaction or behavior.</p>	<p>Changes in visitor use and/or experience would be slight but detectable, but would not appreciably diminish or enhance critical characteristics of the visitor experience. Visitor satisfaction would remain stable.</p>	<p>Few critical characteristics of the desired visitor experience would change and/or the number of participants engaging in an activity would be altered. The visitor would be aware of the effects associated with implementation of the alternative and would likely be able to express an opinion on the changes. Visitor satisfaction would begin to either decline or increase as a direct result of the effect.</p>	<p>Multiple critical characteristics of the desired visitor experience would change and/or the number of participants engaging in an activity would be greatly reduced or increased. The visitor would be aware of the effects associated with implementation of the alternative and would likely express a strong opinion about the change. Visitor satisfaction would markedly decline or increase.</p>
<b>SOCIOECONOMIC ENVIRONMENT</b>				
<p><b>Local Economy</b></p>	<p>The effect would be below detectable levels or detectable only through direct means, with no discernable effect on the character of the social and economic environment.</p> <p>Effects identified as neutral would be actions that do not produce any changes at all to the social and economic environment.</p>	<p>The effect would be detectable but limited in geographic extent or size of population affected and not expected to alter the character of the established social and economic environment.</p>	<p>The effect would be readily detectable across a broad geographic area or segment of the community and could have an appreciable effect on the social and economic environment.</p>	<p>The effect would be readily apparent, affect a large segment of the population across the entire community and region, and would have substantial effect on the social and economic environment.</p>
<b>NPS OPERATIONS AND MANAGEMENT</b>				
<p><b>NPS Operations and Management</b></p>	<p>The effect would be at or below the level of detection, and would not have an appreciable effect on preserve operations and management.</p>	<p>The effects would be detectable, but would be of a magnitude that would not have an appreciable effect on preserve operations and management.</p>	<p>The effects would result in a change in preserve operations and management in a manner readily apparent to staff and possibly to the public.</p>	<p>The effects would result in a substantial and widespread change in preserve operations and management in a manner readily apparent to staff and the public.</p>

## CUMULATIVE IMPACT ANALYSIS

A cumulative impact is described in the Council on Environmental Quality's regulation 1508.7 as follows:

*Cumulative impacts* are the impacts that result from incremental impacts of the action when added to other past, present, and reasonably foreseeable actions, regardless of what agency (federal or nonfederal) or person undertakes such other action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time.

The action area for assessing cumulative impacts on the resources retained for detailed analysis varies depending upon the resource. Although these areas extend well beyond the boundaries of the Addition, the projects or actions in these areas can affect the resources of the Addition. For water resources, the action area is the Big Cypress Watershed, which includes most of Collier County and parts of Hendry, Broward, Miami-Dade, and Monroe counties. The action area for the Florida panther is defined as the known occupied range of the species, which is centered in and around Big Cypress and includes Everglades National Park, Fakahatchee Strand Preserve State Park, Florida Panther National Wildlife Refuge, and privately owned lands north of the Addition in Collier and Hendry counties. The action area for all other natural resources is the Addition plus the surrounding region, which is generally limited to the nearby fringes of the six counties that surround the Addition. This geographic area encompasses the habitats and resources of the four other special status species that are analyzed in this chapter and is more than sufficient for analysis of the other natural resource impact topics.

The action area for assessing cumulative impacts on cultural resources would be Collier and Monroe counties.

The action area for assessing cumulative impacts on visitor use and experience topics

includes the Addition and federal, state, tribal, and private lands within 25 miles of the Addition.

The action area for assessing cumulative impacts on the socioeconomic environment is Collier County.

To determine the potential cumulative impacts on the resources, other projects and actions within these action areas were identified. Projects were identified by discussions with NPS staff, federal land managers, and representatives of city and county governments. Potential projects identified as possible contributors to cumulative impacts included any planning or development activity that was currently being implemented, or is expected to be implemented in the future. Impacts of past actions were also considered in the analysis. Projects and actions that could contribute to cumulative impacts include the following:

***Recreational Off-road Vehicle Management Plan*** — The NPS completed this ORV management plan for the original Preserve in 2000. Included in this plan is the development of 15 ORV access points and no more than 400 miles of designated primary trails. A maximum of 2,000 permits per year can be granted to ORV users. The plan requires monitoring of field conditions and impacts from off-road vehicles and outlines an adaptive management framework to do so.

***Commercial Services Plan*** — The *Commercial Services Plan* is intended to address the existing conditions and law in a manner that will be compliant with the 1998 National Park Service Concessions Management Improvement Act (PL 105-391) and regulations. As an implementation plan, this *Commercial Services Plan* must also be consistent with the established planning direction in the 1991 *General Management Plan* for the Preserve and achieve the desired future conditions or

goals for the Preserve. This plan covers the original Preserve only; the Addition will be addressed in an addendum to this plan after the completion of the *General Management Plan* for the Addition.

The National Park Service has several authorization instruments available to manage commercial services within national park system units. Currently, concession contracts and permits are used to manage commercial services that are assigned land and/or facilities in national park system units. Before the National Park Service will commit resources to those facilities, these commercial activities must be identified as a necessary and appropriate use of the Preserve resources and facilities. The *Commercial Services Plan* is the document that identifies activities currently considered necessary and appropriate, as well as guidance on the process for reviewing activities that may be proposed in the future.

The preferred alternative for the original Preserve's *Commercial Services Plan* proposes to develop the Preserve's visitor services to the level and quality described in the 1991 *General Management Plan*. The concept of this alternative is to enhance the Preserve's visitor services by developing one facility at Monroe Station to provide the visitor services deemed necessary and appropriate, with the opportunity to provide a second, smaller facility at Seagrape Drive as funding permits. Other services may begin and end outside the Preserve. Some services expected to be provided include the following: hunting and fishing guides; buggy tours; hiking tours (both day use and multiday); boat and kayak rentals, livery, and guided tours; firewood sales for campgrounds; bicycle rentals; general van tours, birding and wildlife viewing, and photography — by van, foot, or buggy, and offered through a cooperative association (The Everglades Association). The plan also proposes the development of a backcountry camping complex in the northern portion of the Turner River

Management Unit. Some management changes could be made to improve effectiveness and efficiency, and some minor changes to the level of services could be made for resource protection and visitor experience enhancement to be consistent with the management zone prescriptions established in the 1991 *General Management Plan*.

The Preserve will require the use of indicators and standards as part of the visitor experience and resource protection (VERP) method to answer the question of how much visitor use can be accommodated without causing undesirable impacts on Preserve resources and visitor experience, commonly referred to as "user capacity." Once this user capacity is established, continuous monitoring and adaptive management will be required to ensure that the quality of visitor experience is maintained and that resources are protected.

**Future Oil and Gas Operations** — Plans for future oil and gas operations are a reasonably foreseeable expectation for the Addition. Future oil and gas proposals would likely include conducting a geophysical survey within portions of the Addition and could include the use of specialized off-road equipment that would travel cross-country. An environmental analysis of these proposals and their potential cumulative impacts would be conducted for such submissions.

**South Florida Ecosystem Restoration Projects** — The south Florida ecosystem stretches south from Orlando through the Chain of Lakes, the Kissimmee Valley, Lake Okeechobee, and the remaining Everglades to the waters of Florida Bay and coral reefs. The ecosystem encompasses about 18,000 square miles within 16 counties. This region supports 68 federally threatened and endangered plant and animal species. There is an intense, cooperative effort among federal, state, and local government agencies, tribes, environmental organizations, universities,

businesses, and local citizens to preserve and restore the greater Everglades ecosystem. More than 200 restoration projects within this region have been identified. Listed below are projects that would have the most influence on the Addition.

- **“Comprehensive Everglades Restoration Plan” (CERP)**, commonly known as the “Restudy.” This is a multibillion-dollar water system improvement plan led by the U.S. Army Corps of Engineers. It will reconfigure the artificially created drainage patterns of south Florida back to more natural conditions. Several projects under the umbrella of this plan that will have direct effects on the Big Cypress ecosystem include:
  - ✓ **Big Cypress / L-28 Interceptor Modifications** — The purpose of this project is to (1) reestablish sheet flow from the West Feeder Canal across the Big Cypress Reservation and into the Big Cypress National Preserve, (2) maintain flood protection on Seminole tribal lands, and (3) ensure that inflows to the North and West Feeder canals meet applicable water quality standards. Upstream flows entering the West and North Feeder canals will be routed through two stormwater treatment areas to be located at the upstream ends of the canals. Sheet flow will be reestablished south of the West Feeder Canal. These improvements will be consistent with the “Big Cypress Seminole Tribe's Water Conservation Plan.”
  - ✓ **Water Conservation Area 3 (WCA 3) Decompartmentalization** — The project is a cooperative effort between the Army Corps of Engineers (Corps) and the South Florida Water Management District (SFWMD).

WCA 3 (made up of WCA 3A and WCA 3B) is located immediately north of Everglades National Park. The compartmentalization and constriction of historically broad wetlands, altered hydroperiods, reduction of wildlife, and degradation of water quality are among the environmentally detrimental effects resulting from the construction of the Central and Southern Florida projects.

Water Conservation Area 3 is part of this project. The project, when implemented, would reduce barriers to sheet flow such as canals and levees to the extent practicable. The goal is to restore historical sheet flow distributions, depth patterns, hydroperiods, and hydrologic connectivity in the various landscapes within WCA 3 and in Northeast Shark River Slough within Everglades National Park, thereby creating a sustainable environment that is suitable for the recovery and long-term survival of native flora and fauna in concert with related projects.

**Regional Growth and Development Projects**— Based on the most recent data from the Southwest Florida Regional Planning Council, southwest Florida is one of the most rapidly growing areas of the nation. Since April 1, 2000, the southwest Florida population has grown by at least 24% and is expected to continue growing at an average rate of 3.4% per annum. It is estimated that the region will double its current capacity by the year 2030. Historically, development has occurred to the east and west of the Addition along the coasts. As population growth continues, the likelihood is greater that natural and agricultural lands close to the Addition will be developed. Recently, private lands northwest of the Addition have received approval for major developments. As this

growth occurs, increasing demand will occur on all of the region's resources. The following projects are among those that could have cumulative impacts:

- Town of Ave Maria — This project includes the build out of 11,000 housing units on approximately 5,000 acres. The planned development will also include a private university.
- Town of Big Cypress — This project includes the proposed town of Big Cypress, which would include 9,000 housing units on approximately 3,600 acres. (This project is in the review process and has not yet been approved at the time of this writing.)
- Florida Gulf Coast University/  
Redevelopment of SW Regional

Airport — This project includes the redevelopment of an airport site into a new state university, along with associated housing development that will support the site's new uses.

These projects and actions were evaluated in conjunction with the impacts of each alternative to determine if they would result in any cumulative impacts on a particular natural or cultural resource, the socioeconomic environment, visitor use, or NPS operations and management. Because most of these actions are in the early planning stages, the evaluation of cumulative impacts is qualitative and based on a general description of the project.

## IMPAIRMENT OF ADDITION RESOURCES

In addition to determining the environmental consequences of implementing the alternatives, *NPS Management Policies 2006* (section 1.4) requires analysis of potential effects to determine whether alternatives would impair the Addition's 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 resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within a unit, 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, in the professional judgment of the responsible NPS manager, would harm the integrity of resources and values, including the opportunities that otherwise would be present for the enjoyment of those resources or values (*NPS Management Policies 2006* section 1.4.5). An impact on any resource or value may constitute impairment. An impact would be more likely to constitute impairment if it results in a moderate or major adverse effect on a resource or value whose conservation is

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

Impairment may result from NPS activities in managing the area; visitor activities; or activities undertaken by concessioners, contractors, and others operating in the Addition. A determination on impairment is made in the "Conclusion" section for each required impact topic related to the Addition's resources and values. An evaluation of impairment is not required for topics related to visitor use and experience (unless the impact is resource based), NPS operations, or the socioeconomic environment. When it is determined that an action or actions would have a moderate to major adverse effect, an explanation is presented of why this would not constitute impairment. Impacts of only negligible or minor intensity would, by definition, not result in impairment. The impairment analysis, later in this chapter, for each of the impact topics has determined that none of the alternatives presented in this plan would result in impairment of Addition resources.

## ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE A (NO ACTION)

### NATURAL RESOURCES

#### Surface Water Flow

**Analysis.** Under alternative A, impacts on surface water flow would be attributed primarily to the maintenance of existing facilities that prevent natural sheet flow. Maintaining Nobles, Jones, and Bear Island Grades in their current state restricts hydrologic connectivity within the Northeast Addition. Facilities and structures at Deep Lake (fill pad), Copeland (Fire Operations Center), and Carnestown also would continue to affect natural hydrology in localized areas. Limited NPS administrative ORV use would continue to affect surface water flow in localized areas on a short-term basis. Most impacts on surface water flow are due to the presence of roads and grades. These impacts would continue to be long term, adverse, and of moderate intensity. Although the effects could extend beyond the boundaries of the Addition, they would be localized in nature. Impacts related to the continued presence of NPS facilities and structures would be long term, minor, adverse, and localized.

Ongoing NPS restoration to improve soil conditions and reestablish natural ground contours would have beneficial effects on surface water flow; these impacts would be long term, minor to moderate, and localized. Ongoing vegetation management could also improve surface water flow by eliminating exotic vegetation that impedes flow or reduces water availability. The impact would continue to be long term, minor to moderate, beneficial, and Addition-wide.

Collectively, the impacts on surface water flow would be long term, minor to moderate, adverse, and localized.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on

surface water flow into that portion of the Addition that abuts the original Preserve at localized sites because best management practices and mitigation would maintain or improve hydrologic flow. The impact on surface water flow in the watershed would be negligible.

Implementation of future oil or gas plan of operations proposals could have adverse impacts on surface water flow. If the proposals include using off-road equipment and constructing roads and pads, this would alter local hydrology. Construction and operations activities would affect the timing and intensity of surface water flows. The impacts of these activities would be reduced because NPS approval of the operation plans would require mitigative measures. Short-term impacts on surface water flow would be adverse, minor to moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. Proposals involving the Addition include the removal of the L-28 interceptor canal levee, modification of the L-28 Tie Back Canal, and operational changes to various water control structures. Decentralization of Water Conservation Area 3 would also improve sheet flow and hydrologic connectivity. The impact of these efforts on the hydrology of the Addition, as well as within the watershed, is expected to be long term, major, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands and alter the hydrology of the general area. Changes in sheet flow, including timing and intensity, would affect hydrologic function and connectivity in the watershed. The impact of these activities is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on surface water flow would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would be adverse on surface water flow in the watershed.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on surface water flow. The actions contained in alternative A would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on surface water flow would be long term, adverse, minor to moderate, and localized.

There could be a long-term, minor, adverse cumulative impact on surface water flow. The actions contained in alternative A would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of surface water flow in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## **Water Quality**

**Analysis.** Under alternative A, impacts on water quality would be attributed to visitor use at a few discrete sites as well as from NPS operations and maintenance activities. Visitor use, such as hiking and backcountry camping, could continue to cause soil erosion and generate human waste that would affect turbidity and surface water quality. Inadvertent leaks or spills of fuel or oil from NPS administrative ORV use could affect surface water quality by elevating chemical concentrations. Impacts from parked vehicles would be more common at destination sites or along

roads. The maintenance of roads, grades, and trails within the Addition would likely cause erosion that could enter canals and waterways and increase turbidity. The impacts of these activities would be long term, minor, adverse, and localized. Impacts would be minor due to the limited visitation in the Addition and the limited development and maintenance that would occur under alternative A.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on water quality at localized sites in the portion of the Addition that abuts the original Preserve because best management practices and other mitigation would be used to minimize soil erosion and chemical contamination. The impact of these activities on water quality in the watershed would be negligible.

Implementation of future oil or gas plan of operations proposals could have adverse impacts on water quality. If the proposals included the use off-road equipment and construction of roads and pads, this could result in degrading water quality due to turbidity and chemical contamination. The impacts of these activities would be reduced because NPS approval of the operation plan would require mitigative measures. Short-term impacts on water quality would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized. This is due to the number and complexity of the proposals and uncertainty with their levels of success.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. Although the proposals would increase surface water flow and connectivity, the discharged waters are expected to have elevated chemical concentrations that would degrade water quality. Because the current condition of water resources in the Addition is cleaner than what is expected to be discharged, the impact is predicted to be long term, adverse, and Addition-wide, but the intensity is

unknown. The impact on water quality within the watershed is unknown. This is due to the number and complexity of the proposals and uncertainty with their levels of success.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Water quality would be affected by inputs from urban and suburban development, including increases in organic compounds and chemical concentrations. The impact on water quality within the watershed is expected to be adverse, but the intensity is unknown.

Collectively, adverse impacts could be expected from oil and gas operations, ecosystem restoration projects, and regional growth and development. Overall, the effects of the projects discussed above could be adverse on water quality in the watershed, but the intensity is unknown.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, adverse cumulative impact on water quality in the watershed. The intensity of the impact is unknown. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on water quality would be long term, minor, adverse, and localized.

There would be a long-term, adverse cumulative impact on water quality in the watershed. The intensity of the impact is unknown. The actions contained in alternative A would contribute a very small adverse increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of water quality in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Wetlands

**Analysis.** Under alternative A, impacts on wetlands would be attributed primarily to the retention and maintenance of existing facilities, such as roads, grades, and trails. Impacts would include vegetation loss and alteration of soils, which would result in permanent effects on wetland size and integrity that would be long term, minor, adverse, and localized. Indirect impacts, such as increased runoff and sedimentation, would be long term, minor, adverse, and localized.

NPS efforts to reestablish natural ground contours and restore soil integrity would have positive effects on wetlands — the impact would be long term, beneficial, minor to moderate, and localized.

Collectively, impacts on wetlands under alternative A would continue to be long term, minor, adverse, and localized.

**Cumulative Impacts.** Implementation of future oil or gas plan of operations proposals could have adverse impacts on wetlands. If the proposals included using off-road equipment and constructing roads and pads, this would result in altering wetland soils and vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on wetlands would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would affect wetlands by increasing the availability of water, which in turn could increase the size and integrity and improve the function of wetlands. The impact of these efforts on wetlands is expected to be long term, moderate to major, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of

natural lands to development and alter the hydrology of the general area. Changes in sheet flow and water quality would affect the size, integrity, and function of wetlands in the watershed. The impact of these activities on wetlands would be long term, moderate to major, and adverse. The adverse impacts would be at least partially offset by wetlands mitigation required by permitting agencies.

Collectively, beneficial impacts on wetlands would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would be adverse on wetlands.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on wetlands. The actions contained in alternative A would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on wetlands would be long term, minor, adverse, and localized.

There would be a long-term, minor, adverse cumulative impact on wetlands. The actions contained in alternative A would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of wetlands in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## **Soils**

**Analysis.** Under alternative A, impacts on soils would be attributed primarily to facility maintenance, limited NPS administrative ORV use, and NPS restoration activities.

Facilities such as temporary access points, trails, and grades and roads require recurring maintenance, which could displace or erode soils. The impacts from these activities would be long term, minor to moderate, adverse, and localized. Some rutting and displacement of soils might occur from NPS administrative or illegal public ORV use; however, activity would be infrequent, and the impact would be long term, negligible to minor, adverse, and localized.

Users participating in nonmotorized activities could also cause erosion, but the adverse impacts would likely be negligible to minor.

NPS efforts to reestablish natural ground contours and restore natural hydrologic conditions would have beneficial long-term, minor to moderate, and localized effects on soils.

Collectively, impacts on soils from implementing alternative A would continue to be minor, adverse, long term, and localized.

**Cumulative Impacts.** Implementation of future oil or gas plan of operations proposals could have adverse impacts on soils. If proposals include the use of off-road equipment and construction of roads and pads, this would alter soils. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on soils would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

Changes in the availability of water resources due to the south Florida ecosystem restoration project would affect soil properties. The integrity of hydrologic soils could be improved or restored by increases in water — a beneficial impact.

Decreases in water or permanent soil loss resulting from regional growth and development would adversely impact soils. The impact of these efforts on soils is expected to be long term, moderate to major, and adverse.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on soils. The permanent loss of soils would be expected to outweigh any beneficial impacts that might be realized from ecosystem restoration projects. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on soils would be long term, minor, adverse, and localized.

There would be a long-term, moderate, adverse cumulative impact on soils. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of soils in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Floodplains

**Analysis.** Under alternative A, impacts on floodplains would continue to be limited to those derived from the retention of two existing facilities in the 100-year floodplain — the NPS Fire Operations Center at Copeland and the facilities at Carnestown. Retaining these facilities would continue to only slightly affect the capacity of the floodplain to store flood waters. The flow of water in the floodplain during floods would also be slightly affected. The impact on floodplains would continue to be long term, minor, adverse, and localized.

**Cumulative Impacts.** Regional growth and development is expected to affect floodplains in the region. Floodplains could be physically altered, changing their capacity and altering the natural course of floodwater flow. Natural

flood patterns would be adversely affected, but any adverse impacts on property and life should be mitigated through proper permitting. The impact of these activities on floodplains could be long term, minor to major (depending on the nature of the floodplain design), and adverse.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would affect floodplains by reclaiming some floodplains and improving their integrity and function — a beneficial impact. The impact of these efforts on floodplains would be long term and beneficial, but the intensity is unknown.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to major, adverse cumulative impact on floodplains. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on floodplains would continue to be long term, minor, adverse, and localized.

There would be a long-term, minor to major, adverse cumulative impact on floodplains. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of floodplains in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Vegetation — Cypress Strands and Domes, Mixed Hardwood Swamps, and Sloughs

**Analysis.** Under alternative A, impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would be attributed

primarily to NPS restoration efforts and limited NPS administrative ORV use. Ongoing vegetation management and efforts to restore natural hydrologic processes would continue to improve conditions for native vegetation because water availability and connectivity would increase, and competition from exotic plants would be minimized. Impacts on cypress strands and domes, mixed hardwood swamps, and sloughs from vegetation management would be long term, minor to moderate, beneficial, and Addition-wide.

ORV use by NPS staff (or from illegal public use) would remain infrequent. The conditions that often discourage ORV use (deep water, closely spaced trees, etc.) would continue, and adverse impacts from off-road vehicles would most often be limited to the margins of the plant community. Adverse impacts could include injury to a plant or group of trees, or might include plant loss in a discrete area due to repeated use. The trampling of vegetation by nonmotorized visitors (i.e., hikers) would be more common at frontcountry destinations (Deep Lake and Bear Island Grade) and less common in the backcountry. Impacts on cypress strands and domes, mixed hardwood swamps, and sloughs from NPS use of off-road vehicles and current visitor use would be long term, minor, adverse, and localized.

Collectively, impacts on cypress strands and domes, mixed hardwood swamps, and sloughs from implementing alternative A would continue to be minor, adverse, long term, and localized.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation; however, it is unknown what plant communities would be affected. If proposals

include the use of off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect plant communities and would likely improve plant vigor, abundance, and distribution. The impact of these efforts on cypress strands and domes, mixed hardwood swamps, and sloughs is expected to be long term, minor to moderate, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect plant communities. The impact of these activities on cypress strands and domes, mixed hardwood swamps, and sloughs is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above could slightly benefit cypress strands and domes, mixed hardwood swamps, and sloughs.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, beneficial cumulative impact on cypress strands and domes, mixed hardwood swamps,

and sloughs. The actions contained in alternative A would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would be long term, adverse, minor, and localized.

There could be a long-term, minor, beneficial cumulative impact on cypress strands and domes, mixed hardwood swamps, and sloughs. The actions contained in alternative A would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of cypress strands and domes, mixed hardwood swamps, and sloughs in the Addition. (See specific definition of impairment in the “Impairment of Addition Resources” section.)

### Vegetation — Prairies and Marshes

**Analysis.** Under alternative A, impacts on prairies and marshes would be attributed primarily to NPS restoration efforts and limited NPS administrative ORV use.

Ongoing vegetation management, including the use of prescribed fire, and efforts to restore natural hydrologic processes would continue to improve conditions for native vegetation because water availability and connectivity would increase and competition from exotic plants would be minimized. Impacts on prairies and marshes from vegetation management would continue to be long term, beneficial, minor to moderate, and Addition-wide.

ORV use by NPS staff (or from illegal public use) would remain infrequent; however, even infrequent use could produce adverse impacts. The soil conditions in prairies and marshes cause poor traction for off-road vehicles, and rutting and braiding of trails is common. Most NPS operators understand the sensitivity of prairies and marshes and know

to avoid these areas. Adverse impacts could include injury to a plant or group of plants, or might include plant loss in a discrete area due to rutting or repeated use. Impacts on prairies and marshes from ORV use would be long term, minor, adverse, and localized. The impacts of trampling of vegetation by nonmotorized visitors (i.e., hikers) would be negligible.

Collectively, the impact on prairies and marshes under alternative A would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation; however, it is unknown what plant communities would be affected. If proposals included the use of off-road equipment and construction of roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be moderate, adverse, and localized; long-term residual impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect plant communities and would likely improve plant vigor, abundance, and distribution. The impact of these efforts on prairies and marshes is expected to be long term, minor to moderate, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in

sheet flow, and its timing and intensity, would affect plant communities. Prairies and marshes on private land outside the Addition would continue to be impacted by population growth and development. The impact of these activities on prairies and marshes is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on prairies and marshes would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above on prairies and marshes would be long term, minor, and adverse.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on prairies and marshes. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on prairies and marshes would be long term, adverse, minor, and localized.

There could be a long-term, minor, adverse cumulative impact on prairies and marshes. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of prairies and marshes in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

#### **Vegetation — Mangrove Forests**

**Analysis.** Under alternative A, motorized boating would continue to be allowed south of U.S. 41 in the Western Addition. Motorized

boating does not include airboating because airboats are classified by the Preserve as off-road vehicles. Most of the boating in the Addition occurs in the deep, open-water environs, outside the dense mangrove forests. Motorized boating could continue to injure individual plants or prevent their expansion into the shallower margins of the well-travelled boating corridors. Impacts on mangrove forests would continue to be long term, minor, adverse, and localized.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. Because airboats are not allowed in the Addition, beneficial impacts on mangroves would be negligible.

Regional growth and development, including waterfront development, is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Mangroves receive special protection under state law, and any impacts on mangrove forests would be expected to be negligible.

**Conclusion.** Under alternative A, impacts on mangrove forests would continue to be long term, minor, adverse, and localized.

Cumulative impacts on mangrove forests would be negligible. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of mangrove forests in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

#### **Vegetation — Pinelands**

**Analysis.** Under alternative A, impacts on pinelands would be attributed primarily to

NPS restoration efforts and limited NPS administrative ORV use.

Ongoing vegetation management, including the use of prescribed fire, would decrease competition from exotic plants and improve the integrity of native habitats. Impacts on pinelands from vegetation management would continue to be long term, beneficial, minor to moderate, and Addition-wide.

ORV use by NPS staff (or from illegal public use) would continue in the Addition. The durability of the substrate present in pinelands minimizes adverse impacts from ORV use. The loss of pines from ORV use has not been documented in the original Preserve; however, wheeled use could have adverse impacts on other plant species present within these communities or within certain ecotonal areas. Adverse impacts could include injury to a plant or group of plants, or might include plant loss in a discrete area due to repeated use. Impacts on pinelands from ORV use would be long term, adverse, minor, and localized.

Collectively, the impact on pinelands under alternative A would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation in the Addition; however, it is unknown what plant communities would be affected. If proposal included the use off-road equipment and construction of roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operation plan would require mitigative measures. Short-term impacts on vegetation would be adverse,

moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of pinelands. The assemblage of pines and palmettos could change as a result of changes in hydrology or periods of inundation. The impact is uncertain because drying often adversely impacts pinelands, and increasing the water table could also cause a net reduction in pinelands compared to current conditions. It is expected that restoring natural hydrologic conditions would have a beneficial impact on pinelands.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Studies have shown that pinelands are the most impacted by human land conversion. Pinelands on private land in the region would continue to be lost. The impact would be long term, moderate to major, and adverse.

Collectively, beneficial impacts on pinelands would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would be adverse on pinelands in the Addition.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate to major, adverse cumulative impact on pinelands. The actions contained in alternative A would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on pinelands would be long term, adverse, minor, and localized.

There could be a long-term, moderate to major, adverse cumulative impact on pinelands. The actions contained in alternative A would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of pinelands in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Vegetation — Hardwood Hammocks**

**Analysis.** Under alternative A, impacts on hardwood hammocks would be attributed primarily to NPS restoration efforts and limited NPS administrative ORV use.

Ongoing vegetation management would decrease competition from exotic plants and improve the integrity of native habitats. Impacts on hardwood hammocks from vegetation management would continue to be long term, beneficial, minor to moderate, and Addition-wide.

ORV use by NPS staff (or from illegal public use) would continue in the Addition. Although the substrate present in hardwood hammocks is suitable for ORV use, use tends to be infrequent because of the size and density of trees present in these areas. However, infrequent ORV use could continue to adversely impact understory plants. Adverse impacts could include injury to a plant or group of plants, or might include plant loss in a discrete area due to repeated use. Backcountry camping could also cause trampling or loss of vegetation at localized sites. Impacts on hardwood hammocks from ORV use and backcountry visitor use would be long term, adverse, minor, and localized. Impacts would be expected to be minor because areas affected would be relatively small and dispersed.

Collectively, the impact on hardwood hammocks under alternative A would continue to be long term, minor, adverse, and localized.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation in the Addition; however, it is unknown what plant communities would be affected. If proposal included the use off-road equipment and construction of roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operation plan would require mitigative measures. Short-term impacts on vegetation would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of hardwood hammocks. The impact is uncertain, but restoring natural conditions is expected to have a long term, minor, beneficial impact.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect plant communities. The impact of these activities on hardwood hammocks is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on hardwood hammocks would accrue from ORV

management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above could slightly benefit hardwood hammocks.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, beneficial cumulative impact on hardwood hammocks. The actions contained in alternative A would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on hardwood hammocks would be long term, adverse, minor, and localized.

There could be a long-term, minor, beneficial cumulative impact on hardwood hammocks. The actions contained in alternative A would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of hardwood hammocks in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### Exotic/Nonnative Plants

**Analysis.** Under alternative A, impacts on exotic/nonnative plants would be attributed primarily to NPS restoration efforts, limited ORV and visitor use, and facility maintenance activities. Ongoing vegetation management (including the use of prescribed fire and chemical and mechanical treatment) in the Addition would continue to decrease competition from exotic plants and improve the integrity of native habitats. The continuation of monitoring efforts would also help to detect and mitigate new exotic species that could affect native plant communities. Impacts on exotic/nonnative species from ongoing resource management activities

would be long term, beneficial, moderate, and Addition-wide.

Limited NPS administrative ORV use, as well as visitor use and facility maintenance in the Addition, could continue to cause impacts on the distribution and establishment of exotic plants. Visitors and off-road vehicles can be agents for seed dispersal, increasing the threat to native plant communities. Exotic plants can have severe effects on the integrity of native systems and habitats. Impacts on exotic/nonnative plants from these activities would be long term, minor, and adverse. Although the effects would continue to be most pronounced along travel corridors and at disturbed sites, the impacts could extend beyond these immediate areas and become Addition-wide.

Collectively, the impact on exotic/nonnative plants under alternative A would continue to be long term, minor, beneficial, and potentially Addition-wide.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on exotic plants and native vegetation in the original Preserve and reduces the potential for dispersal into the Addition — a beneficial impact on nonnative vegetation. Furthermore, the designated trail system would facilitate management of exotic species, including reporting and removal. The impact on exotic plants and nonnative vegetation in the region would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on native vegetation because of the potential for the spread of exotic plants in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this would disturb soils and native vegetation. Short-term impacts could include the establishment of exotic plants on disturbed sites and the dispersal of seeds and plant stock. The impacts of these activities would be reduced because NPS approval of the

operations plan would require mitigative measures. Short-term impacts on native vegetation because of the potential for the spread of exotic and nonnative species would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of exotic plants. The impact on exotic plants is uncertain, but restoring natural conditions is expected to have a long-term, minor to moderate, beneficial impact on native plants and vegetation.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect exotic plants, as would increases in the amount of disturbed land that is available for colonization by exotic species. The impact of these activities on exotic plants and nonnative vegetation is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on native vegetation would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above could have a minor adverse impact on exotic plants and nonnative vegetation.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on exotic plants. The actions contained in alternative A would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on native vegetation because of the potential for the spread of exotic and nonnative plants would be long term, minor, beneficial, and potentially Addition-wide.

There could be a long-term, minor, adverse cumulative impact on exotic plants and nonnative vegetation. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of native vegetation in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

#### **Federal Threatened and Endangered Species**

**Florida Panther.** Under alternative A, impacts on the Florida panther would be attributed primarily to NPS restoration efforts and limited NPS administrative ORV use and visitor use.

Ongoing vegetation management efforts would continue to improve habitat for panthers as well as for the major game species in the Addition that serve as their primary food source. Partnerships with the Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service would continue and would contribute to the monitoring and improved understanding of the species. Impacts on panthers from ongoing resource management activities would continue to be long term, beneficial, minor, and Addition-wide.

Public ORV use would continue to be prohibited in the Addition under alternative A. The hunting pressure associated with walk-in access only would be expected to be minimal, with no substantial effect on the panther's prey base. Consequently, human use and disturbance in the Addition would continue to be minimal and would maintain conditions that support panther use of the

area as well as robust prey populations. Adverse impacts, such as flushing and displacement of panthers, would continue. The impact would be long term, minor to moderate, adverse, and localized.

Limited administrative ORV use by NPS staff, as well as nonmotorized public use (primarily backcountry hiking), would continue to affect Florida panthers, potentially causing displacement and avoidance of certain areas within the Addition. The impact would continue to be long term, adverse, minor, and localized.

Overall, impacts on the Florida panthers resulting from the continuation of current management (alternative A) would be long term, adverse, minor, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of ORVs on panthers in the region, a beneficial impact because an individual panther's range may include the Preserve as well as the Addition and other adjacent lands. In other words, improving and protecting habitat value on the original Preserve could yield a regional benefit to the species. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on panthers. Adverse impacts on panthers would still occur from ORV use in the original Preserve, but the effects would be less than with no ORV management. With implementation of the terms and conditions of the U.S. Fish and Wildlife Service's "Biological Opinion" (USFWS 2000), the plan is not likely to result in jeopardy to the panther. Overall, the impact of the 2000 *Recreational Off-road Vehicle Management Plan* on the Florida panther would be long term, moderate, and beneficial compared to no ORV management.

Implementation of future oils and gas proposals could have adverse impacts on Florida panthers in the Addition. If such proposals included using off-road equipment and construct ingroads and pads, this could create human disturbances and result in degradation and loss of panther habitat. Short-term adverse impacts from construction could include flushing and displacement of panthers, effects on feeding and sheltering behavior, and an increase in mortality from vehicle collisions. The same types of adverse impacts would be long term due to ongoing operations and maintenance activities. These adverse impacts would be minor and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communities and in turn wildlife habitat. The impact on the Florida panther is uncertain, but restoring natural conditions is assumed to have a long-term, minor, beneficial impact because it would return vegetation communities to historic conditions and improve predator/prey relationships.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a substantial loss of panther habitat. Natural areas that remain are more fragmented and contain higher levels of human disturbance, both of which adversely affect panthers and their long-term survival. Increased panther mortality due to vehicle collisions could also be attributed to the effects of regional growth and development. The impact of these activities on the Florida panther is expected to be long term, moderate to major, and adverse.

Collectively, beneficial impacts on the Florida panther would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development.

Overall, the effects of the projects discussed above would likely be long term, minor to moderate, and adverse on Florida panthers in the region.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the Florida panther. The actions contained in alternative A would contribute a small increment to this cumulative impact.

**Conclusion** — Continuation of current management under alternative A would result in long-term, minor, adverse, mostly localized impacts on the Florida panther across the Addition. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor to moderate, adverse cumulative impact on the Florida panther. The actions contained in alternative A would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not likely result in impairment of the Florida panther in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**West Indian Manatee.** Under alternative A, impacts on the West Indian manatee would be

attributed primarily to continued motorboat use associated with recreational fishing (airboat use is prohibited). Manatees in the creeks, canals, and estuarine area south of U.S. 41 in the Western Addition would be subjected to potential injury from collisions with boat hulls and/or propellers. Manatees would also be displaced from and/or avoid certain areas, which could affect feeding and other behaviors. The National Park Service already manages boating in this area to reduce impacts on manatees and their designated critical habitat. Partnerships with the Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service would continue and would help improve monitoring and recovery of the species. Essential features of critical habitat would not be impacted. Impacts on the West Indian manatee would continue to be long term, adverse, minor, and localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would increase the quantity of freshwater inputs into the estuarine system, a beneficial impact on the manatees. The quality of freshwater inputs is predicted to be less than current conditions, which could adversely impact manatee habitat. Overall, it is expected that restoring natural hydrologic conditions would produce long-term, minor beneficial impacts for the West Indian manatee.

Regional growth and development is expected to continue and could result in an increase in the number of recreational boaters in the region. Injury and mortality of the manatees associated with recreational boating could increase as a result of increased motorboat use. Incompatible coastal development could also adversely affect manatees by loss of habitat and feeding areas, as well as pollution discharges. These activities would adversely

impact manatees and could affect their long-term survival. The impact on the West Indian manatee is expected to be long-term, moderate to major, and adverse.

Overall, the effects of the projects discussed above would likely be adverse to West Indian manatees in the region.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on the West Indian manatee. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

**Conclusion** — Implementation of alternative A would result in localized, long-term, minor adverse impacts on the West Indian manatee. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, moderate, adverse cumulative impact on the West Indian manatee. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the West Indian manatee in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Red-Cockaded Woodpecker.** Under alternative A, impacts on the red-cockaded woodpecker would be attributed primarily to NPS restoration efforts and limited ORV and visitor use.

Ongoing vegetation management efforts, including the use of prescribed fire to maintain preferred understory conditions, would continue to improve habitat for red-cockaded woodpeckers. Long-term, minor to moderate, beneficial, impacts would be anticipated from ongoing resource management activities.

Nonmotorized visitor use (primarily hiking) could continue to affect woodpeckers, potentially causing displacement and their avoidance of certain areas in the Addition; the impact would be long term, negligible to minor, adverse, and localized.

Because there are currently no known nest sites within the Addition, effects on woodpeckers would be limited to impacts on foraging habitat and avoidance of certain areas during periods of human activity. The impacts would be long term, adverse, minor, and localized.

Overall, the continuation of current management (alternative A) would continue to result in long-term, minor to moderate, beneficial, impacts on this species across the Addition. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on red-cockaded woodpeckers in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on woodpeckers. Cavity trees and active clusters would be avoided as trail sites, thereby reducing adverse impacts. Adverse impacts on woodpeckers would still occur from ORV use in pinelands in the original Preserve, but the impact would be minor. Overall, the impact of the 2000 *Recreational Off-road Vehicle Management Plan* on the red-

cockaded woodpecker would continue to be long-term, negligible, and adverse.

Implementation of future oil and gas proposals could have adverse impacts on the red-cockaded woodpecker in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could degrade and reduce available woodpecker habitat. The impacts of these activities would be reduced because NPS approval of the operations plans would require mitigative measures. Short-term adverse impacts could include flushing and displacement of woodpeckers, while long-term impacts could include the loss of cavity nesting trees.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communities (including pinelands) and in turn wildlife habitat. The impact on the red-cockaded woodpecker is uncertain, but restoring natural conditions is assumed to have a long-term, minor, beneficial impact because returning vegetation communities to historic conditions and improving foraging resources would be beneficial.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a substantial loss of woodpecker habitat (pinelands) in the region. Natural areas that remain are more fragmented and contain higher levels of human disturbance and displacement of woodpeckers, both of which adversely affect woodpeckers and their long-term survival. The impact of these activities on the red-cockaded woodpecker is expected to be long-term, moderate, and adverse.

Collectively, beneficial impacts on the red-cockaded woodpecker would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to red-cockaded woodpeckers in the region.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the red-cockaded woodpecker. The actions contained in alternative A would contribute a small beneficial increment to this cumulative impact.

**Conclusion** — The continuation of current management (alternative A) would result in long-term, minor to moderate, beneficial impacts across the Addition. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor to moderate, adverse cumulative impact on the red-cockaded woodpecker. The actions contained in alternative A would contribute a small beneficial increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment on the red-cockaded woodpecker in the Addition because habitat conditions would be maintained or enhanced, and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Wood Stork.** Under alternative A, ongoing NPS efforts to improve natural hydrologic processes would continue, but the wood stork's habitat also would continue to be

affected primarily by water levels and drying conditions resulting from natural climatic events. Currently there are no known stork nest sites within the Addition, and they have nested in the Preserve only sporadically since 1996. The continuation of current management (alternative A), including limited human activity in the Addition associated with limited NPS administrative ORV use and backcountry hiking, would continue to result in negligible adverse impacts on the wood stork. Public hunting would be allowed via walk-in access only. The determination of effect under Section 7 of the Endangered Species Act would be *no effect*.

**Cumulative Impacts** — Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of off-road vehicles on the wood stork's foraging habitat (prairies and marshes) in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on storks. Nesting habitat (cypress trees in open water) would likely not be affected because off-road vehicles typically avoid the deep, open water areas that storks commonly nest in. Consequently, the effect on nesting habitat due to the actions in the 2000 *Recreational Off-road Vehicle Management Plan* would be negligible. Overall, the impact of that plan on the wood stork in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the wood stork in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in loss and degradation of wood stork habitat. The impacts of these activities would be reduced because NPS approval of the operations plans would require mitigative measures. Adverse impacts could include flushing and displacement of wood storks. Short-term impacts on wood storks would

be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions, including food supply. The impact on the wood stork is unknown, but restoring natural hydrologic conditions is expected to have a long-term, minor to moderate, beneficial impact because vegetation communities would return to historic conditions and foraging resources would improve.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development and alteration of the hydrology of the general area. Impacts such as the loss of wetlands and compromised water quality from discharge of urban pollutants into hydrologic systems would adversely affect storks. The impact of these activities on the wood stork is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on the wood stork would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse for wood storks in the region.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on the wood stork. The actions contained in alternative A would add a very small increment to this cumulative impact.

**Conclusion** — Under alternative A, impacts on the wood stork would be long term, negligible, and adverse. The determination of effect under Section 7 of the Endangered Species Act would be *no effect*.

There would be a long-term, minor, adverse cumulative impact on the wood stork. The actions contained in alternative A would add a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the wood stork in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Everglade Snail Kite.** Under alternative A, impacts on the Everglade snail kite would be attributed primarily to NPS restoration efforts and limited NPS administrative ORV use and nonmotorized visitor use.

The snail kite's diet is predominantly apple snails. Given this distinct dependence, the kite can also be affected by actions that affect apple snail populations or affect the kite's access to apple snails. Although there are no known snail kite nest sites in the Addition, kites may occasionally use marshes and open water littoral zones in the Addition for foraging on apple snails. They may also roost in the vicinity of these water bodies. Over time, without disturbances from recreation or hydrologic alterations, it may be possible for kites to nest in the Addition.

Under alternative A, ongoing NPS efforts to improve natural hydrologic processes would continue to benefit apple snail populations in the Addition, which in turn would benefit the kite. However, natural hydrologic cycles would continue to bring yearly fluctuations in apple snail abundance in the Addition, which

would affect foraging opportunities for the kite.

The kite's ability to forage for apple snails depends on water clarity and the lack of dense vegetation in wetlands or pond/lake shallows, because the kite needs to see snails below the water surface. Thus, under alternative A, continued NPS management of invasive plants and water quality in the Addition would also continue to benefit the snail kite by maintaining open, accessible foraging areas in wetlands and open water.

The continuation of current recreation management (alternative A), including limited human activity associated with limited NPS administrative ORV use, backcountry hiking, and walk-in hunting, may continue to occasionally flush or displace foraging or roosting kites in the Addition. This would continue to result in negligible to minor adverse impacts on the Everglade snail kite and its foraging habitat.

Collectively, the continuation of current management (alternative A) would continue to result in long-term, minor to moderate, beneficial, impacts on this species across the Addition. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of off-road vehicles on the snail kite's foraging, roosting, and nesting habitat (marshes and pond/lake fringes) in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on the kites in the region. However, foraging, roosting, or possible nesting habitat for snail kites could be adversely affected in areas where ORV use is permitted under the plan, particularly in specific ORV use areas that are near marshes, ponds, or lakes. Overall, the

impact of that plan on the snail kite in the region would be long term, minor, and beneficial.

Implementation of future oils and gas proposals could have adverse impacts on the snail kite habitat in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in loss and degradation of snail kite habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Adverse impacts could include flushing and displacement of snail kites. Short-term impacts on snail kites would be adverse, moderate, and localized, while long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions, including food supply and water quality. This would be particularly beneficial to the snail kite, because its diet predominantly consists of apple snails that depend on adequate hydrological conditions. Furthermore, the return of natural hydrological conditions and improved water quality to the region would also enhance or increase the availability of quality foraging, roosting, and nesting habitat for the Everglade snail kite. The restoration of natural hydrologic conditions would have long-term, moderate, beneficial impacts.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Impacts such as the loss of wetlands and compromised water quality from discharge of urban pollutants into hydrologic systems would adversely affect snail kites and their primary food source, the apple snail. The impact of these

activities on the snail kite is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on the snail kite would result from improved ORV management and ecosystem restoration projects by mitigating ORV impacts and allowing habitat restoration. Adverse impacts would be expected from oil and gas development and regional growth and urban development. Overall, the effects of the projects discussed above would likely be adverse to snail kite habitat in the region.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on the Everglade snail kite. The actions contained in alternative A would add a small increment to this cumulative impact.

**Conclusion** — Under alternative A, impacts on the Everglade snail kite would be long term, minor to moderate, and beneficial. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

However, there would be a long-term, minor, adverse cumulative impact on the snail kite. The actions contained in alternative A would add a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the Everglade snail kite in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**American Crocodile.** Under alternative A, impacts on the American crocodile and its

habitat would primarily be attributed to continued human activities near mangrove forests, particularly motorized boating associated with recreational fishing in the Western Addition (airboat use is prohibited). Mangrove forests are the primary habitat for the American crocodile in south Florida, although crocodiles are generally rare in Big Cypress National Preserve. The mangrove habitat areas along creeks, canals, and estuaries south of U.S. 41 in the Western Addition are where effects would most likely occur.

In these areas, crocodiles may be affected by motorboat noise, boat wakes and waves, human noise or actions, or boat hulls or propellers. Because most American crocodile activity occurs from just before sunset to just after sunrise, most of these human-induced actions would disturb the crocodiles when they are at rest during daytime hours. These disturbances may cause resting crocodiles to be flushed, resulting in unnecessary energy use and stress. Boating in early morning or evening hours may also alter crocodile foraging behavior or flush the possible prey of the crocodile. Depending on the level and frequency of human disturbances, crocodiles could avoid some areas entirely.

Crocodiles are not known to nest in the Addition. However, if nesting occurs, the hatching success would primarily depend on risks from flooding, predation, lack of soil moisture during incubation, and extreme storms. The nest success also depends on the female crocodile returning to the nest to excavate the hatchlings. Research suggests that some female crocodiles may abandon their nests if the area is subjected to repeated, close human presence (Kushlan and Mazzotti 1989). Once hatched, juveniles would then be affected by similar human disturbances as highlighted above. The young crocodiles would be at greatest risk during their journey through open water from their nest site to more distant nursery habitat.

Given the infrequent presence of crocodiles in the area, the above effects from human

recreation activities such as boating would be long term, minor, adverse, and localized.

Alternative A would also continue current NPS vegetation management actions that would help maintain or improve habitat conditions in the Addition. These actions would help address invasive plant infestations that could degrade or displace habitat for the American crocodile. The impacts of ongoing NPS vegetation management would be long term, minor to moderate, beneficial, and localized.

Under alternative A, the impacts on the American crocodile would continue to be long term, adverse, minor, and localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would increase the quantity of freshwater inputs into the estuarine system, a beneficial impact on the American crocodile. This restoration of hydrologic flows and connectivity would be most beneficial to the crocodile in the nonnesting season when they seek inland freshwater habitats. However, the freshwater inflows are predicted to have lower water quality than current conditions, which could adversely impact crocodile habitat. Overall, it is expected that restoring natural hydrologic conditions would produce long-term, moderate, beneficial impacts for the American crocodile.

Regional growth and development, including waterfront development, is expected to continue in south Florida. This would result in the alteration or displacement of natural lands and changes to the local and regional hydrology. Because mangrove forests receive special protection under state law, any direct

impacts on mangrove forests would be expected to be negligible. However, even if direct impacts on mangroves are avoided, urban encroachment may diminish mangrove habitat values if human activity and development is near the mangroves. Road mortality would likely increase as development and regional population increase. Growth and development could also result in an increase in boating and other recreational activities in the area. Crocodile foraging, breeding, resting, and nesting may be affected by increases in motorboat disturbances, boat wakes and waves, and human noise or actions. Crocodiles could avoid some areas entirely depending on the level and frequency of human disturbances. The impact on the American crocodile from urban growth and development is expected to be long term, moderate, and adverse.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the American crocodile. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

**Conclusion** — Implementation of alternative A would result in localized, long-term, minor, adverse impacts on the American crocodile. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor to moderate, adverse cumulative impact on the American crocodile. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the American crocodile in the Addition

because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Eastern Indigo Snake.** Under alternative A, impacts on potential habitat for the eastern indigo snake would be attributed primarily to NPS restoration efforts, limited NPS administrative ORV use, and nonmotorized visitor use.

NPS vegetation management efforts would continue to improve habitat values for the indigo snake and its prey. Given the snake's dependence on a mosaic of habitat types throughout its lifecycle and its generalist nature in south Florida, the combination of these Addition-wide active management efforts and natural restoration processes (that restore previously disturbed lands) would enhance the conditions for the eastern indigo snake. Impacts on the snake from these ongoing resource management activities would continue to be long term, beneficial, minor, and Addition-wide.

Public ORV use would continue to be prohibited in the Addition under alternative A. Therefore, little or no disturbance to vegetative groundcover or soil substrates would be expected. Other impacts, such as being flushed by public ORV noises, would also be avoided. This continued effect would be particularly beneficial to the eastern indigo in the upland areas of the Addition, such as pinelands or successional hardwood hammocks, which provide habitat conditions for foraging, breeding, and snake burrows or refuges. The prohibition of ORV use under this alternative would also retain the Addition as a large, unfragmented, mosaic of undisturbed snake habitat types, which is essential for viable eastern indigo populations (Layne and Steiner 1996, Breininger et al. 2004).

The hunting pressure associated with walk-in access only would be expected to be minimal,

with negligible effect on the eastern indigo snake or its prey. In addition, continued enforcement of the Endangered Species Act and the Lacey Act would limit the risk of illegal snake capture for the pet trade. Other nonmotorized public use (e.g., backcountry hiking) would also continue, but would only cause sporadic flushing of the snake or its prey. Limited administrative ORV use by NPS staff would also be an occasional, short-term disturbance. Consequently, human use and disturbance in the Addition would continue to be minimal and would maintain habitat conditions that support the eastern indigo snake and its prey. The impact from human activity would be long term, negligible to minor, adverse, and localized.

Collectively, the continuation of current management (alternative A) would continue to result in long-term, minor to moderate, beneficial, impacts on this species across the Addition. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

***Cumulative Impacts*** — Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of ORVs on the wide variety of habitat types that support the eastern indigo snake. Most importantly, the improved ORV management efforts would reduce disturbance or degradation to vegetative groundcover and soil substrates in areas that provide for foraging, breeding, and snake burrows or refugia, such as pine-lands or successional hardwood hammocks. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on the indigo snakes in the region. However, snake habitat might be altered or displaced, and individual snakes may be flushed, in areas where ORV use is permitted under the plan. Overall, the impact of that plan on the eastern indigo in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the eastern indigo snake habitat in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in the loss and degradation of several habitat types that support the snake. Adverse impacts would include displacement of vegetative cover for the snake; soil and burrow disturbances; possible roadway injury/mortality; and disruption of normal foraging, breeding, and dispersal behaviors. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on the snake would be adverse, moderate, and localized, while long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions for many species. This hydrologic restoration could benefit the eastern indigo directly during times of the year when the snake uses wetter habitats in the area. At other times, it would benefit the eastern indigo indirectly by restoring a natural system that could improve conditions and increase populations of the snake's food base. However, the reintroduction of natural flows could displace some existing upland areas. This effect could decrease available upland habitat for the eastern indigo snake and its prey that depend on upland habitat. The restoration of natural hydrologic conditions would have long-term, minor to moderate impacts that could be both beneficial and adverse to the snake.

Regional growth and development is expected to continue and result in an increase in habitat displacement for the snake. Because the eastern indigo uses a variety of habitat types and has a large home range, it is particularly susceptible to

habitat loss and habitat fragmentation from urban development. In addition to habitat displacement and fragmentation, urban development also brings injury or mortality threats from domestic animals, vehicles, and property owners, as well as from pesticides and rodenticides in the food chain. All of these would adversely affect eastern indigos. The impact of these activities on the snake is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on the eastern indigo snake would result from improved ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas development and regional growth and urban development. Overall, the effects of the projects discussed above would likely be adverse to the snake's habitat in the region.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the eastern indigo snake. The actions contained in alternative A would add a small beneficial increment to this cumulative impact.

**Conclusion** — Under alternative A impacts on the eastern indigo snake would be long term, minor to moderate, and beneficial. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

However, there would be a long-term, minor to moderate, adverse cumulative impact on the eastern indigo. The actions contained in alternative A would add a small beneficial increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the eastern indigo snake in the Addition

because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### Major Game Species

**Analysis.** Under alternative A, impacts on the major game species of the Addition (white-tailed deer, feral hogs, and wild turkey) would be attributed primarily to NPS restoration efforts, limited NPS administrative ORV use, and visitor use.

Ongoing vegetation management efforts, including the use of prescribe fire, would continue to improve habitat for major game species by decreasing competition from exotic plants and increasing the availability of native plants as food sources. The deer's preferred browse, the swamp lily, would be favored by reductions of melaleuca. The use of prescribed fire to promote early successional stages of vegetation would provide new vegetative growth for deer browse. Hogs and turkeys would also benefit from ongoing resource management activities. This impact would continue to be minor to moderate, beneficial, and Addition-wide. Short-term adverse impacts, such as flushing and displacement, could occur during implementation of these management activities.

Human activity in the Addition under alternative A would remain minimal — limited to occasional ORV use by NPS staff, infrequent backcountry hiking by the public, and future public hunting via walk-in access only. The hunting pressure associated with walk-in access would be expected to be minimal, with no important effect on the viability of game populations. Short-term, minor adverse impacts, such as flushing and displacement of game species, would continue. Long-term, moderate beneficial impacts could also occur from hunting and management of game populations, such as disease mitigation and

improvements in population genetics. Partnerships with the Florida Fish and Wildlife Conservation Commission would continue and would contribute to the monitoring and improved understanding of game populations.

Overall, impacts on major game species from the continuation of current management (alternative A) would continue to be long term, beneficial, minor, and Addition-wide.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the adverse impacts of off-road vehicles on major game species in the region, a beneficial impact. Eliminating some and designating new ORV trails would make ORV noise and movement more predictable, thereby displacing animals away from travel corridors but reducing the impacts on wildlife habitat and game populations. Conducting education, best management practices, research, and mitigation called for in the 2000 ORV plan would also limit impacts on wildlife. Adverse impacts on major game species would still occur from ORV use in the original Preserve, but the effects on the species from the actions in the 2000 ORV plan would be less than with no ORV management. Overall, the impact of the 2000 ORV plan on major game species would be long term, minor, and beneficial.

Implementation of future oils and gas proposals could have adverse impacts on major game species in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this would create human disturbances and alter wildlife habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Adverse impacts could include flushing and displacement of game species. Short-term impacts on major game species would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communities and in turn wildlife habitat. The impact on the major game species is unknown, but restoring natural conditions is expected to have a long-term, minor to moderate, beneficial impact.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a loss of wildlife habitat. The major game species are considered generalists and have demonstrated their resiliency and ability to adapt to changing conditions. Within the region, the three species (deer, hogs, and turkey) are widespread. However, continued urbanization has fragmented remaining natural areas and increased the risks and threats to these species, including automobile collisions, exotic species, and pathogens. The impact of these activities on the major game species is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on major game species would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects described above would likely be adverse on major game species in the region.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on the major game species. The actions contained in alternative A would contribute an appreciable beneficial increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on major game species from the continuation of

current management would be long term, beneficial, minor, and Addition-wide.

There would be a long-term, minor, adverse cumulative impact on the major game species. The actions contained in alternative A would contribute an appreciable beneficial increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the major game species in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## **WILDERNESS RESOURCES AND VALUES**

### **Analysis**

Per NPS *Management Policies 2006*, eligible land in the Addition would continue to be managed to preserve its wilderness qualities and maintain its potential eligibility for wilderness designation; however, lands within the Addition would not receive any special status or protection from wilderness designation. Because no public ORV use would be allowed, fragmentation of habitats would be minimized, and the current condition of the natural soundscape would continue to be preserved. Opportunities for solitude and primitive and unconfined recreation would continue to be preserved and available. These actions would result in minor to moderate, long-term beneficial impacts.

Hunting, frogging, and fishing would be allowed but would be accommodated by walk-in access only. The minimal public use in the Addition would cause only negligible to minor adverse impacts on wilderness resources and values. Ongoing NPS resource management activities, as well as natural reclamation processes, would continue to improve the long-term naturalness of the Addition, but could cause some short-term adverse impacts on soundscapes and visitor opportunities from restoration actions.

Overall, the impacts on wilderness resources and values would continue to be long term, minor, beneficial, and localized.

### **Cumulative Impacts**

Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the effects of off-road vehicles on wilderness resources and values by reducing the potential for dispersal and establishment of exotic plants, a beneficial impact. The impact on natural soundscapes resulting from the management of off-road vehicles in the original Preserve would be negligible because about the same number of off-road vehicles would be using the original Preserve and in about the same areas. Consequently, impacts on a visitor's wilderness experience (freedom and natural sights and sounds) resulting from the 2000 ORV plan would be negligible. Impacts on wilderness resources and values in the region would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on wilderness resources and values. If such proposals included using off-road equipment and constructing roads and pads, this would create human disturbances and alter natural habitats. NPS approval of the operations plan would require mitigative measures to eliminate or reduce the impact of activities on natural resources. Short-term impacts on wilderness resources and values would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect natural communities. Restoring natural conditions is expected to have a long-term, moderate, beneficial impact on wilderness resources and values.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands in the general area. Increasing urbanization, fragmentation of habitat, and the loss of natural areas have led to the degradation of natural resources, ecosystem function, and natural soundscapes in the region. The impact of these activities on wilderness resources and values is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on wilderness resources and values would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to wilderness resources and values in the region.

When the likely effects of implementing the actions contained in alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on wilderness resources and values in the region. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

## **Conclusion**

Under alternative A, impacts on wilderness resources and values from the continuation of current management would be long term, minor, beneficial, and localized.

There would be a long-term, minor, adverse cumulative impact on wilderness resources and values in the region. The actions contained in alternative A would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of wilderness resources and values in the Addition. (See specific definition of impairment in

the "Impairment of Addition Resources" section.)

## **CULTURAL RESOURCES**

### **Archeological Resources**

**Analysis.** Under alternative A, impacts on archeological resources could result from visitor activities such as hiking, camping, cycling, and equestrian use. Most of the archeological sites in the Addition are middens. These raised mound areas would be potentially attractive to backcountry users, and trampling or disturbance could result in a loss of surface archeological materials, alteration of artifact distribution, and a reduction of contextual evidence. Impacts related to these activities would be permanent, adverse, and of minor intensity.

Archeological resources adjacent to or easily accessible from trails could be vulnerable to looting and vandalism. Continued ranger patrol and emphasis on visitor education, as well as keeping the Addition closed to public recreational ORV use, would minimize adverse effects and any adverse effects would be anticipated to range in intensity from negligible to minor and be permanent. However, looting and vandalism associated with illegal ORV use, as well as the displacement of soils and potential erosion of archeological sites resulting from such ORV use, could result in permanent, minor, adverse impacts on archeological resources.

There is no potential for impacts on archeological sites resulting from facility development.

**Cumulative Impacts.** Current research indicates relatively little disturbance of archeological sites in the Addition resulting from past actions such as hunting and camping, logging, looting, and energy exploration. Large-scale water projects and commercial and residential development could pose some impacts on archeological resources in the vicinity of the Addition. The

number and extent of these archeological resources is unknown so the potential impact cannot be assessed with any degree of accuracy. However, significant archeological resources would likely be avoided to the greatest extent possible, and any impact on archeological resources would be adverse and permanent and range in intensity from minor to moderate.

Implementation of future oil and gas proposals could have adverse impacts on archeological resources. If such proposals included using off-road equipment and constructing roads and pads, this could affect archeological resources. However, because approval of the operations plan would require mitigation measures to eliminate or reduce the impact of activities on archeological resources, the permanent effect of energy exploration on archeological resources should be negligible.

When the permanent, minor, adverse effects of implementing the actions in alternative A are added to the permanent, minor to moderate adverse effects of other past, present, and reasonably foreseeable actions as described above, there would be a permanent, moderate, adverse cumulative impact on archeological resources. The actions contained in alternative A would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative A, impacts on archeological resources would be permanent, minor, and adverse.

There would be a permanent, moderate, adverse cumulative impact on archeological resources. The actions contained in alternative A would contribute a small increment to this cumulative impact.

**Section 106 Summary.** After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of alternative A would generally result in a no adverse effect on archeological resources.

Impacts from actions contained in this alternative would not result in impairment of archeological resources in the Addition.

### **Ethnographic Resources**

**Analysis.** Access to these resources would be limited to recognized traditionally associated peoples. Visitor activities such as hiking, camping, cycling, equestrian use and other recreational uses would not be allowed in or near identified ethnographic sites. Therefore, under alternative A there would be no potential for impacts on ethnographic resources.

There would be no potential for impacts on ethnographic resources or sites resulting from facility development because new development would be sited to avoid ethnographic resources.

**Cumulative Impacts.** Although other past, present, and reasonably foreseeable future actions may affect ethnographic resources in the area, alternative A would have no impacts on ethnographic resources and therefore would not contribute to the effects of other actions. Consequently, there would be no cumulative impacts on ethnographic resources under alternative A.

**Conclusion.** Under alternative A there would be no impacts on ethnographic resources. Therefore there would be no cumulative impacts.

**Section 106 Summary.** After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of alternative A would generally result in a no adverse effect on ethnographic resources.

This would not result in impairment of ethnographic resources in the Addition.

## VISITOR USE AND EXPERIENCE

### Recreational Opportunities

**Motorized Use.** The no-action alternative would not change the current management of the Addition. The National Park Service would continue to manage the Addition to preserve its wilderness characteristics and values, and it would remain closed to ORV use — other than for private property owners with a special use permit and limited NPS administrative use. Access points would be developed at mile markers 51 and 63 per the *I-75 Recreational Access Plan*, providing pull-offs/stopping points within the Addition, but no new facilities would be developed under this alternative. The lack of access and opportunity for ORV users to experience the Addition would continue to have a long-term, moderate, adverse impact on ORV users.

**Nonmotorized Use (including hiking, horseback riding, and bicycling).** Hikers would continue to enjoy temporary access to the Florida National Scenic Trail, but the trail would remain temporary and undesignated. Access points would be developed at mile markers 51 and 63 per the *I-75 Recreational Access Plan*, providing limited access to the Addition for nonmotorized users. Opportunities for backcountry hiking, horseback riding, and dispersed camping would continue to be allowed throughout the Addition. The lack of designated trails would continue to limit the less adventurous nonmotorized user's ability to experience the Addition. The availability of these recreational opportunities would result in long-term, moderate, beneficial impacts for those seeking solitude and a primitive experience, but the lack of designated trails would result in long-term, minor to moderate, adverse impacts on less adventurous hikers.

Bicycling would continue to be available at Nobles Grade in the Addition. The development of an access point at mile marker 63 would enhance biker experiences by eliminating the need to park on the shoulder of I-75. These opportunities would result in long-

term, minor, beneficial impacts on bicyclists. Overall, impacts on nonmotorized users would be long term, negligible, and adverse.

**Hunting (including fishing and frogging).** Under this alternative walk-in hunting would be allowed in the Addition. Nonmotorized hunting would be allowed in designated areas and seasons as determined by the National Park Service in cooperation with the Florida Fish and Wildlife Conservation Commission. New access points at mile markers 51 and 63 would facilitate accessibility to many parts of the Addition. Although hunting with the use of an ORV would not be allowed in the Addition, ORV hunters traveling through the Addition on I-75 would benefit from additional stopping points. Camping access and opportunities would remain dispersed and undeveloped. The ability to hunt in the Addition and an increase in the number of access points would have a long-term, minor to moderate, beneficial impact on nonmotorized hunters and a long-term, negligible, beneficial impact on hunters with off-road vehicles because of more pull-offs/stopping points.

Collectively, implementation of all the actions described above would result in long-term, moderate, adverse impacts on visitor use and experience.

### Cumulative Impacts

Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* would provide up to 400 miles of designated primary ORV trails, 15 ORV access points, and up to 2,000 annual permits in the original Preserve. This quantity of trail miles and permits provides abundant opportunities for operating off-road vehicles. The availability of these opportunities adjacent to the Addition would have long-term, moderate, beneficial impacts on ORV users in the local area.

Implementation of future oil and gas proposals could adversely impact the experience of visitors. Noise and human

activity from the construction of roads and pads and the use of off-road equipment could detract from the experience of those seeking a primitive experience and natural soundscape. Impacts resulting from a reduction in the natural settings of the Addition due to the operation of oil and gas equipment would be long term, minor, and adverse in localized areas.

The south Florida ecosystem restoration project is a large-scale effort among public, private, and nongovernmental entities to restore surface water flows within the region. Implementation of the proposals would improve sheet flows and hydrologic connectivity and likely restore natural conditions to the Addition. This effort would enhance the visitor use and experience by providing increased opportunities for wildlife viewing and experiencing natural settings. Opportunities for hunting in the Addition would also improve with more abundant, healthy wildlife populations. Impacts resulting from the effects of a healthy, fully-functioning ecosystem would be long term, moderate, beneficial, and regionwide.

Regional growth and development are expected to result in increased visitation to the Addition. More visitations over time may result in increased congestion and user conflicts at mile markers 51 and 63. Impacts from growth and development would be long term, minor to moderate, and adverse as a result of increased congestion and user conflict.

Implementation of the *Commercial Services Plan* will initially only affect the original Preserve. The Addition will be addressed in an addendum to that plan after the completion of this *General Management Plan* for the Preserve Addition. The *Commercial Services Plan* proposes to enhance the original Preserve's visitor services through the development of one or more new facilities; a new backcountry camping complex; hunting and fishing guides; buggy, van, and hiking tours; boat and bicycle rentals; and expanded opportunities for birding, wildlife viewing, and photography. Enhanced and expanded

opportunities in the Preserve, prior to an addendum to include the Addition, would increase visitation and may result in increased congestion and user conflicts. Impacts resulting from increased visitation and congestion at mile markers 51 and 63 would result in long-term, minor, adverse impacts on visitors. When the Addition is addressed in an addendum, visitor opportunities to explore and use the Addition could be expanded, but only minimally given the lack of motorized access and minimal access points. If so, impacts from implementing the *Commercial Services Plan* in the Addition would be long term, negligible, and beneficial as a result of expanded opportunities.

Combining the likely effects of implementing the no-action alternative with the effects of other past, present, and reasonably foreseeable actions described above, the cumulative impact on visitor use and experience in the Addition would be long term, moderate, and adverse. The actions contained in the no-action alternative would contribute an appreciable increment to this cumulative impact.

## Conclusion

Under the no-action alternative, recreational ORV use would be nonexistent, whereas informal nonmotorized opportunities would continue and walk-in hunting would be allowed. Collectively, the resulting impacts on visitor use and experience would be long term, moderate, and adverse.

The cumulative impact on visitor use and experience in the Addition would be long term, moderate, and adverse. The actions contained in the no-action alternative would contribute an appreciable increment to this cumulative impact.

## SOCIOECONOMIC ENVIRONMENT

Analysis of economic impacts under alternative A was based on projected visitation to the

Preserve (including the Addition) as well as estimated one-time capital expenditures due to construction activities, if appropriate. Because alternative A would maintain the status quo, visitor spending is assumed to remain as it is today.

### **Local Economy**

**Employment.** Under this no action alternative, long-term direct and indirect employment would remain the same in Collier County. Based on historical trends, the construction, tourist (i.e. entertainment, accommodation, and food service), educational services, and healthcare sectors would continue to be the dominant employers in the county. But, because no new jobs would be created under alternative A, Collier County would not realize any changes to its employment levels. As a result, long-term impacts resulting from alternative A would be localized, negligible, and neutral.

Furthermore, because there would be no new capital expenditures in the Addition, short-term employment impacts would also remain unaffected, because there would be no need to hire labor for construction activity. Based on historical trends, the construction sector would continue to serve as an important employer, employing approximately 20% of the county's workforce (based on 2004 estimates). Consequently, short-term impacts of alternative A would be localized, negligible, and neutral.

**Housing.** Under alternative A, the housing market would remain unaffected in the long-term because employment levels, the primary driver of residential construction, would remain the same. Naples and Marco Island would continue to serve as the primary housing locations for those moving into and within Collier County due to the relatively high availability of residential housing in these areas. Although population growth in the region is one of the fastest in the nation, Collier County is currently experiencing a slowdown in the residential housing market

(as are many parts of southwest Florida), in part due to factors such as overbuilding, inflated prices, sub-prime mortgages, and an overall weaker U.S. economy. Because alternative A would neither increase nor decrease housing supply and demand, it is assumed Collier County's housing market would continue to trend with southwest Florida as a whole. Consequently, the long-term impacts of alternative A would be localized, negligible, and neutral.

Due to a lack of construction activity, alternative A would not create additional temporary jobs and therefore demand for residential housing would remain unchanged. Short-term impacts resulting from alternative A would be localized, negligible, and neutral.

**Sales.** Total sales of goods and services in Collier County, as a result of visitor spending, would remain unchanged under the no-action alternative. In 2004 Collier County had more than 1.4 million visitors who spent roughly \$713 million in the area, providing annual direct and indirect (secondary) sales of more than \$1.06 billion. This represents approximately 17% of the \$6.1 billion in sales for all county industries in 2004. Given that annual taxable sales from 1999 to 2004 grew at a 6.5% compound annual growth rate, it is anticipated that Collier County's economy will continue to grow over the long-term. Because alternative A does not increase or decrease sales revenue, long-term impacts would be localized, negligible, and neutral.

Short-term economic impacts resulting from changes in sales of goods and services would remain unchanged under the no-action alternative. Although the construction industry will continue to serve as a primary economic driver in the region, alternative A does not increase or decrease total economic activity. Without capital expenditures for construction activity, short-term impacts would be localized, negligible, and neutral.

**Tribal Impacts.** In assessing long-term impacts to the Seminole and Miccosukee reservations, it appears that neither tribe

would realize any change in economic activity as a result of implementing alternative A. Consequently, long-term impacts under alternative A would be assumed to be localized, negligible, and neutral.

There would be no short-term economic impacts on the tribes under alternative A because there would be no new construction in the Addition. Consequently, short-term impacts under alternative A would be localized, negligible, and neutral.

Collectively, the long-term and short-term impacts resulting from implementing the no-action alternative would be localized, negligible, and neutral.

### Cumulative Impacts

The action area for evaluating cumulative impacts on the socioeconomic environment is Collier County. The likely effects of implementing the actions contained under alternative A, in combination with the effects of other past, present, and reasonably foreseeable actions are described below.

The implementation of the *Recreational Off-Road Vehicle Plan*, which provides for a maximum of 2,000 permits, 15 access points, and 400 miles of designated trails, has a strong likelihood of attracting new visitors and locals to the Preserve. Such an increase in Preserve visitation would translate into greater visitor spending in the area, resulting in positive long-term gains for Collier County in terms of employment, housing, and taxable annual sales, as well as increased economic activity for the Miccosukee and Seminole tribes. However, relative to the economy of the entire county, long-term economic impacts would likely be minimal. Short-term impacts as a result of one-time capital expenditures from building ORV trail access, facilities, and other structures are also likely to be minimal relative to the overall level of construction activity within the county. As a result, both long-term and short-term cumulative impacts would be localized, negligible, and beneficial.

Although the *Commercial Services Plan* does not include the Addition, social and economic impacts to the county as a whole would be positive due to increased visitation and visitor spending in the area, and expansion of facilities, services, and recreational opportunities in the Preserve. In particular, the implementation of the *Commercial Services Plan's* preferred alternative, which includes the potential to develop two new visitor facilities, partnership agreements for offering a variety of guided tours and equipment rentals, and the creation of a backcountry camping complex, could translate into moderate long-term gains in visitor spending at the county level. Depending on the level of construction activity generated from implementation of the *Commercial Services Plan*, short-term impacts could be substantial at the county level. As a result, both long-term and short-term cumulative impacts would be localized, negligible to moderate, and beneficial.

The potential exists for exploration activities, as proposed under the oil and gas plan, to reduce visitation in the Preserve due to environmental disruptions from the use of off-road equipment and the development of roads and pads for oil and gas exploration. Due to multiplier effects, long-term impacts from reduced visitation could result in reductions in county employment, housing, and sales, as well as reduced economic activity for the Miccosukee and Seminole tribes. However, such effects will likely be minimal in relation to the entire county economy. Short-term impacts from construction could be both positive and substantial, depending on the level of construction and percentage of that economic activity that remains within the county. Long-term impacts would be localized, negligible, and adverse, while short-term impacts would be localized, negligible to moderate, and beneficial.

The south Florida ecosystem restoration projects would likely attract additional visitors to the region due to the rehabilitation of natural ecosystems within and near the Preserve through various water system improvements. In particular, the Big Cypress

Interceptor Modification Plan would likely increase use across a variety of recreational activities offered in the Preserve, particularly for visitors interested in enjoying the natural habitat and wildlife. Collier County would also benefit from restoration efforts in nearby sites, such as Everglades National Park, because additional visitors may pass through or decide to make an additional stop at the Preserve. Because these restoration projects are relatively large in scale, are occurring at multiple sites, and are at a regional level, the long-term impacts on county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes could be substantial. Short-term impacts would also be positive because capital expenditures on water infrastructure improvements (estimated at multi-billions of dollars) would likely generate substantial temporary gains to county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes. As a result, both long-term and short-term impacts would be localized, moderate, and beneficial.

The development of lands northwest of the Addition could increase Preserve visitation and result in positive long-term economic impacts at the county level. In particular, the availability of greater residential housing and the building of a new private and state university in the area could greatly increase the number of residents living in Collier County. The provision of additional services, goods, and facilities would also likely be expanded to accommodate these new residents, which in turn would also attract a greater number of visitors from outside the region. As a result, increased local and visitor spending would produce long-term positive gains to county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes. Short-term economic impacts could be substantial at the county level, because large scale construction activity would be needed to support new residents, the universities, and visitors. As a result, long-term and short-term impacts would be localized, moderate to major, and beneficial.

Each of the tribes, to varying degrees, is expanding services offered to reservation visitors, which currently includes retail, food, accommodations, and entertainment. Although these projects could increase economic activity within the reservations, alternative A would not further benefit these activities.

Combining the likely effects of implementing the no-action alternative with the effects of other past, present, and reasonably foreseeable actions described above, the cumulative socioeconomic impacts would be localized, moderate, and beneficial. Alternative A would contribute a very small increment to this cumulative impact.

### **Conclusion**

Because there would be no changes to visitor spending or construction activity within Collier County under alternative A, long-term and short-term impacts on the socioeconomic environment would be localized, negligible, and neutral. As a result, county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes, would remain constant.

In terms of cumulative impacts, long-term and short-term impacts would be localized, moderate, and beneficial. Alternative A would contribute a very small increment to this total cumulative effect.

### **NPS OPERATIONS AND MANAGEMENT**

#### **Analysis**

Under the no-action alternative, NPS operations would be conducted much as they are now. Operations would continue to be based in the original Preserve, which is at a minimum an hour drive from the Northeast Addition. NPS staff's reduced efficiency and ability to respond to fire or enforcement issues in the Addition would be a continuing,

minor to moderate, long-term, adverse impact.

### **Cumulative Impacts**

Expansion of nearby communities, including the towns of Ave Maria and Big Cypress, Everglades ecosystem restoration activities, and oil and gas exploration activities would require time and attention by NPS staff. The expansion of commercial services offered in the original Preserve would require time from staff spent managing the commercial service authorizations and leases. Cooperation and coordination with neighboring agencies and entities regarding planning, land use resources, and development proposals near the Preserve also would require substantial amounts of staff time and result in minor to moderate, long-term, adverse impacts.

Combined with other past, present, and reasonably foreseeable future impacts, the no-action alternative would result in minor to moderate, long-term, adverse impacts on NPS operations. The actions proposed for implementation in alternative A would contribute a modest increment to these cumulative effects.

### **Conclusion**

Operational and visitor facilities in the original Preserve would result in continuing minor to moderate, long-term, adverse impacts on NPS operations.

The cumulative impacts of the no-action alternative and other actions would be minor to moderate, long term, and adverse. The actions proposed for implementation in alternative A would contribute a modest increment to these cumulative effects.

### **EFFECTS ON ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL**

Under alternative A, no new facilities would be developed, thereby eliminating any new energy requirements for facility construction. Public use of the Addition would remain very limited. The fuel and energy consumed by visitors traveling to the Addition would not be likely to increase because visitation is not likely to increase. Energy would still be consumed to maintain existing facilities and for resource management of the Addition.

### **UNAVOIDABLE ADVERSE IMPACTS**

Unavoidable adverse impacts are defined as impacts that cannot be fully mitigated or avoided. Adverse impacts on natural and cultural resources and visitor experience could occur in some areas throughout the Addition, resulting from limited public use or NPS management activities.

### **IRRETRIEVABLE OR IRREVERSIBLE COMMITMENTS OF RESOURCES**

Under alternative A, the energy requirements identified above would result in an irreversible commitment of resources. There would be no permanent effects on Addition resources.

### **RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE OR ENHANCEMENT OF LONG-TERM PRODUCTIVITY**

In this alternative, most of the Addition would be protected in a natural state and would maintain their long-term productivity. Only a small percentage of the Addition would be maintained as developed areas.

## ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE B

### NATURAL RESOURCES

#### Surface Water Flow

**Analysis.** Under alternative B, impacts on surface water flow would be attributed primarily to the development of new facilities, the maintenance of existing facilities, and restoration activities. Development of new facilities such as trails, trailheads, and access points would alter natural sheet flow, degrading hydrologic connectivity in some localized areas. Development (including formalization of and improvements to existing trails) of about 132 miles of ORV trails would create localized barriers to surface water flow due to raised trail treads and ORV use. Culverts and other best management practices such as at-grade trail construction and low-water crossings would reduce the impacts, resulting in long-term, moderate, adverse, localized impacts. NPS administrative ORV use would continue to affect surface water flow in localized areas on a short-term basis.

Impacts on surface water flow due to the presence of roads and grades would be about the same as in the no-action alternative. These impacts would continue to be long term, adverse, and of moderate intensity. Existing grades, such as Jones, Nobles, and Bear Island grades, would be maintained and converted to trails, which would continue to affect hydrologic connectivity within localized areas of the Northeast Addition. The effects could extend beyond the immediate area of impact and become Addition-wide, because impediments to water flow could affect areas beyond the boundaries of the Addition. Impacts related to the presence of facilities and structures would be long term, moderate, adverse, and localized.

In the context of the regional hydrology of south Florida, the actions of alternative B

would have negligible effects on the hydrologic restoration efforts associated with the Comprehensive Everglades Restoration Plan or related projects. For example, the surface water restoration benefits that would result from the proposed L-28 interceptor project to the east of the Addition would not be adversely affected by the ORV management of alternative B.

Collectively, the impact of these activities on surface water flow would be long term, moderate, adverse, and mostly localized in the Addition compared to the no-action alternative.

**Cumulative Impacts.** Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on surface water flow into the portion of the Addition that abuts the original Preserve at localized sites because best management practices and mitigation would maintain or improve hydrologic flow. The impact on surface water flow in the watershed would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on surface water flow. If such proposals included using off-road equipment and constructing roads and pads, this would alter local hydrology. Construction and operations activities would affect the timing and intensity of surface water flows. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on surface water flow would be adverse, minor to moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. Proposals involving the Addition include the removal of the L-28 interceptor canal levee, modification of the L-28 Tie Back canal, and operational changes to various water control structures. Decompartmentalization of Water Conservation Area 3 would also improve sheet flow and hydrologic connectivity. The impact of these efforts on the hydrology of the Addition, as well as within the watershed, is expected to be long term, major, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect hydrologic function and connectivity in the watershed. The impact of these activities is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on surface water flow would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would be negligible on surface water flow in the watershed.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there could be a long term, minor, adverse cumulative impact on surface water flow. The actions contained in alternative B would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative B, impacts on surface water flow would be long term, moderate, adverse, and mostly localized.

There could be a long-term, minor, adverse cumulative impact on surface water flow. The actions contained in alternative B would

contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of surface water flow in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### Water Quality

**Analysis.** Under alternative B, impacts on water quality would be attributed primarily to the development and maintenance of facilities and ongoing visitor use. Development of new facilities such as trails, trail-heads, and access points would affect water quality by causing erosion that could contribute to turbidity. Inadvertent spills of fuel or oil from construction machinery could also adversely affect water quality. Impacts from these activities would be mostly short term, minor to moderate, adverse, and localized; however, some long-term impacts could occur from larger spills or from ongoing pollution due to runoff from developed sites. The maintenance of roads, grades, and trails within the Addition would likely result in similar long-term adverse impacts.

Visitor use, such as ORV use, hiking, biking, horseback riding, and backcountry camping, could continue to cause soil erosion and generate human waste that would affect turbidity and surface water quality. Impacts on water quality would be reduced by the designated trail system; however, they would be greater than under the no-action alternative because off-road vehicles are not allowed in alternative A. Inadvertent leaks or spills of fuel or oil from ORV use (public and NPS administrative use) could affect surface water quality by elevating chemical concentrations. Similar impacts from parked vehicles would be more common at destination sites, such as mile markers 51 and 63, or Deep Lake. The impacts of these activities would be long term, minor, adverse, and localized.

Collectively, the impact of these activities on water quality would be long term, moderate, adverse, and localized.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on water quality at localized sites in the portion of the Addition that abuts the original Preserve because best management practices and mitigation would be used to minimize soil erosion and chemical contamination. The impact of these activities on water quality in the watershed would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on water quality. If such proposals included using off-road equipment and constructing roads and pads, this could degrade water quality due to turbidity and chemical contamination. The impacts of these activities would be reduced because NPS approval of the operation plan would require mitigative measures. Short-term impacts on water quality would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized. This is due to the numbers and complexity of the proposals and uncertainty with their levels of success.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. Although the proposals would increase surface water flow and connectivity, the discharged waters are expected to have elevated chemical concentrations that would degrade water quality. Because the current condition of water resources in the Addition is cleaner than what is expected to be discharged, the impact is predicted to be long term, adverse, and Addition-wide, but the intensity is unknown. This is due to the numbers and complexity of the proposals and uncertainty with their levels of success. The impact on water quality in the watershed is unknown.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Water quality would be affected by inputs from urban and suburban development, including increases in organic compounds and chemical concentrations. The impact on water quality within the watershed is expected to be adverse, but the intensity is unknown.

Collectively, adverse impacts could be expected from oil and gas operations, ecosystem restoration projects, and regional growth and development. Overall, the effects of the projects discussed above could be adverse to water quality in the watershed, but the intensity is unknown.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, adverse cumulative impact on water quality in the watershed. The intensity of the impact is unknown. The actions contained in alternative B would contribute a very small increment to this cumulative impact.

**Conclusion.** Under alternative B, impacts on water quality would be long term, moderate, adverse, and localized.

There would be a long-term, adverse cumulative impact on water quality in the watershed. The intensity of the impact is unknown. The actions contained in alternative B would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of water quality in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Wetlands

**Analysis.** Under alternative B, impacts on wetlands would be attributed primarily to the development and maintenance of facilities. The development of new facilities, such as trails, trailheads, access points, and specific improvements to develop Deep Lake into a day use area would result in permanent loss of wetlands.

The designation and construction of ORV trails could also adversely impact wetland function and integrity. The proposed 132 miles of primary ORV trails under alternative B, which would also be used by equestrians, bicyclists, and hikers, would cause the direct displacement of a relatively small acreage of wetlands (from trail construction and treatment). These impacts on wetland size and functionality from ORV trail development would be long term, minor to moderate, adverse, and localized.

However, the public use of the ORV trails would also have other adverse effects on wetland values in several other areas throughout the designated ORV trail network. Under alternative B, several miles of primary ORV trails would run through wetland areas. This could amount to direct adverse impacts on wetland functions or values for a notable acreage of wetlands. Also, adverse impacts on additional acreages of wetlands would also be expected because many of the impacts on wetland values or functions would likely extend beyond the 12-foot width of the primary trail or would be associated with secondary spur trails that develop outside the alignment of the primary trail.

Some effects on wetland functions and values that would be expected along ORV trail corridors (primary or secondary) include wetland vegetation displacement, rutting, altered wetland hydrology, soil compaction, and diminished wetland habitat value or habitat displacement (loss of vegetation, ORV noise, etc.). These impacts on wetland values and functional integrity

from ORV use in the Addition would be long term, moderate, adverse, and localized.

The NPS maintenance of roads, grades, and trails could also impact wetlands. Impacts from these activities would include vegetation loss and alteration of soils, which would result in permanent effects on wetland size and integrity and impacts would be long term, moderate, adverse, and localized. Indirect impacts, such as increased runoff and sedimentation, would be long term, minor, adverse, and localized.

Collectively, compared with alternative A (no action), impacts on wetland values and functions under alternative B would be long term, moderate, adverse, and localized.

The site-specific functional analysis of wetland impacts from ORV trails throughout the Addition is beyond the scope of this management plan. However, before any action implementation, NPS staff would conduct more detailed wetland impact and mitigation analyses per NPS policy and Section 404 of the Clean Water Act (as administered by the Army Corps of Engineers). For example, NPS policy requires the development of a “Wetlands Statement of Findings,” that identifies and analyzes all wetland functions and values affected by NPS actions in a park unit. The “Wetlands Statement of Findings” for this management plan for the Addition would quantify all wetland impacts from management actions specified in this management plan. Although Section 404 of the Clean Water Act pertains only to wetland filling and dredging, the NPS statement of findings policy addresses the impacts on several other wetland values, such as wildlife habitat, soils, vegetation communities, surface hydrology, aesthetics, and cultural values.

The detailed functional analysis of wetland impacts and the development of wetland avoidance and mitigation measures would be completed as part of the “Wetlands Statement of Findings.” The effects of ORV use associated with this management plan

would likely be the primary focus of the "Wetlands Statement of Findings" for the Addition. No ORV use, ORV trail development, or other actions with wetland impacts would be implemented or allowed until the appropriate wetland policy requirements are met.

Collectively, compared with the no-action alternative, impacts on wetlands under alternative B would be long term, moderate, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of future oil and gas proposals could have adverse impacts on wetlands. If such proposals included using off-road equipment and constructing roads and pads, this would alter wetland soils and vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on wetlands would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow in the region. The proposals would affect wetlands by increasing the availability of water, which in turn could increase the size, integrity, and function of wetlands. The impact of these efforts on wetlands is expected to be long term, moderate to major, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow and water quality would affect the size, integrity, and function of wetlands in the watershed. The impact of these activities on wetlands would be long term, moderate to major, and adverse.

Collectively, beneficial impacts on wetlands would accrue from ecosystem restoration

projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would be slightly adverse on wetlands.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on wetlands. The actions contained in alternative B would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative B, impacts on wetlands would be long term, moderate, adverse, and localized.

There would be a long-term, moderate, adverse cumulative impact on wetlands. The actions contained in alternative B would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of wetlands in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## **Soils**

**Analysis.** Under alternative B, impacts on soils would be attributed primarily to facility development and maintenance and visitor use.

Development and maintenance of new recreational facilities, such as at mile markers 51 and 63, Bear Island Grade, and Deep Lake, would result in displacement or permanent loss of soil resources. Designating 132 miles of ORV trails would cause similar impacts; however, these impacts would be reduced by using existing trails and designating ORV routes. Frontcountry development would typically compact previously disturbed/filled areas, while

backcountry developments could impact native soils. The impacts from these activities would be long term, moderate, adverse, and localized.

Some rutting and displacement of soils might occur due to ongoing ORV use, resulting in long-term, minor, adverse, localized impacts. Impacts on soils from ORVs would be confined to the designated trail system. Non-motorized use (equestrians, bicyclists, and hikers) could also cause erosion, but the adverse impact would likely be negligible to minor.

Collectively, impacts on soils from alternative B would be long term, moderate, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of future oil and gas proposals could have adverse impacts on soils. If such proposals included using off-road equipment and constructing roads and pads, this would alter soils. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on soils would be adverse, moderate, and localized; long-term impacts would be minor, adverse, and localized.

Changes in the availability of water resources due to the south Florida ecosystem restoration project would affect soil properties. The integrity of hydrologic soils could be improved or restored by increases in water — a beneficial impact.

Decreases in water or permanent soil loss resulting from regional growth and development would adversely impact soils. The impact of these efforts on soils is expected to be long term, moderate to major, and adverse.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and

reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on soils. The permanent loss of soils would be expected to outweigh any beneficial impacts that might be realized from ecosystem restoration projects. The actions contained in alternative B would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative B, impacts on soils would be long term, moderate, adverse, and localized.

There would be a long-term, moderate, adverse cumulative impact on soils. The actions contained in alternative B would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of soils in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### Floodplains

**Analysis.** Alternative B would have no impact on floodplains. Two facilities located in the 100-year floodplain would be retained, but would cause no additional impacts to floodplains beyond what is accounted for under the no-action alternative.

**Cumulative Impacts.** No cumulative impacts to floodplains would occur under alternative B because there would be no impacts on floodplains resulting from the alternative B.

**Conclusion.** Alternative B would have no impact on floodplains. Two facilities located in the 100-year floodplain would be retained, but would cause no additional impacts to floodplains beyond what is accounted for under the no-action alternative.

No cumulative impacts to floodplains would occur under alternative B because there would be no impacts on floodplains resulting from the alternative B.

Impacts from actions contained in this alternative would not result in impairment of floodplains in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Vegetation — Cypress Strands and Domes, Mixed Hardwood Swamps, and Sloughs**

**Analysis.** Under alternative B, impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would be attributed to new facility development and visitor use.

Development of trailheads and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake would result in vegetation loss or injury from construction activities. Establishment of 132 miles of ORV trails would result in similar impacts on vegetation. Impacts on this vegetation community from facility development would be long term, moderate, adverse, and localized.

Impacts on this vegetation community such as trampling, injury, or loss of plant material due to the effects of ORV traffic could occur within and along designated ORV trails. The conditions that often discourage ORV use (deep water, closely spaced trees, etc.) would continue, and adverse impacts from off-road vehicles would most often be limited to the margins of the plant community. Adverse impacts could include injury to a plant or group of trees, or might include plant loss in a discrete area due to repeated use. Impacts from nonmotorized visitor use, such as trampling from hiking and camping, would be more common at frontcountry destinations and less common in the backcountry. Impacts on cypress strands and domes, mixed hardwood swamps, and sloughs from

these visitor activities would be long term, moderate, adverse, and localized.

Collectively, the impact on cypress strands and domes, mixed hardwood swamps, and sloughs under alternative B would be long term, moderate, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would have the potential to alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on this vegetation community would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect plant communities and would likely improve plant vigor, abundance, and distribution. The impact of these efforts on cypress strands and domes, mixed hardwood swamps, and sloughs is expected to be long term, minor to moderate, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area.

Changes in sheet flow, and its timing and intensity, would affect plant communities. The impact of these activities on cypress strands and domes, mixed hardwood swamps, and sloughs is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above could slightly benefit cypress strands and domes, mixed hardwood swamps, and sloughs.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, beneficial cumulative impact on cypress strands and domes, mixed hardwood swamps, and sloughs. The actions contained in alternative B would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative B, impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would be long term, moderate, adverse, and localized.

There could be a long-term, minor, beneficial cumulative impact on cypress strands and domes, mixed hardwood swamps, and sloughs. The actions contained in alternative B would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of cypress strands and domes, mixed hardwood swamps, and sloughs in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Vegetation — Prairies and Marshes

**Analysis.** Under alternative B, impacts on prairies and marshes would be attributed primarily to visitor use. New facilities (including ORV trails) would be sited to avoid prairies and marshes to the greatest extent possible, although some adverse impacts on the margins of these plant communities could occur from ORV use. The soil conditions in prairies and marshes cause poor traction for off-road vehicles, and rutting and braiding of trails is common. Adverse impacts could include injury to a plant or group of plants, or might include plant loss in a discrete area due to rutting or from repeated use. Impacts on prairies and marshes from ORV use would be long term, minor, adverse, and localized.

Ongoing vegetation management, including the use of prescribed fire, and efforts to restore natural hydrologic processes would continue to improve conditions for native vegetation because water availability and connectivity would increase and competition from exotic plants would be minimized. Impacts on prairies and marshes from vegetation management would continue to be long term, beneficial, minor to moderate, and Addition-wide.

Some prairies and marshes would be accessible to nonmotorized users, and therefore could be subject to impacts, such as trampling of vegetation. Impacts would be greatest and more concentrated in frontcountry locations and less common in the backcountry. Impacts on prairies and marshes from visitor use would be long term, negligible, adverse, and localized.

Collectively, the impact on prairies and marshes under alternative B would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within

the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oils and gas proposals could have adverse impacts on vegetation; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be moderate, adverse, and localized; long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect plant communities and would likely improve plant vigor, abundance, and distribution. The impact of these efforts on prairies and marshes is expected to be long term, minor to moderate, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect plant communities. Prairies and marshes on private land outside of the Addition would continue to be impacted by population growth and development. The impact of these activities on prairies and marshes is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on prairies and marshes would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above on

prairies and marshes would be long term, minor, and adverse.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on prairies and marshes. The actions contained in alternative B would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative B, impacts on prairies and marshes would be long term, minor, adverse, and localized.

There would be a long-term, minor, adverse cumulative impact on prairies and marshes. The actions contained in alternative B would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of prairies and marshes in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Vegetation — Mangrove Forests**

**Analysis.** Impacts on mangrove forests under alternative B would generally be the same as under the no-action alternative because recreational use in this vegetation community would be the same as in alternative A (no action). As in alternative A, motorized boating would continue to be allowed south of U.S. 41 in the Western Addition in the deep, open-water environs outside the dense mangrove forests. Motorized boating could continue to cause injury to individual plants or prevent their expansion into the shallower margins of the well-travelled boating corridors. Consequently, compared to the no-action alternative, there would be no impact on mangrove forests in the Addition under alternative B.

**Cumulative Impacts.** Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Regional growth and development, including waterfront development, is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Mangroves receive special protection under state law, and any adverse impacts on mangrove forests would be expected to be negligible. Because alternative B would not contribute any increment, there would be no cumulative impact.

**Conclusion.** Alternative B would have no impact on mangrove forests. Impacts on mangroves would be the same as what was accounted for under the no-action alternative.

There would be no cumulative impacts on mangrove forests under alternative B.

Impacts from actions contained in this alternative would not result in impairment of mangrove forests in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Vegetation — Pinelands**

**Analysis.** Under alternative B, impacts on pinelands would be attributed to new facility development and visitor use.

Ongoing vegetation management, including the use of prescribed fire, would decrease competition from exotic plants and improve the integrity of native habitats. Impacts on pinelands from vegetation management would continue to be long term, beneficial, minor to moderate, and Addition-wide.

Development of trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake would result in vegetation loss or injury from construction activities. Establishment of 132 miles of ORV

trails would affect pinelands. Impacts on pinelands would likely be proportionately greater than for the other vegetation communities because pinelands are often targeted as appropriate development sites and trail corridors. The durability of the substrate present in pinelands reduces adverse impacts from ORV use. The loss of pines from ORV use has not been documented in the original Preserve; however, wheeled use could have adverse impacts on other plant species present within these communities or within certain ecotonal areas. Adverse impacts could include injury to a plant or group of plants or reduced regeneration, or plant loss in a discrete area due to repeated use. Impacts on pinelands from facility development and trail development and use would be long term, moderate, adverse, and localized.

Impacts from nonmotorized visitor use, such as trampling due to hiking or equestrian use, would be more common at frontcountry destinations and less common in the backcountry. Although individual understory plants could be injured or killed, the integrity of the pineland community would not likely be affected due to the durable substrate and the resiliency of mature trees to relatively benign activities. Impacts on pinelands from these activities would be long term, negligible to minor, adverse, and localized.

Collectively, the impact on pinelands under alternative B would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation in the Addition; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be moderate, adverse, and localized; long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of pinelands. The assemblage of pines and palmettos could change as a result of changes in hydrology or periods of inundation. The impact is uncertain because drying often adversely impacts pinelands, and increasing the water table could also cause a net reduction in pinelands compared to current conditions. It is expected that restoring natural hydrologic conditions would have a beneficial impact on pinelands.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Studies have shown that pinelands are the habitat most impacted by human land conversion. Pinelands on private land in the region would continue to be lost. The impact would be long term, moderate to major, and adverse.

Collectively, beneficial impacts on pinelands would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the

projects discussed above would be adverse on pinelands in the Addition.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate to major, adverse cumulative impact on pinelands. The actions contained in alternative B would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative B, impacts on pinelands would be long term, minor, adverse, and localized.

There could be a long-term, moderate to major, adverse cumulative impact on pinelands. The actions contained in alternative B would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of pinelands in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Vegetation — Hardwood Hammocks**

**Analysis.** Under alternative B, impacts on hardwood hammocks would be attributed primarily to new facility development and visitor use.

Ongoing vegetation management would decrease competition from exotic plants and improve the integrity of native habitats. Impacts on hardwood hammocks from vegetation management would continue to be long term, beneficial, minor to moderate, and Addition-wide.

Development of trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake could result in vegetation loss or injury from construction activities. Establishment of 132 miles of ORV trails would affect hardwood hammocks.

Although the substrate present in hardwood hammocks is suitable for ORV use, use tends to be infrequent because of the size and density of trees present in these areas. However, infrequent ORV use could adversely impact understory plants. Adverse impacts could include injury to a plant or group of plants or might include plant loss in a discrete area due to repeated use. Impacts on hardwood hammocks from facility development and ORV use would be long term, minor to moderate, adverse and localized.

Impacts from nonmotorized visitor use, such as trampling due to hiking or equestrian use, would be more common at frontcountry destinations and less common in the backcountry. Backcountry camping could cause trampling or loss of vegetation at localized sites. Although individual understory plants could be injured or killed, the integrity of the hammock community would not likely be affected due to the durable substrate and the resiliency of mature trees to relatively benign activities. Impacts on hardwood hammocks from these activities would be long term, negligible to minor, adverse, and localized.

Collectively, the impact on hardwood hammocks under alternative B would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation in the Addition; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced

because NPS approval of the operation plan would require mitigative measures. Short-term impacts on vegetation would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of hardwood hammocks. The impact is uncertain, but restoring natural conditions is expected to have a long-term, minor, beneficial impact.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect plant communities. The impact of these activities on hardwood hammocks is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on hardwood hammocks would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above on hardwood hammocks would be long term, minor, and adverse.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on hardwood hammocks. The actions contained in alternative B would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative B, impacts on hardwood hammocks would be long term, minor, adverse, and localized.

There could be a long-term, minor, adverse cumulative impact on hardwood hammocks. The actions contained in alternative B would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of hardwood hammocks in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Exotic/Nonnative Plants**

**Analysis.** Under alternative B, impacts on exotic/nonnative plants would be attributed primarily to facility development and maintenance, visitor use, NPS restoration efforts, and NPS administrative ORV use. Ongoing vegetation management (including the use of prescribed fire and chemical and mechanical treatment) in the Addition would continue to decrease competition from exotic plants and improve the integrity of native habitats. The continuation of monitoring efforts would also help to detect and mitigate new exotic species that could affect native plant communities. Impacts on exotic/nonnative species from ongoing resource management activities would be long term, beneficial, moderate, and Addition-wide.

New facility development — such as trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake — would create disturbed lands that would be subject to colonization by invasive plants. Construction materials and activities could also be a seed source for exotic plants and would increase the potential for their dispersion. Maintaining these facilities would also create disturbed habitats that could increase the density of exotic plants and affect the integrity of adjacent natural

areas. Exotic plants can have severe effects on the integrity of native systems and habitats. The impact from these activities would be long term, moderate, adverse, and localized.

NPS administrative ORV use and expanded visitor use, including the establishment and use of 132 miles of ORV trails, would increase the dispersal of exotic plants and also create additional disturbed areas that would be subject to colonization by invasive plants. The impact on exotic plants from visitor use would be long term, moderate, adverse, and localized. Although the effects would be most pronounced along travel corridors and at disturbed sites, the impacts could extend beyond these immediate areas and become Addition-wide. However, ORV management includes education, prevention, and mitigation components that would limit the establishment and distribution of exotic plants in the Addition.

Collectively, impacts on exotic/nonnative plants under alternative B would be long term, moderate, adverse, and potentially Addition-wide.

**Cumulative Impacts.** Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on exotic plants and nonnative vegetation in the Preserve and reduce the potential for dispersal into the Addition. The impact on exotic plants and nonnative vegetation in the region would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on native vegetation because of the potential for the spread of exotic and nonnative plants in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this would disturb soils and native vegetation. Short-term impacts could include the establishment of exotic plants on

disturbed sites and the dispersal of seeds and plant stock. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on native vegetation because of the potential for the spread of exotic and nonnative species would be adverse, moderate, and localized; long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of exotic plants. The impact on exotic plants is unknown, but restoring natural conditions is expected to have a long-term, minor to moderate, beneficial impact on native plants and vegetation.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect exotic plants, as would increases in the amount of disturbed land that is available for colonization by exotic species. The impact of these activities on exotic plants and nonnative vegetation is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on native vegetation would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above could be minor and adverse on exotic plants and nonnative vegetation.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor,

adverse cumulative impact on exotic plants. The actions contained in alternative B would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative B, impacts on native vegetation because of the potential for the spread of exotic and nonnative plants would be long term, moderate, adverse, and potentially Addition-wide.

There could be a long-term, minor, adverse cumulative impact on exotic plants and nonnative vegetation. The actions contained in alternative B would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of native vegetation in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### Federal Threatened and Endangered Species

**Florida Panther.** Under alternative B, impacts on the Florida panther would be attributed to new facility development, expanded visitor use and expanded NPS administrative ORV use.

New facility development — such as trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake — would impact panthers by causing short-term disturbances associated with construction activities and permanent loss of habitat. Development footprints would be confined to previously disturbed areas to the greatest extent possible while also considering design needs and standards (e.g., using disturbed areas near existing access points along major highways). There would still be a loss of habitat within the panther home range. Facility development under alternative B would be greater than in the no-action alternative. The impact would be long term, minor to moderate, adverse, and localized.

Public ORV use in the Addition under alternative B would be allowed on up to 132 miles of designated trails and through the issuance of up to 660 annual ORV permits. Adverse impacts from ORV use could include displacement of panthers and their avoidance of certain areas within the Addition. Public hunting would also be allowed but is not expected to adversely impact the viability of the panther's prey base because game populations would be managed for sustainable harvests. Although no studies have shown that ORV use alone causes changes in panther behavior (NPS 2000), the Janis and Clark (1999) study on the effects of human activity in the original Preserve showed that panthers' home range shifted and they avoided designated ORV trails during higher levels of human activity associated with the hunting season. Total human use and disturbance within panther habitat in the Addition would increase substantially relative to the no-action alternative. The impacts from these activities would be long term, moderate, adverse, and could be Addition-wide.

Nonmotorized visitor use (primarily back-country hiking) could continue to affect Florida panthers, potentially causing occasional displacement of panthers and their avoidance of certain areas within the Addition; the impact would be long term, minor, adverse, and localized.

Designating lands as wilderness under alternative B could result in beneficial impacts on the panther. Habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This could likely result in greater protection of panther habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Collectively, impacts on the Florida panther under alternative B would be long term, moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

***Cumulative Impacts*** — Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on panthers in the region — a beneficial impact (because an individual panther's range may include the Preserve as well as the Addition and other adjacent lands). In other words, improving and protecting habitat value on the original Preserve could yield a regional benefit to the species. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on panthers. Adverse impacts on panthers could still occur from ORV use in the original Preserve, but the effects on the species would be less than with no ORV management. With implementation of the terms and conditions of the U.S. Fish and Wildlife Service's "Biological Opinion" (USFWS 2000), the plan is not likely to result in jeopardy to the panther. Overall, the impact of the 2000 ORV plan on the Florida panther would be long term, moderate, and beneficial compared to no ORV management.

Implementation of future oil and gas proposals could have adverse impacts on Florida panthers in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could create human disturbances and result in degradation and loss of panther habitat. Short-term adverse impacts from construction could include flushing and displacement of panthers, effects on feeding and

sheltering behavior, and an increase in mortality from vehicle collisions. Panthers have been seen at existing oil and gas operations in other portions of the Preserve. The same types of adverse impacts would be long term due to ongoing operations and maintenance activities. These adverse impacts would be minor and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communities and in turn wildlife habitat. The impact on the Florida panther is uncertain, but restoring natural conditions is assumed to have a long-term, minor, beneficial impact because it would return vegetation communities to historic conditions and improve predator/prey relationships.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a substantial loss of panther habitat. Natural areas that remain are more fragmented and contain higher levels of human disturbance, both of which adversely affect panthers and their long-term survival. Increased panther mortality due to vehicle collisions could also be attributed to the effects of regional growth and development. The impact of these activities on the Florida panther is expected to be long term, moderate to major, and adverse.

Collectively, beneficial impacts on the Florida panther would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects

discussed above would likely be adverse to Florida panthers in the region.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on the Florida panther. The actions contained in alternative B would contribute a modest increment to this cumulative impact.

**Conclusion** — Impacts on the Florida panther under alternative B would be long term, moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

There would be a long-term, moderate, adverse cumulative impact on the Florida panther. The actions contained in alternative B would contribute a modest increment to this cumulative impact.

Impacts from actions contained in this alternative would not likely result in impairment of the Florida panther in the Addition because habitat conditions would be maintained or enhanced and the NPS would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**West Indian Manatee.** Impacts on the West Indian Manatee under alternative B would generally be the same as under the no-action alternative. Designating new paddling trails in tidal areas south of U.S. 41 could increase displacement or avoidance behavior, which could affect feeding and other behaviors. The impact would be long-term, minor, adverse, and localized.

Overall, compared to the no-action alternative, impacts on the West Indian manatee would be long term, minor,

adverse, and localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under alternative B would generally be the same as under the no-action alternative. The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would increase the quantity of freshwater inputs into the estuarine system, a beneficial impact on manatees. The quality of freshwater inputs is predicted to be less than current conditions, which could adversely impact manatee habitat. Overall, it is expected that restoring natural hydrologic conditions would produce long-term, minor beneficial impacts on the West Indian manatee.

Regional growth and development is expected to continue and could result in an increase in the number of recreational boaters in the region. Injury and mortality of manatees associated with recreational boating could increase as a result of increased motorboat use. Incompatible coastal development could also adversely affect manatees by loss of habitat and feeding areas, as well as pollution discharges. These activities would adversely impact manatees and could affect their long-term survival. The impact on the West Indian manatee is expected to be long term, moderate to major, and adverse.

Overall, the effects of the projects discussed above would likely be adverse to West Indian manatees in the region.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would

be a long-term, moderate, adverse cumulative impact on the West Indian manatee. The actions contained in alternative B would contribute a very small increment to this cumulative impact.

**Conclusion** — Impacts on the West Indian manatee under alternative B would be long term, minor, adverse, and localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, moderate, adverse cumulative impact on the West Indian manatee. The actions contained in alternative B would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the West Indian manatee in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Red-Cockaded Woodpecker.** Under alternative B, impacts on potential habitat for the red-cockaded woodpecker would be attributed to new facility development and expanded visitor use.

New facility development — such as trails, trailheads, and access points at mile marker 51, mile marker 63, Bear Island Grade, and Deep Lake — could impact potential habitat and thus woodpeckers by causing short-term disturbances associated with construction activities and permanent loss of habitat. Development footprints would be confined to previously disturbed areas to the greatest extent possible while also considering design needs and standards (e.g., using disturbed areas near existing

access points along major highways). There would still be a loss of habitat. The impact would be long term, minor to moderate, adverse, and localized.

Public ORV use in the Addition under alternative B would be allowed on up to 132 miles of designated trails and through the issuance of up to 660 annual ORV permits. Adverse impacts on woodpeckers from recreational ORV use would include displacement of woodpeckers and their avoidance of certain areas within the Addition. NPS administrative ORV use could add slightly to these impacts. Public hunting would also be allowed, but it is not expected to adversely impact woodpecker habitat because the integrity of cavity trees and forage resources would be maintained. Total human use and disturbance in the Addition would increase substantially relative to the no-action alternative. Conditions that support woodpecker use of the area would continue to be maintained. Because there are currently no known nest sites within the Addition, effects on woodpeckers would be limited to impacts on foraging habitat and their avoidance of certain areas during periods of human activity. The impacts would be long term, minor to moderate, adverse, and localized.

Nonmotorized visitor use (primarily back-country hiking) would continue to affect woodpeckers, potentially causing occasional displacement of woodpeckers and their avoidance of certain areas within the Addition. The impact would be long term, negligible to minor, adverse, and localized.

Designating lands as wilderness under alternative B could result in beneficial impacts on the woodpeckers. Habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of woodpecker habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its

wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Collectively, impacts on the red-cockaded woodpecker under alternative B would be long term, minor to moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on red-cockaded woodpeckers in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on woodpeckers. Cavity trees and active clusters would be avoided as trail sites, thereby also reducing adverse impacts. Adverse impacts on woodpeckers would still occur from ORV use in pinelands in the original Preserve, but the impact would be minor. Overall, the impact of the ORV plan on the red-cockaded woodpecker would be long term, negligible, and adverse.

Implementation of future oil and gas proposals could have adverse impacts on the red-cockaded woodpecker in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could degrade and reduce available woodpecker habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term adverse impacts could include flushing and displacement of woodpeckers, while long-term impacts would include the loss of cavity nesting trees.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communities (including pinelands) and in turn wildlife habitat. The impact on the red-cockaded woodpecker is uncertain, but restoring natural conditions is assumed to have a long-term, minor, beneficial impact because returning vegetation communities to historic conditions and improving foraging resources should be beneficial.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a substantial loss of woodpecker habitat (pinelands) in the region. Natural areas that remain are more fragmented and contain higher levels of human disturbance and displacement of woodpeckers, both of which adversely affect woodpeckers and their long-term survival. The impact of these activities on the red-cockaded woodpecker is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on the red-cockaded woodpecker would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse on red-cockaded woodpeckers in the region.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on the red-cockaded

woodpecker. The actions contained in alternative B would contribute a small increment to this cumulative impact.

**Conclusion** — Impacts on the potential habitat for and thus the red-cockaded woodpecker under alternative B would be long term, minor to moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

There would be a long-term, moderate, adverse cumulative impact on the potential habitat for and thus the red-cockaded woodpecker. The actions contained in alternative B would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the red-cockaded woodpecker in the Addition because habitat conditions would be maintained or enhanced, and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Wood Stork.** Under alternative B, impacts on the wood stork would be attributed to new facility development and expanded visitor use.

Because there are currently no known nest sites within the Addition, and they have nested in the original Preserve only sporadically since 1996, effects on wood storks would be limited to impacts on foraging habitat and avoidance of certain areas during periods of human activity.

Because new facility development, such as trailheads and access points, would be confined mostly to developed corridors and areas of existing disturbance, impacts on wood stork habitat would be negligible. Establishment of 132 miles of ORV trails

could cause adverse impacts on storks by creating short-term disturbances associated with construction activities and permanent loss of habitat. Use of the ORV trails and the increase in human occupation and disturbance in the backcountry could displace birds and cause them to avoid certain areas. NPS administrative ORV use could add slightly to these impacts. Public hunting would also be allowed, but is not expected to adversely impact wood stork habitat because the integrity of roost and nest trees and forage resources would be maintained. Total human use and disturbance in the Addition would increase substantially relative to the no-action alternative; however, conditions that support wood stork use of the area would continue to be maintained. The impact of these activities would be long term, minor, adverse, and localized.

Nonmotorized visitor use, (primarily backcountry hiking) would continue to affect wood storks, potentially causing displacement and their avoidance of certain areas in the Addition — the impact would be long term, negligible to minor, adverse, and localized.

Designating lands as wilderness under alternative B would likely result in beneficial impacts on the wood stork. Potential habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of stork habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Collectively, impacts on the wood stork under alternative B would be long-term, minor, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of off-road vehicles on the wood stork's foraging habitat (prairies and marshes) in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation in the original Preserve would limit impacts on storks. Nesting habitat (cypress trees in open water) would likely not be affected because off-road vehicles typically avoid the deep, open water areas that storks commonly nest in. Consequently, the effect on nesting habitat in the region due to the actions in the ORV plan would be negligible. Overall, the impact of the ORV plan on the wood stork in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the wood stork in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in loss and degradation of wood stork habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Adverse impacts could include flushing and displacement of wood storks. Short-term impacts on wood storks would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions, including food supply. The impact on the wood stork is unknown, but restoring

natural hydrologic conditions is expected to have a long-term, minor to moderate, beneficial impact because returning vegetation communities to historic conditions and improving foraging resources should be beneficial.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Impacts such as the loss of wetlands and compromised water quality from discharge of urban pollutants into hydrologic systems would adversely affect storks. The impact of these activities on the wood stork is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on the wood stork would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to wood storks in the region.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on the wood stork. The actions contained in alternative B would add a very small increment to this cumulative impact.

**Conclusion** — Impacts on the wood stork under alternative B would be long term, minor, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor, adverse cumulative impact on the wood

stork. The actions contained in alternative B would add a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the wood stork in the Addition because habitat conditions would be maintained or enhanced and the NPS would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Everglade Snail Kite.** Under alternative B, impacts on the Everglade snail kite would be attributed to new facility development, trail development, and expanded visitor use.

Because no snail kite nest sites are known within the Addition, effects on existing snail kite habitat would be limited to impacts on foraging and roosting habitat near marshes and open water bodies. However, the increased recreation and human activity associated with alternative B might preclude possible future kite nesting in the Addition.

New facility development, such as trailheads and access points, would be confined mostly to developed corridors and areas of existing disturbance. Therefore, the impacts from constructing these facilities on snail kite habitat would be negligible. However, the establishment of 132 miles of ORV trails would cause adverse impacts on snail kite habitat. The noise and human activity associated with construction and maintenance of these trails could generate short-term disturbances on kite habitat in areas where trail segments are near marshes, lakes, and other snail kite foraging areas. These impacts would be short term, minor, adverse, and localized.

The long-term public use of the ORV trails and the increase in human occupation and disturbance in the backcountry would also have adverse effects on snail kite habitat. Noise from ORVs and nearby human presence and activity would disturb or flush

kites that are roosting or foraging for apple snails in nearby marshes, ponds, and lakes in the Addition. Over time, this might cause snail kites to avoid foraging or roosting in certain habitat areas that are near ORV trail corridors or associated zones of human activity (which may radiate or spur off of the designated ORV trails). Larger habitat areas that become fragmented into smaller habitat “islands” by ORV trail corridors may also be avoided because of diminished habitat value. NPS administrative ORV use could add to these impacts. Public hunting would also be allowed and would have adverse impacts on snail kite foraging habitat if the hunting takes place in or near the marshes and open water bodies. Human presence and gun noise would contribute to these hunting impacts. The total human use and disturbance in the Addition associated with alternative B would be a substantial increase relative to the no-action alternative. The impact of these activities would be long term, minor to moderate, adverse, and localized.

Nonmotorized visitor use (primarily back-country hiking) would continue to affect Everglade snail kites in a manner that is similar to the no-action alternative. Snail kites could avoid foraging in areas that receive high levels of human activity. The impact would be long term, negligible to minor, adverse, and localized.

Designating lands as wilderness under alternative B would likely result in beneficial impacts on the snail kite. Potential habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of kite habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Under alternative B, ongoing NPS efforts to improve natural hydrologic processes, water quality, and invasive plant control would continue just as in the no-action alternative. These NPS management actions could benefit apple snail populations in the Addition, as well as improve the snail kite’s accessibility to the apple snails.

Collectively, impacts on the Everglade snail kite under alternative B would be long term, minor to moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under alternative B would be similar to that of the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of ORVs on the snail kite’s foraging, roosting, and nesting habitat (marshes and pond/lake fringes) in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on the kites in the region. However, foraging, roosting, or possible nesting habitat for snail kites could be adversely affected in areas where ORV use is permitted under the plan, particularly in specific ORV use areas that are near marshes, ponds, or lakes. Overall, the impact of that plan on the snail kite in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the snail kite habitat in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in loss and degradation of snail kite habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative

measures. Adverse impacts could include flushing and displacement of snail kites. Short-term impacts on snail kites would be adverse, moderate, and localized, while long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions, including food supply and water quality. This would be particularly beneficial to the snail kite, because its diet predominantly consists of apple snails, which are very dependent on adequate hydrological conditions. Furthermore, the return of natural hydrological conditions and improved water quality to the region would also enhance or increase the availability of quality foraging, roosting, and nesting habitat for the Everglade snail kite. The restoration of natural hydrologic conditions would have long-term, moderate, beneficial impacts.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Impacts such as the loss of wetlands and compromised water quality from discharge of urban pollutants into hydrologic systems would adversely affect snail kites and their primary food source, the apple snail. The impact of these activities on the snail kite is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on the snail kite would result from improved ORV management and ecosystem restoration projects by mitigating ORV impacts and allowing habitat restoration. Adverse impacts would be expected from oil and gas development and regional growth and urban development. Overall,

the effects of the projects discussed above would likely be adverse to snail kite habitat in the region.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the Everglade snail kite. The actions contained in alternative B would add a small increment to this cumulative impact.

**Conclusion** — Impacts on the Everglade snail kite under alternative B would be long term, minor to moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

There would be a long-term, minor to moderate, adverse cumulative impact on the snail kite. The actions contained in alternative B would add a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the Everglade snail kite in the Addition because habitat conditions would be maintained or enhanced and NPS staff would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**American Crocodile.** Impacts on the American crocodile and its habitat under alternative B would generally be the same as under the no-action alternative because recreational use in and near mangrove forests of the Addition would be the same as in alternative A (no action).

Under alternative B, impacts on the American crocodile and its habitat would primarily be attributed to continued human

activities near mangrove forests, particularly motorized boating associated with recreational fishing in the Western Addition (airboat use is prohibited). Mangrove forests are the primary habitat for the American crocodile in south Florida, although crocodiles are generally rare in Big Cypress National Preserve. The mangrove habitat areas along creeks, canals, and estuaries south of U.S. 41 in the Western Addition are where effects would most likely occur.

In these areas, crocodiles may be affected by motorboat noise, boat wakes and waves, human noise or actions, or boat hulls or propellers. Because most American crocodile activity occurs from just before sunset to just after sunrise, most of these human-induced actions would disturb the crocodiles when they are at rest during daytime hours. These disturbances might cause resting crocodiles to be flushed, resulting in unnecessary energy use and stress. Boating in early morning or evening hours might also alter crocodile foraging behavior or flush the possible prey of the crocodile. Depending on the level and frequency of human disturbances, crocodiles could avoid some areas entirely.

Crocodiles are not known to nest in the Addition. However, if nesting occurs, the hatching success would primarily depend on risks from flooding, predation, lack of soil moisture during incubation, and extreme storms. The nest success also depends on the female crocodile returning to the nest to excavate the hatchlings. Research suggests that some female crocodiles may abandon their nests if the area is subjected to repeated, close human presence (Kushlan and Mazzotti 1989). Once hatched, juveniles would then be affected by similar human disturbances as highlighted above. The young crocodiles would be at greatest risk during their journey through open water from their nest site to more distant nursery habitat.

Given the infrequent presence of crocodiles in the area, the above effects from human

recreation activities such as boating would be long term, minor, adverse, and localized.

Alternative B would also continue current NPS vegetation management actions that would help maintain or improve habitat conditions in the Addition. These actions would help address invasive plant infestations that could degrade or displace habitat for the American crocodile. The impacts of ongoing NPS vegetation management would be long term, minor to moderate, beneficial, and localized.

Under alternative B, the impacts on the American crocodile would continue to be long term, adverse, minor, and localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under alternative B would generally be the same as under the no-action alternative. The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would increase the quantity of freshwater inputs into the estuarine system, a beneficial impact on the American crocodile. This restoration of hydrologic flows and connectivity would be most beneficial to the crocodile in the nonnesting season when they seek inland freshwater habitats. However, the water quality of freshwater inflows is predicted to be less than current conditions, which could adversely impact crocodile habitat. Overall, it is expected that restoring natural hydrologic conditions would produce long-term, moderate, beneficial impacts for the American crocodile.

Regional growth and development, including waterfront development, is expected to continue in south Florida. This would result in the alteration or displacement of natural lands and

changes to the local and regional hydrology. Because mangrove forests receive special protection under state law, any direct impacts on mangrove forests would be expected to be negligible. However, even if direct impacts on mangroves are avoided, urban encroachment may diminish mangrove habitat values if human activity and development is near the mangroves. Road mortality would likely increase as development and regional population increase. Growth and development could also result in an increase in boating and other recreational activities in the area. Crocodile foraging, breeding, resting, and nesting may be affected by increases in motorboat disturbances, boat wakes and waves, and human noise or actions. Crocodiles could avoid some areas entirely depending on the level and frequency of human disturbances. The impact on the American crocodile from urban growth and development is expected to be long term, moderate, and adverse.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the American crocodile. The actions contained in alternative B would contribute a very small increment to this cumulative impact.

**Conclusion** — Implementation of alternative B would result in localized, long-term, minor, adverse impacts on the American crocodile. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor to moderate, adverse cumulative impact on the American crocodile. The actions contained in alternative B would

contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the American crocodile in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Eastern Indigo Snake.** Under alternative B, impacts on the potential habitat for the eastern indigo snake would be attributed to new facility development, ORV trail development, and expanded visitor use.

New facility development, such as the construction of trailheads and access points, would be confined mostly to developed corridors and areas of existing disturbance. Therefore, the impacts from construction of these facilities on existing snake habitat would be negligible. However, debris and brush piles generated during site construction might be an attractant to eastern indigo snakes. This could lead to snake injury or mortality during construction, which would be an impact that is short term, minor to moderate, adverse, and very localized. Also, the establishment and designation of 132 miles of ORV trails could cause adverse impacts on the snakes and their habitat. The noise and human activity associated with construction and maintenance of these trails could generate short-term disturbances on habitat areas where trail segments are close to active snake foraging, breeding, or burrowing areas. These impacts would be short term, minor to moderate, adverse, and localized.

The long-term public use of the ORV trails, radiating spur trails, and the increase in human occupation and disturbance in the backcountry would have adverse effects on potential eastern indigo snake habitat. Noise from ORVs and nearby human presence and

activity would disturb or flush snakes and thus may disrupt normal foraging, breeding, or dispersal. In addition, ORV use and undesignated spur trails that extend beyond the immediate vicinity of designated ORV trails would also displace a variety of potential snake habitat types. This off-trail activity by the public could disturb or degrade vegetative groundcover and soil substrates in areas that support foraging, breeding, and snake burrows or refuges such as pinelands or successional hardwood hammocks. The combination of these impacts could cause eastern indigos to leave the area, abandon den sites, and miss foraging and mating opportunities. NPS administrative ORV use could add to these impacts. Also, the ORV use would have similar impacts on many prey species of the eastern indigo, which would indirectly have adverse effects on the snake. Under alternative B, the ORV use and associated human disturbances in the Addition would be an increase relative to the no-action alternative. The impact of these activities would be long term, minor to moderate, adverse, and localized.

Given the snake's large home range and need to disperse across a variety of habitat types to sustain viable populations, the eastern indigo is particularly vulnerable to habitat fragmentation and the resulting "edge effect" (Layne and Steiner 1996, Breininger et al. 2004). Unlike the no-action alternative, large habitat areas would become fragmented into smaller habitat "islands" by ORV trail corridors. This would result in diminished habitat value for the snake throughout the Addition. The effect of this habitat fragmentation would be long term, minor to moderate, adverse, and Addition-wide.

Public hunting would also be allowed (walk-in or via ORV access) and would have adverse impacts on eastern indigo habitat if the hunting frequently takes places in or near vegetation communities that are commonly occupied by the snake (e.g.,

pinelands, successional hardwood hammocks, and mangrove forests).

Other nonmotorized visitor use (primarily backcountry hiking) would continue to affect eastern indigo snake habitat in a manner that is similar to the no-action alternative. Although increased human use would be expected with alternative B, these pedestrian activities would cause sporadic flushing of the snake. Eastern indigo snakes could avoid foraging in areas that receive high levels of human activity. The impact would be long term, negligible to minor, adverse, and localized.

Designating lands as wilderness under alternative B would likely result in beneficial impacts on eastern indigo habitat. Potential habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of the snake's habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible. Also, most of the proposed wilderness under alternative B is south of I-75. Most of this area to the south of the highway is the wettest land in the Addition and would be least suitable habitat for the indigo snake.

Under alternative B, ongoing NPS efforts to improve natural hydrologic processes, water quality, and invasive plant control would continue as in the no-action alternative. Given the snake's dependence on a mosaic of habitat types throughout its lifecycle, these active NPS management actions could benefit the eastern indigo snake habitat directly and indirectly.

Collectively, impacts on the potential eastern indigo snake habitat under alternative B would be short term and long term, minor to moderate, adverse, and localized to

Addition-wide. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under alternative B would be similar to those under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of ORVs on the wide variety of habitat types that support the eastern indigo. Most importantly, the improved ORV management efforts would reduce disturbance or degradation to vegetative groundcover and soil substrates in areas that provide for foraging, breeding, and snake burrows or refuges, such as pinelands or successional hardwood hammocks. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on the indigo snakes in the region. However, snake habitat might be altered or displaced, and individual snakes might be disturbed, in areas where ORV use is permitted under the plan. Overall, the impact of that plan on the eastern indigo in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the eastern indigo snake habitat in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in the loss and degradation several habitat types that support the snake. Adverse impacts would include displacement of vegetative cover for the snake; soil and burrow disturbances; possible roadway injury/mortality; and disruption of normal foraging, breeding, and dispersing behaviors. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on the snake would be adverse, moderate,

and localized, while long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions for many species. This hydrologic restoration could benefit the eastern indigo directly during times of the year when the snake uses wetter habitats. At other times, it would benefit the eastern indigo indirectly by restoring a natural system that could improve conditions and increase populations of the snake's food base. However, the reintroduction of natural flows could displace some existing upland areas. This effect could decrease available upland habitat for the eastern indigo snake and its prey that depend on upland habitat. The restoration of natural hydrologic conditions would have long-term, minor to moderate impacts that could be both beneficial and adverse to the snake.

Regional growth and development is expected to continue and result in an increase in habitat displacement for the snake. Because the eastern indigo uses a variety of habitat types and has a large home range, it is particularly susceptible to habitat loss and habitat fragmentation from urban development. In addition to habitat displacement and fragmentation, urban development also brings injury or mortality threats from domestic animals, road vehicles, property owners, and pesticides and rodenticides in the food chain. All of these could adversely affect eastern indigos. The impact of these activities on the snake is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on the eastern indigo snake would result from improved ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and

development. Overall, the effects of the projects discussed above would likely be adverse to the snake's habitat in the region.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact and a short-term, minor to moderate, adverse cumulative impact on the potential habitat for the eastern indigo snake. The actions contained in alternative B would contribute a small increment to this adverse cumulative impact.

**Conclusion** — Impacts on the potential habitat for and thus the eastern indigo snake under alternative B would be short-term and long term, minor to moderate, adverse, and localized to Addition-wide. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

There would be a short-term and long-term, moderate, adverse cumulative impact on the potential habitat for the eastern indigo snake. The actions contained in alternative B would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the eastern indigo snake in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Major Game Species

**Analysis.** Under alternative B, impacts on the major game species of the Addition (white-tailed deer, feral hogs, and wild turkey) would be attributed to new facility development and expanded visitor use.

New facility development — such as trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake — would impact game species by causing short-term disturbances associated with construction activities and permanent loss of habitat. Development footprints would be confined to previously disturbed areas to the greatest extent possible (such as at existing access points along major highways and the interstate), but there would still be a loss of habitat. The impact would be long term, minor, adverse, and localized.

Establishment of 132 miles of ORV trails would fragment game habitat, and ongoing use of the trails would cause flushing, displacement, and avoidance of certain areas. NPS administrative ORV use could add slightly to these impacts. The impacts on game species from ORV use in the Addition would likely be long term, minor, adverse, and localized. Game species typically adapt to changes in habitat conditions and can become habituated to the predictable use of designated ORV routes.

Public hunting would be allowed under alternative B, and the 132-mile network of ORV trails would allow hunters to access much of the Addition and increase hunting opportunities. The Addition would be expected to become part of the adjacent Big Cypress State Wildlife Management Area. As in the original Preserve, hunting would be regulated according to the requirements, seasons, and bag limits established by the Florida Fish and Wildlife Conservation Commission. Short-term, minor adverse impacts, such as flushing and displacement of game species, would continue. Long-term, moderate beneficial impacts could also occur from harvesting and management of

game populations, such as disease mitigation and improvements in population genetics. Partnerships with the Florida Fish and Wildlife Conservation Commission would continue and would contribute to the monitoring and improved understanding of game populations.

Designating lands as wilderness under alternative B would likely result in beneficial impacts on major game species. Habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of game habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Collectively, impacts on major game species under alternative B would be long term, minor to moderate, adverse, and mostly localized.

**Cumulative Impacts.** Cumulative impacts under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the adverse impacts of off-road vehicles on major game species in the region — a beneficial impact. Eliminating some and designating new ORV trails would make ORV noise and movement more predictable, thereby displacing animals away from travel corridors but reducing the impacts on wildlife habitat and game populations. Conducting education, best management practices, research, and mitigation called for in the ORV plan would also limit impacts on wildlife. Adverse impacts on major game species would still occur from ORV use in the Preserve, but the effects on the species would be less than with no ORV plan / management / permitting. Overall, the

impact of the ORV plan on major game species in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on major game species in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this would create human disturbances and alter wildlife habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Adverse impacts could include flushing and displacement of game species. Short-term impacts on major game species would be moderate, adverse and localized; long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communities and in turn wildlife habitat. The impact on the major game species is unknown, but restoring natural conditions is expected to have a long-term, minor to moderate, beneficial impact.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a loss of wildlife habitat. The major game species are considered generalists and have demonstrated their resiliency and ability to adapt to changing conditions. Within the region, the three species (deer, hogs, and turkey) are widespread. However, continued urbanization has fragmented remaining natural areas and increased the risks and threats to these species, including automobile collisions, exotic species, and pathogens. The impact of these activities on the major game species is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on major game species would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to major game species in the region.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the major game species. The actions contained in alternative B would contribute a small increment to this cumulative impact.

**Conclusion.** Impacts on major game species under alternative B would be long term, minor to moderate, adverse, and mostly localized.

There would be a long-term, minor to moderate, adverse cumulative impact on the major game species. The actions contained in alternative B would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the major game species in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## **WILDERNESS RESOURCES AND VALUES**

### **Analysis**

Under alternative B, impacts on wilderness resources and values would be attributed primarily to ORV trail development and use and designation of lands as wilderness. Development of approximately 132 miles of ORV trails would fragment native habitat and degrade natural conditions in certain

areas that were evaluated as eligible for wilderness designation. ORV use would affect the natural soundscape of the area. Impacts would be confined to a designated trail system, limiting changes to natural conditions and wilderness character outside of the trail system. Impacts from visitor use would be long term, moderate, and adverse.

Approximately 37,567 acres of the Addition would be proposed for designation as wilderness (53% of those lands considered eligible under the wilderness study and 26% of the Addition's total acreage). The special status and protection afforded to these lands under the Wilderness Act would preserve their wilderness resources and values in perpetuity, a moderate to major beneficial impact. Opportunities for solitude and primitive and unconfined recreation would continue to be preserved and available, but the extent and availability of the opportunities would be reduced compared to the no-action alternative.

Overall, the impacts on wilderness resources and values would be long term, moderate, beneficial, and Addition-wide.

### **Cumulative Impacts**

Cumulative impacts on wilderness resources and values under alternative B would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the effects of off-road vehicle use on wilderness resources and values by reducing the potential for dispersal and establishment of exotic plants, a beneficial impact. The impact on natural soundscapes resulting from the management of off-road vehicles in the original Preserve would be negligible because approximately the same number of off-road vehicles would be using the original Preserve and in roughly the same areas. Consequently, impacts on a visitor's wilderness experience (freedom and natural sights and sounds) resulting from the 2000

ORV plan would be negligible. Impacts on wilderness resources and values in the region would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on wilderness resources and values. If such proposals included using off-road equipment and constructing roads and pads, this would create human disturbances and alter natural habitats. NPS approval of the operations plan would require mitigative measures to eliminate or reduce the impact of activities on natural resources. Short-term impacts on wilderness resources and values would be moderate, adverse, and localized; residual long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect natural communities. Restoring natural conditions is expected to have a long-term, moderate, beneficial impact.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. Increasing urbanization, fragmentation of habitat, and the loss of natural areas have led to the degradation of natural resources, ecosystem function, and natural soundscapes in the region. The impact of these activities on wilderness resources and values is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on wilderness resources and values would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to wilderness resources and values in the region.

When the likely effects of implementing the actions contained in alternative B are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on wilderness resources and values in the region. The actions contained in alternative B would contribute a modest beneficial increment to this cumulative impact.

## **Conclusion**

Impacts on wilderness resources and values under alternative B would be long term, moderate, beneficial, and Addition-wide.

There would be a long-term, moderate, adverse cumulative impact on wilderness resources and values in the region. The actions contained in alternative B would contribute a modest beneficial increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of wilderness resources and values in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## **CULTURAL RESOURCES**

### **Archeological Resources**

**Analysis.** As appropriate, archeological surveys would precede any ground disturbance for the construction of parking, restrooms, trailheads, and trails, and national register-eligible or -listed archeological resources would be avoided. No adverse impacts on archeological resources would be anticipated. If during construction previously unknown archeological resources were discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and, if the resources cannot be preserved in situ, an appropriate mitigation

strategy would be developed in consultation with the state historic preservation officer and any associated Indian tribes.

Most of the archeological sites in the Addition are middens. These raised mound areas would be potentially attractive to ORV and backcountry users, and trampling or disturbance could result. Increased visitor use under this alternative would increase the potential for looting and vandalism, and unauthorized off-trail ORV use could displace soils and cause erosion of archeological sites. Continued ranger patrol and emphasis on visitor education would discourage vandalism and inadvertent destruction of cultural remains, but any adverse impacts would be permanent, minor to moderate, and adverse.

**Cumulative Impacts.** Current research indicates relatively little disturbance of archeological sites in the Addition resulting from past actions such as hunting and camping, logging, looting, and energy exploration. These impacts would be characterized as permanent and negligible.

Large-scale water projects and commercial and residential development could pose some impacts on archeological resources in the vicinity of the Addition. The number and extent of these archeological resources is unknown so the potential impact cannot be assessed with any degree of accuracy. However, significant archeological resources would likely be avoided to the greatest extent possible, and any impacts on archeological resources would be adverse and permanent, and range in intensity from minor to moderate.

Implementation of future oils and gas could have adverse impacts on archeological resources. If such proposals included using off-road equipment and constructing roads and pads, this could affect archeological resources. However, because approval of the operations plan would require mitigation measures to eliminate or reduce the impact of activities on archeological resources, the

permanent effect of energy exploration on archeological resources should be negligible.

When the permanent, minor to moderate effects of implementing the actions in alternative B are added to the permanent, minor to moderate adverse effects of other past, present, and reasonably foreseeable actions, there would be a permanent, moderate, adverse cumulative impact on archeological resources. The actions contained in alternative B would contribute a smaller increment to the cumulative impact than would the actions of other past, present, and reasonably foreseeable actions.

**Conclusion.** Under alternative B, impacts on archeological resources would be permanent, minor to moderate, and adverse.

There would be a permanent, moderate, adverse cumulative impact on archeological resources. The actions contained in alternative B would contribute a smaller increment to the cumulative impact than would the actions of other past, present, and reasonably foreseeable actions.

**Section 106 Summary.** As appropriate, archeological surveys would precede any ground disturbance for the construction of parking, restrooms, trailheads, and trails, and significant archeological resources would be avoided. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of alternative B would result in a potential adverse effect on archeological resources. Impacts from actions contained in this alternative would not result in impairment of archeological resources in the Addition.

### Ethnographic Resources

**Analysis.** Under alternative B, there would be limited potential for impacts on ethnographic resources. Access to these resources would be limited to recognized

traditionally associated peoples. Visitor activities such as hiking, camping, cycling, and equestrian use would not be allowed in or near identified ethnographic sites. However, increases in motorized recreation, specifically ORV use and the construction of trails for ORVs, hiking, camping, cycling, and equestrian use would pose the potential of impacts such as trampling, looting or vandalism on ethnographic resources. Increased ranger patrols and education programs informing visitors of the sensitive nature of these sites would result in long-term, negligible impacts.

The National Park Service would work with traditionally associated people to identify ethnographic resources and identify appropriate protection strategies for these resources. Consultation with traditionally associated peoples would precede construction in order to avoid or mitigate potential impacts resulting from trail or facility development (such as parking areas, restrooms, and trailheads). With this mitigation, no adverse impacts on ethnographic resources would be anticipated from construction.

**Cumulative Impacts.** Current research indicates negligible impacts on ethnographic resources in the Addition resulting from hunting and camping and looting. Past actions, including road construction, energy exploration, logging, and agricultural development, might have impacted ethnographic resources at Deep Lake and other sites within the Addition. Any adverse impacts would have been long term and of negligible to minor intensity.

Large-scale water projects and commercial and residential development could pose some impacts on ethnographic resources in the vicinity of the Addition. However, ethnographic resources would likely be avoided to greatest extent possible, and any impacts on ethnographic resources would be adverse and permanent and range in intensity from negligible to minor.

Implementation of future oil and gas proposals could have adverse impacts on ethnographic resources. However, because approval of the operations plan would require mitigation measures to eliminate or reduce the impact of activities on ethnographic resources, the permanent effect of energy exploration on ethnographic resources should be negligible.

When the long-term, negligible adverse effects of implementing the actions contained in alternative B are added to the negligible to minor adverse effects of other past, present, and reasonably foreseeable actions, there would be a long-term, negligible to minor, adverse cumulative impact on ethnographic resources. The actions contained in alternative B would contribute a very small increment to this cumulative impact.

**Conclusion.** Under alternative B, there would be negligible, long-term, impacts on ethnographic resources.

Combined with the impacts of past actions, including road construction and agricultural development, there would be a long-term, negligible to minor, adverse cumulative impact. The actions proposed in this alternative would contribute a very small increment to any cumulative impacts.

**Section 106 Summary.** After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of alternative B would generally result in a no adverse effect on ethnographic resources.

## VISITOR USE AND EXPERIENCE

### Recreational Opportunities

**Motorized Use.** ORV access and opportunities to explore, sightsee, and camp would be greatly expanded with the development of up to 132 miles of primary

ORV trails, issuance of a maximum of 660 annual ORV permits, and access points and visitor information at mile markers 51 and 63 and Bear Island Grade. The construction of a new visitor contact station and NPS operation facility at mile marker 63 would also have beneficial impacts by greatly expanding education and interpretation opportunities, services, and NPS operational capacity in the Addition. An increased NPS staff presence would also improve visitor safety and increase opportunities for interpretation. Impacts resulting from ORV access and opportunities as well as visitor services and information would be long term, moderate to major, beneficial, and Addition-wide.

Allowing ORV use in the Addition, along with the construction of a new contact station, might lead to user congestion and user conflicts at trailheads and along the primary and secondary ORV trail network, resulting in long-term, minor, adverse, impacts on users. But dispersing users across multiple access points as proposed would minimize the impact. Finally, the provision of additional services at Carnestown would result in long-term, negligible to minor, beneficial impacts to ORV users seeking additional information and services. Overall, implementation of alternative B would result in long-term, moderate to major, beneficial impacts to motorized users.

**Nonmotorized Use (including hiking, horseback riding, and bicycling).** The primary and secondary ORV trail network, new access points and visitor information, and the new contact station would also be open to hikers, expanding both access and opportunities. The construction of a new day use area and ADA-compliant boardwalk at Deep Lake would have beneficial impacts by providing a comfortable area to enjoy the natural surrounding and provide an easy, safe route to access the lake. Opportunities for challenging adventure and primitive solitude as well as less primitive hiking would be available. Impacts resulting from expanding access and opportunity for

nonmotorized user groups would be long term, moderate to major, and beneficial.

The addition of ORV users and the construction of a new contact station might result in user congestion and user conflict at trailheads and along the primary and secondary ORV trail network and would reduce the quality of the natural soundscape. The addition of hunting under alternative B would likely further increase encounters, reduce the quality of the natural soundscape, and could periodically affect access. Impacts on hikers as a result of congestion and a reduced natural soundscape would be long term, minor to moderate, and adverse. Dispersing users across multiple access points as proposed would minimize the impact. Impacts resulting from the provision of additional visitor services at Carnestown would be long term, minor, and beneficial.

Access to the Addition and parking would be improved in comparison to alternative A. Although bicycling would be allowed on all designated primary and secondary ORV trails, many of these trails would not be conducive to bicycling; therefore, bicycling opportunities would only be slightly expanded beyond alternative A. New access points and the ability to use the primary and secondary ORV trail network would disperse bicyclists across the Addition, reducing the potential for congestion and user conflict. Impacts resulting from an expansion of access and opportunity would be long term, minor, beneficial, and Addition-wide. Conflict between user groups at trailheads and along the primary and secondary ORV trail network and a reduction of the natural soundscape due to ORV use would detract from the experience of bicycling in a natural setting, resulting in long-term, minor, adverse impacts on bicyclists. Finally, the provision of additional services at Carnestown would result in long-term, negligible to minor, beneficial impacts on bicyclists seeking additional information and services.

Overall, impacts on nonmotorized users would be long term, moderate, and beneficial.

**Hunting (including fishing and frogging).**

Nonmotorized and ORV hunting would be allowed in designated areas and seasons as determined by the National Park Service in cooperation with the Florida Fish and Wildlife Conservation Commission in the areas zoned as primitive backcountry, backcountry recreation. Hunters using off-road vehicles, however, would not have the opportunity to operate their vehicles off designated trails. Conflict between ORV and nonmotorized hunters and with other trail users at trailheads and along primary and secondary ORV trails would likely be infrequent due to sensible facility design, resulting in long-term, minor, adverse impacts. The operation of off-road vehicles might detract from the hunting experience of those that prefer walk-in hunting and solitude. Overall, impacts on hunters in the Addition would be long term, moderate, and beneficial.

Collectively, impacts on visitor use and experience resulting from alternative B would be long term, moderate, and beneficial.

**Cumulative Impacts**

Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* would provide up to 400 miles of designated primary ORV trails, 15 ORV access points, and up to 2,000 annual permits in the original Preserve. This quantity of trail miles and permits provides abundant opportunities for operating off-road vehicles. The availability of these opportunities adjacent to the Addition would have long-term, moderate, beneficial impacts on ORV users in the local area.

Implementation of future oil and gas proposals could adversely impact the experience of visitors. The construction of roads and

pads and the use of off-road equipment, if included in the proposals, could detract from the experience of those seeking a primitive experience and natural soundscape. Impacts resulting from a reduction in the natural settings of the Addition due to the operation of oil and gas equipment would be long term, minor, and adverse in localized areas.

The south Florida Ecosystem Restoration Project is a large-scale effort among public, private, and nongovernmental entities to restore surface water flows within the region. Implementation of the proposals would improve sheet flows and hydrologic connectivity and likely restore natural conditions in the Addition. This effort would enhance the visitor use and experience by providing increased opportunities for wildlife viewing and experiencing natural settings. Opportunities for hunting in the Addition would also improve with more abundant, healthy wildlife populations. Impacts resulting from the effects of a healthy, fully functioning ecosystem would be long term, moderate, beneficial, and regionwide.

Regional growth and development are expected to result in increased visitation to the Addition. More visitation over time might result in increased congestion and user conflicts at access points and along the primary and secondary ORV trail network. Impacts from growth and development would be long term, minor to moderate, and adverse because of increased congestion and user conflict.

Implementation of the *Commercial Services Plan* will initially only affect the original Preserve. The Addition will be addressed in an addendum to the *Commercial Services Plan* after the completion of the *General Management Plan* for the Addition. The *Commercial Services Plan* proposes to enhance the original Preserve's visitor services through the development of one or more new facilities; a new backcountry camping complex; hunting and fishing

guides; buggy, van, and hiking tours; boat and bicycle rentals; and expanded opportunities for birding, wildlife viewing, and photography. Enhanced and expanded opportunities in the original Preserve, before an addendum to include the Addition, would increase visitation in the Addition and might result in increased congestion and user conflicts. Impacts resulting from increased visitation and congestion at access points and along the primary and secondary ORV trail network would result in long-term, minor, adverse impacts on visitors. When the Addition is addressed in an addendum, visitor opportunities to explore and use the Addition could be expanded. If so, impacts from implementing the *Commercial Services Plan* in the Addition would be long term, minor to moderate, and beneficial as a result of expanded opportunities.

The likely effects of implementing alternative B, in combination with the effects of other past, present, and reasonably foreseeable actions described above, would result in long-term, moderate, and beneficial cumulative impacts on visitor use and experience in the Addition. The actions contained in alternative B would contribute an appreciable increment to this cumulative impact.

### Conclusion

Under alternative B, designated access points and abundant trail opportunities would be provided for ORV use, hunting, and nonmotorized uses. Collectively, the resulting impacts on visitor use and experience would be long term, moderate, and beneficial.

The cumulative impact on visitor use and experience in the Addition would be long term, moderate, and beneficial. The actions contained in the alternative B would contribute an appreciable increment to this cumulative impact.

## SOCIOECONOMIC ENVIRONMENT

Analysis of economic impacts under alternative B was based on projected increases in visitation to the Preserve (including the Addition) (which in turn would affect visitor spending patterns), as well as estimated one-time capital expenditures due to construction activity. A total of 39,479 new visitors were estimated to visit the Preserve each year as a result of implementing this alternative. Of this total, it was assumed that 8,291 were local visitors, 15,002 were non-local day visitors, 11,054 were motel visitors, and 5,132 were campers. In terms of capital expenditures, it was estimated that alternative B would produce \$6.7 million in total construction costs.

### Local Economy

**Employment.** Approximately 41 jobs (35 direct and six indirect) would be created in Collier County as a result of visitor spending under alternative B. This would generate a total labor income of \$604,000 annually (which covers wages, salaries, and payroll benefits), representing \$458,000 in direct labor income effects as a result of new job growth and \$146,000 in indirect labor income effects from new job growth in tourism-related industries. Approximately half of direct employment would be attributable to increases in Preserve staff needed to operate and maintain new facilities, trails, and services in the Addition; the remaining jobs would result from partnerships at Carnestown and businesses that cater to tourists. Indirect employment increases would result from firms that support tourist-related businesses, as well as from firms that hire additional staff as a result of changes in direct employment spending. Employment in Collier County is approximately 140,184 (2006 estimate) so the additional jobs only increase county employment by .03%. Consequently, as a result of alternative B, long-term impacts related to employment would be localized, negligible, and beneficial.

In terms of short-term impacts, approximately 51 temporary jobs would be created due to construction activity in the Addition, generating about \$1.6 million in personal labor income. Most direct employment increases would be attributable to temporary labor needed during the construction period. Secondary employment increases would be attributable to new staff needed in industries that provide goods and services to the construction sector as well to businesses that need additional staff to support changes in direct employee spending. However, the additional jobs only increase county employment by 0.04%. Short-term impacts related to employment in alternative B would be localized, negligible, and beneficial.

**Housing.** The addition of jobs could translate into greater demand for housing, if most of the additional employees come from outside the county (and thus need to seek housing near the Preserve). However, such impacts, if felt at all, would likely be concentrated in the Naples and Marco Island areas, because the creation of 41 jobs is not large enough to create a discernable impact on the housing market at the county level. Consequently, the long-term impacts related to housing would be localized, negligible, and beneficial.

Short-term housing impacts as a result of construction activity are also likely to be insignificant from a county perspective. Specific locales such as Naples and Marco Island might see temporary increases in the demand for housing as a result of transitory employees moving into the area during the construction period. However, in relation to the overall housing market in Collier County, this impact is likely to be undetectable. Consequently, short-term impacts related to the housing market would be localized, negligible, and beneficial.

**Sales.** Long-term impacts of visitor spending under alternative B would generate a total of \$1.76 million annually in direct and indirect sales of goods and services by businesses in

Collier County. The majority of businesses that would realize these financial gains would be in industries that cater directly to tourism, such as retail, arts, entertainment, recreation, accommodation and food services. As a total of Collier County's annual taxable sales, estimated to be over \$6.10 billion in 2004, such changes represent only a .03% increase. Consequently, the long-term impacts related to sales under alternative B would be localized, negligible, and beneficial.

Capital construction expenditures would also increase short-term sales under alternative B. Total annual taxable sales of goods and services were estimated to be \$4.3 million, with \$3.4 million (79%) of that amount attributable to transactions occurring within Collier County. The majority of direct sales would be attributable to construction-related businesses, with indirect sales attributable to industries that support the construction industry and its temporary employees. Consequently, the short-term impacts related to sales under alternative B would be localized, negligible, and beneficial.

**Tribal Impacts.** In qualitatively assessing long-term impacts to the Miccosukee and Seminole tribes, it appears that both reservations would realize some degree of positive long-term benefits under alternative B. Increased visitation to the Preserve as a result of this alternative would likely generate a small to moderate boost in sales of tourist-related goods and services (i.e. gaming, dining, and entertainment) provided at these reservations. Both tribes could also directly benefit from entering into select partnership agreements with the Preserve, as specified under this alternative. However, the magnitude of such gains is based on reasonable speculation due to the limited amount of data available on the tribes' economic activities. Consequently, the long-term impacts related to economic activity under alternative B would be localized, negligible to moderate, and beneficial.

New construction activity in the Addition would generate temporary construction jobs. Additional construction workers in the area would likely increase visitation to the two reservations, leading to an increase in the sales of tourist-related goods and services. Consequently, the short-term impacts related to economic activity under alternative B would be localized, negligible to moderate, and beneficial.

Collectively, the long-term and short-term impacts resulting from implementing alternative B would be localized, negligible, and beneficial.

### Cumulative Impacts

The action area for evaluating cumulative impacts on the socioeconomic environment is Collier County. The likely effects of implementing the actions contained under alternative B, in combination with to the effects of other past, present, and reasonably foreseeable actions are described below.

The implementation of the *Final Recreational Off-Road Vehicle Plan*, which provides for a maximum of 2,000 permits, 15 access points, and 400 miles of designated trails, has a strong likelihood of attracting new visitors and locals to the Preserve. Such an increase in Preserve visitation would translate into greater visitor spending in the area, resulting in positive long-term gains for Collier County in terms of employment, housing, and taxable annual sales, as well as increased economic activity for the Miccosukee and Seminole tribes. However, relative to the economy of the entire county, long-term economic impacts will likely be minimal. Short-term impacts as a result of one-time capital expenditures from building ORV trail access, facilities, and other structures are also likely to be minimal relative to the overall level of construction activity in the county. As a result, both long-term and short-term cumulative impacts would be localized, negligible, and beneficial.

Although the *Commercial Services Plan* does not include the Addition, social and economic impacts to the county as a whole would be positive due to increased visitation and visitor spending in the area, and expansion of facilities, services, and recreational opportunities in the Preserve. In particular, the implementation of the *Commercial Services Plan's* preferred alternative, which includes the potential to develop two new visitor facilities, partnership agreements for offering a variety of guided tours and equipment rentals, and the creation of a backcountry camping complex, could translate into moderate long-term gains in visitor spending at the county level. Depending on the level of construction activity generated from implementation of the *Commercial Services Plan*, short-term impacts could be substantial at the county level. As a result, both long-term and short-term cumulative impacts would be localized, negligible to moderate, and beneficial.

The potential exists for exploration activities, as proposed under the oil and gas plan, to reduce visitation in the Preserve due to environmental disruptions from the use of off-road equipment and the development of roads and pads for oil and gas exploration. Due to multiplier effects, long-term impacts from reduced visitation could result in reductions in county employment, housing, and sales, as well as reduced economic activity for the Miccosukee and Seminole tribes. However, such effects will likely be minimal in relation to the entire county economy. Short-term impacts from construction could be both positive and substantial, depending on the level of construction and percentage of that economic activity that remains within the county. Long-term impacts would be localized, negligible, and adverse, while short-term impacts would be localized, negligible to moderate, and beneficial.

The south Florida ecosystem restoration projects would likely attract additional visitors to the region due to the rehabilitation of natural ecosystems within and near

the Preserve through various water system improvements. In particular, the Big Cypress Interceptor Modification Plan would likely increase use across a variety of recreational activities offered in the Preserve, particularly for visitors interested in enjoying the natural habitat and wildlife. Collier County would also benefit from restoration efforts in nearby sites, such as Everglades National Park, because additional visitors may pass through or decide to make an additional stop at the Preserve. Because these restoration projects are relatively large in scale, are occurring at multiple sites, and are at a regional level, the long-term impacts on county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes could be substantial. Short-term impacts would also be positive because capital expenditures on water infrastructure improvements (estimated at multi-billions of dollars) would likely generate substantial temporary gains to county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes. As a result, both long-term and short-term impacts would be localized, moderate, and beneficial.

The development of lands northwest of the Addition could increase Preserve visitation and result in positive long-term economic impacts at the county level. In particular, the availability of greater residential housing and the building of a new private and state university in the area could greatly increase the number of residents living in Collier County. The provision of additional services, goods, and facilities would also likely be expanded to accommodate these new residents, which in turn would also attract a greater number of visitors from outside the region. As a result, increased local and visitor spending would produce long-term positive gains to county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes. Short-term economic impacts could be substantial at the county level, because large scale construction activity would be needed to support new residents, the universities, and visitors.

As a result, long-term and short-term impacts would be localized, moderate to major, and beneficial.

Combining the likely effects of implementing alternative B with the effects of other past, present, and reasonably foreseeable actions described above, the cumulative long-term and short-term socioeconomic impacts would be localized, moderate, and beneficial. Alternative B would contribute a very small increment to this cumulative impact.

## **Conclusion**

Because of increased visitor spending under alternative B, long-term and short-term impacts on the socioeconomic environment would be localized, negligible, and beneficial. As a result, county employment, housing, and sales, as well as economic activity associated with the Miccosukee and Seminole tribes would realize positive gains, although such increases would be minimal when compared to the county as a whole.

In terms of total cumulative effects, long-term and short-term impacts would be localized, moderate, and beneficial. Alternative B would contribute a very small increment to the total cumulative impact.

## **NPS OPERATIONS AND MANAGEMENT**

### **Analysis**

Alternative B proposes a visitor contact station, an operations center, and employee housing to be located in the Addition. The visitor contact station would allow staff to orient and educate visitors to the Addition, which would not be as easily done without a local visitor facility. An operations center, which would station employees and equipment in the Addition, would increase operational efficiency and reduce response time for fire, law enforcement, maintenance,

and interpretation staff. Currently, staff must travel a minimum of an hour to reach the Northeast Addition from the original Preserve. Employee housing for three law enforcement and two fire division staff would increase efficiency and reduce response time for fire and enforcement scenarios. Having staff based at these NPS facilities in the Addition would result in moderate, long-term, beneficial impacts on NPS operations.

Oversight of design and construction processes for new facilities would require managerial and contracting staff time. Additionally, new facilities must be maintained, and this would burden maintenance staff. A day use area at Deep Lake, up to 132 miles of primary ORV trails, trailheads, and interpretive panels are also proposed for development in the Addition. Managing the Addition would require time and effort from administrative, visitor and resource protection, interpretation, resource management, and fire division staff. Maintenance and resource management in areas proposed as wilderness would require the use of the minimum requirements process, which would require staff time and, in some cases, could increase the cost of management actions. Increased visitation due to the new facilities would also require time from all staff divisions. Therefore, management of the Addition and construction and maintenance of facilities under alternative B would result in moderate, long-term, adverse impacts to NPS operations.

### **Cumulative Impacts**

Expansion of nearby communities, including the towns of Ave Maria and Big Cypress, Everglades ecosystem restoration activities, and oil and gas exploration activities, would require time and attention by NPS staff. The expansion of commercial services offered in the original Preserve would require staff time for managing the commercial service authorizations and leases. Cooperation and coordination with neighboring agencies and

entities regarding planning, land use resources, and development proposals near the Preserve also would require substantial amounts of staff time and result in minor to moderate, long-term, adverse impacts.

Alternative B would place an additional burden on NPS staff, but this burden would be lessened with adequate staffing. Combined with other past, present, and reasonably foreseeable future impacts, alternative B would result in moderate, long-term, beneficial impacts on NPS operations. Although the extra staff time required to manage the Addition facilities and actions taken by other entities would have an adverse impact, the new facilities would play a much larger role in the overall impact by allowing staff to be located within the Addition and respond to operational and visitor needs in an efficient and timely manner. Alternative B's proposed actions would contribute a modest increment to these cumulative impacts.

### **Conclusion**

Operational efficiencies achieved through development of new facilities in the Addition, along with the increased staffing burdens associated with managing those lands and constructing and maintaining new facilities, would have overall long-term, moderate, adverse and beneficial impacts on NPS operations.

The cumulative impacts of alternative B and other actions would be moderate, long term, and beneficial. Alternative B's proposed actions would contribute a modest increment to these cumulative impacts.

### **EFFECTS ON ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL**

The construction of new facilities under alternative B, such as trails, trailheads, access points, and visitor/operations facilities, would result in more energy use and con-

sumption; however, the projects would follow NPS policies concerning sustainability and energy conservation to minimize the overall energy requirements. The carbon footprint of the facilities would be minimized through appropriate design and the use of green technology to the greatest extent possible. To maintain, operate, and protect the facilities, NPS travel to and within the Addition also would increase, and the increased travel would increase energy consumption. The fuel and energy consumed by visitors traveling to and within the Addition would increase because visitation would be expected to increase as a result of the Addition being open to the public and the expansion of ORV and nonmotorized recreational opportunities.

#### **UNAVOIDABLE ADVERSE IMPACTS**

Human use and the construction of new facilities under the alternative B would result in minor to moderate adverse impacts to natural resources, primarily vegetation and wildlife, in some areas throughout the Addition. Impacts on certain aspects of visitor experience, namely solitude and primitive conditions, would also be unavoidable. Mitigation to reduce these impacts would be carried out where possible.

#### **IRRETRIEVABLE OR IRREVERSIBLE COMMITMENTS OF RESOURCES**

The additional energy requirements identified above would result in an irreversible commitment of resources. In addition, there would be a commitment of material used to construct new visitor facilities such as trailheads and access points and the visitor and operations facilities at mile marker 63.

#### **RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY**

As in alternative A, most of the Addition would be protected in a natural state and would maintain its long-term productivity under alternative B. Only a small percentage of the Addition would be converted to development. No actions in this alternative would jeopardize the long-term productivity of the environment. Short-term impacts might result from construction, such as local air and water pollution, as detailed in the analysis of specific impact topics. Noise and human activity from construction and restoration might displace some wildlife from the immediate area. However, these activities would not jeopardize the long-term productivity of the environment.

## ENVIRONMENTAL CONSEQUENCES OF THE PREFERRED ALTERNATIVE

### NATURAL RESOURCES

#### Surface Water Flow

**Analysis.** Under the preferred alternative, impacts on surface water flow would be attributed primarily to the development of new facilities, the maintenance of existing facilities, and restoration activities. Development of new facilities such as trails, trailheads, and access points would alter natural sheet flow, degrading hydrologic connectivity in some localized areas. Development (including improvements to existing trails) of up to 130 miles of ORV trails would create localized barriers to surface water flow due to raised trail treads and ORV use. Culverts and other best management practices such as at-grade trail construction and low-water crossings would reduce the impacts, resulting in long-term, moderate, adverse, localized impacts. Development of backcountry camping areas near the Nobles and Jones grades airstrips would have similar impacts on surface water flow. Limited NPS administrative ORV use would continue to affect surface water flow in localized areas on a short-term basis.

Impacts on surface water flow due to the continued presence of roads and grades would be about the same as in the no-action alternative. Existing grades, such as Jones, Nobles, and Bear Island grades, would be maintained and converted to trails, which would continue to affect hydrologic connectivity within localized areas of the Northeast Addition. The effects could extend beyond the immediate area of impact and become Addition-wide, because impediments to water flow could affect areas beyond the boundaries of the Addition. Impacts related to the presence of facilities and structures would be long term, moderate, adverse, and localized.

Although some localized hydrological adverse impacts could occur from recreational use, in the context of the regional hydrology of south Florida, the actions of the preferred

alternative would have negligible effects on the hydrologic restoration efforts associated with the Comprehensive Everglades Restoration Plan or related projects. For example, the surface water restoration benefits that would result from the proposed L-28 interceptor project to the east of the Addition would not be adversely affected by the ORV management of the preferred alternative.

Collectively, the impact of these activities on surface water flow would be long term, moderate, adverse, and mostly localized in the Addition compared to the no-action alternative.

**Cumulative Impacts.** Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on surface water flow into the portion of the Addition that abuts the original Preserve at localized sites because best management practices and mitigation would maintain or improve hydrologic flow. The impact on surface water flow in the watershed would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on surface water flow. If such proposals included using off-road equipment and constructing roads and pads, this would alter local hydrology. Construction and operations activities would affect the timing and intensity of surface water flows. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on surface water flow would be minor to moderate, adverse, and localized; long-term residual impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. Proposals involving the Addition include the removal of the L-28 interceptor canal levee, modification of the L-28 Tie Back canal, and operational changes to various water control structures. Decompartmentalization of Water Conservation Area 3 would also improve sheet flow and hydrologic connectivity. The impact of these efforts on the hydrology of the Addition, as well as within the watershed, is expected to be long term, major, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect hydrologic function and connectivity in the watershed. The impact of these activities is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on surface water flow would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would be negligible on surface water flow in the watershed.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there could be a long-term, minor, adverse cumulative impact on surface water flow. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

**Conclusion.** Under the preferred alternative, impacts on surface water flow would be long term, moderate, adverse, and mostly localized.

There could be a long-term, minor, adverse cumulative impact on surface water flow. The

actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of surface water flow in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## **Water Quality**

**Analysis.** Under the preferred alternative, impacts on water quality would be attributed primarily to the development and maintenance of facilities and ongoing visitor use. Development of new facilities such as trails, trailheads, and access points would affect water quality by causing erosion that could contribute to turbidity. Inadvertent spills of fuel or oil from construction machinery could also adversely affect water quality. Impacts from these activities would be mostly short term, minor to moderate, adverse and localized; however, some long-term impacts could occur from larger spills or from ongoing pollution due to runoff from developed sites. Development of backcountry camping areas near the Nobles and Jones grades airstrips would have similar impacts on water quality. The maintenance of roads, grades, and trails within the Addition would likely result in similar long-term adverse impacts.

Visitor use, such as ORV use, hiking, and backcountry camping, could continue to cause soil erosion and generate human waste that would affect turbidity and surface water quality. Impacts on water quality would be reduced by the designated trail system; however, they would be greater than under the no-action alternative because off-road vehicles are not allowed in alternative A. Inadvertent leaks or spills of fuel or oil from ORV use (public and NPS administrative use) could affect surface water quality by elevating chemical concentrations. Similar impacts from parked vehicles would be more common at destination sites, such as mile markers 51 and 63, or Deep Lake. The impacts of these activi-

ties would be long term, minor, adverse, and localized.

Collectively, the impact of these activities on water quality would be long term, moderate, adverse, and localized.

**Cumulative Impacts.** Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on water quality at localized sites in the portion of the Addition that abuts the original Preserve because best management practices and other mitigation would be used to minimize soil erosion and chemical contamination. The impact of these activities on water quality in the watershed would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on water quality. If such proposals included using off-road equipment and constructing roads and pads, this could degrade water quality due to turbidity and chemical contamination. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on water quality would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized. This is due to the number and complexity of the proposals and uncertainty with their levels of success.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. Although the proposals would increase surface water flow and connectivity, the discharged waters are expected to have elevated chemical concentrations that would degrade water quality. Because the current condition of water resources in the Addition is cleaner than what is expected to be discharged, the impact is predicted to be long term, adverse, and Addition-wide, but the intensity is unknown. This is due to the number and complexity of the proposals and uncertainty with their levels of success. The

impact on water quality within the watershed is unknown.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Water quality would be affected by inputs from urban and suburban development, including increases in organic compounds and chemical concentrations. The impact on water quality within the watershed is expected to be adverse, but the intensity is unknown.

Collectively, adverse impacts could be expected from oil and gas operations, ecosystem restoration projects, and regional growth and development. Overall, the effects of the projects discussed above could be adverse on water quality in the watershed, but the intensity is unknown.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, adverse cumulative impact on water quality in the watershed. The intensity of the impact is unknown. The actions contained in the preferred alternative would contribute a very small increment to this cumulative impact.

**Conclusion.** Under the preferred alternative, impacts on water quality would be long term, moderate, adverse, and localized.

There would be a long-term, adverse cumulative impact on water quality in the watershed. The intensity of the impact is unknown. The actions contained in the preferred alternative would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of water quality in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Wetlands

**Analysis.** Under the preferred alternative, impacts on wetlands would be attributed primarily to the development and maintenance of facilities. The development of new facilities, such as trails, trailheads, access points, and specific improvements to develop Deep Lake into a day use area, would result in permanent loss of wetlands.

The designation and construction of ORV trails could also adversely impact wetland function and integrity. The proposed 130 miles of primary ORV trails under this alternative would necessitate the direct displacement of an estimated 0.70 acres of wetlands (from trail construction and treatment over a distance of 0.48 miles of trails). These impacts on wetland size and functionality from ORV trail development would be long term, minor to moderate, adverse, and localized.

The public use of the ORV trails would also have other adverse effects on wetland values in several other areas throughout the designated ORV trail network. Under the preferred alternative, an estimated 54 miles of primary ORV trails would go through wetland areas. This could amount to direct adverse impacts on wetland functions or values for approximately 79 acres of wetlands (i.e., 54 miles of trail at a 12-foot trail width). However, adverse impacts on additional acreages of wetlands would also be expected because many of the impacts on wetland values or functions would likely extend beyond the 12-foot width of the primary trail or would be associated with secondary spur trails that develop outside the alignment of the primary trail.

Some effects on wetland functions and values that would be expected along ORV trail corridors (primary or secondary) include wetland vegetation displacement, rutting, altered wetland hydrology, soil compaction, and diminished wetland habitat value or habitat displacement (loss of vegetation, ORV noise, etc.). These impacts on wetland values

and functional integrity from ORV use in the Addition would be long term, moderate, adverse, and localized.

The NPS maintenance of roads, grades, and trails could also impact wetlands. Impacts from these activities would include vegetation loss and alteration of soils, which would result in permanent effects on wetland size and integrity and impacts would be long term, moderate, adverse, and localized. Indirect impacts, such as increased runoff and sedimentation, would be long term, minor, adverse, and localized.

Collectively, compared with alternative A (no action), impacts on wetland values and functions under the preferred alternative would be long term, moderate, adverse, and localized.

The site-specific functional analysis of wetland impacts from ORV trails throughout the Addition is beyond the scope of this management plan.

However, before any action implementation, NPS staff would conduct more detailed wetland impact and mitigation analyses per NPS policy and Section 404 of the Clean Water Act (as administered by the Army Corps of Engineers). For example, NPS policy requires the development of a "Wetlands Statement of Findings," which identifies and analyzes all wetland functions and values affected by NPS actions in a park unit. The "Wetlands Statement of Findings" for this management plan would quantify all wetland impacts from management actions specified in this management plan. Although Section 404 of the Clean Water Act pertains only to wetland filling and dredging, the NPS statement of findings policy addresses the impacts on several other wetland values, such as wildlife habitat, soils, vegetation communities, surface hydrology, aesthetics, and cultural values.

The detailed functional analysis of wetland impacts and the development of wetland avoidance and mitigation measures would be completed as part of the "Wetlands Statement

of Findings.” The effects of ORV use associated with this management plan would likely be the primary focus of the “Wetlands Statement of Findings” for the Addition. No ORV use, ORV trail development, or other actions with wetland impacts would be implemented or allowed until the appropriate wetland policy requirements are met. Also refer to table 29 in chapter 5 entitled, “Future Compliance Required for Implementation of Specific Actions under the Preferred Alternative”.

**Cumulative Impacts.** Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of future oil and gas proposals could have adverse impacts on wetlands. If such proposals included using off-road equipment and constructing roads and pads, this would alter wetland soils and vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on wetlands would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would affect wetlands by increasing the availability of water, which in turn could increase the size, integrity, and function of wetlands. The impact of these efforts on wetlands is expected to be long term, moderate to major, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow and water quality would affect the size, integrity, and function of wetlands in the watershed. The impact of these activities on wetlands would be long term, moderate to major, and adverse.

Collectively, beneficial impacts on wetlands would accrue from ecosystem restoration

projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would be adverse on wetlands.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on wetlands. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

**Conclusion.** Under the preferred alternative, impacts on wetlands would be long term, minor to moderate, adverse, and localized.

There would be a long-term, moderate, adverse cumulative impact on wetlands. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of wetlands in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Soils

**Analysis.** Under the preferred alternative, impacts on soils would be attributed primarily to facility development and maintenance, and visitor use.

Development and maintenance of new recreational facilities, such as at mile markers 51 and 63, Bear Island Grade, and Deep Lake, would result in displacement or permanent loss of soil resources. Development of backcountry camping areas near the Nobles and Jones grades airstrips could have similar impacts on soils. Formalizing up to 130 miles of ORV trails would cause similar impacts. Frontcountry development would typically compact previously disturbed/filled areas,

while backcountry developments could impact native soils. The impacts from these activities would be long term, moderate, adverse, and localized.

Some rutting and displacement of soils might occur due to ongoing ORV use, resulting in long-term, minor, adverse, localized impacts. Nonmotorized use could also cause erosion, but the adverse impact would likely be negligible to minor.

Collectively, impacts on soils from the preferred alternative would be long term, moderate, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of future oil and gas proposals could have adverse impacts on soils. If such proposals included using off-road equipment and constructing roads and pads, this would alter soils. The impacts of these activities would be reduced because NPS approval of the operation plan would require mitigative measures. Short-term impacts on soils would be adverse, moderate, and localized; long-term impacts would be minor, adverse, and localized.

Changes in the availability of water resources due to the south Florida ecosystem restoration project would affect soil properties. The integrity of hydrologic soils could be improved or restored by increases in water — a beneficial impact.

Decreases in water or permanent soil loss resulting from regional growth and development would adversely impact soils. The impact of these efforts on soils is expected to be long term, moderate to major, and adverse.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on soils. The permanent loss of soils would be

expected to outweigh any beneficial impacts that might be realized from ecosystem restoration projects. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

**Conclusion.** Under the preferred alternative, impacts on soils would be long term, moderate, adverse, and localized.

There would be a long-term, moderate, adverse cumulative impact on soils. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of soils in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## **Floodplains**

**Analysis.** The preferred alternative would have no impact on floodplains. Two facilities located in the 100-year floodplain would be retained, but would cause no additional impacts on floodplains beyond what is accounted for under the no-action alternative.

**Cumulative Impacts.** No cumulative impacts on floodplains would occur under the preferred alternative because there would be no impacts on floodplains resulting from the actions proposed in the preferred alternative.

**Conclusion.** The preferred alternative would have no impact on floodplains. Two facilities located in the 100-year floodplain would be retained, but would cause no additional impacts on floodplains beyond what is accounted for under the no-action alternative.

No cumulative impacts on floodplains would occur under the preferred alternative because there would be no impacts on floodplains resulting from actions proposed in the preferred alternative.

Impacts from actions contained in this alternative would not result in impairment of floodplains in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Vegetation — Cypress Strands and Domes, Mixed Hardwood Swamps, and Sloughs**

**Analysis.** Under the preferred alternative, impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would be attributed to new facility development, and visitor use.

Development of trailheads and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake would result in vegetation loss or injury from construction activities. Development of backcountry camping areas near the Nobles and Jones grades airstrips could have similar impacts on vegetation. Formalization and establishment of up to 130 miles of ORV trails would result in similar impacts on vegetation. Impacts on cypress strands and domes, mixed hardwood swamps, and sloughs from facility development would be long term, moderate, adverse, and localized.

Impacts on this vegetation community, such as trampling, injury, or loss of plant material due to the effects of ORV traffic could occur within and along designated ORV trails. The conditions that often discourage ORV use (deep water, closely spaced trees, etc.) would continue, and adverse impacts from off-road vehicles would most often be limited to the margins of the plant community. Adverse impacts could include injury to a plant or group of trees, or might include plant loss in a discrete area due to repeated use. Impacts from nonmotorized visitor use, such as trampling from hiking and camping, would be more common at frontcountry destinations and less common in the backcountry. Impacts on cypress strands and domes, mixed hardwood swamps, and sloughs from these visitor activities would be long term, moderate, adverse, and localized.

Collectively, the impact on cypress strands and domes, mixed hardwood swamps, and sloughs under the preferred alternative would be long term, moderate, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect plant communities and would likely improve plant vigor, abundance, and distribution. The impact of these efforts on cypress strands and domes, mixed hardwood swamps, and sloughs would be expected to be long term, minor to moderate, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect plant communities. The impact of these activities on cypress strands and domes,

mixed hardwood swamps, and sloughs is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above could slightly benefit cypress strands and domes, mixed hardwood swamps, and sloughs.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, beneficial cumulative impact on cypress strands and domes, mixed hardwood swamps, and sloughs. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

**Conclusion.** Under the preferred alternative, impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would be long term, moderate, adverse, and localized.

There could be a long-term, minor, beneficial cumulative impact on cypress strands and domes, mixed hardwood swamps, and sloughs. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of cypress strands and domes, mixed hardwood swamps, and sloughs in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

#### **Vegetation — Prairies and Marshes**

**Analysis.** Under the preferred alternative, impacts on prairies and marshes would be attributed primarily to visitor use. New

facilities (including ORV trails) would be cited to avoid prairies and marshes to the greatest extent possible, although some adverse impacts on the margins of these plant communities could occur from ORV use. The soil conditions in prairies and marshes cause poor traction for off-road vehicles, and rutting and braiding of trails is common. Adverse impacts could include injury to a plant or group of plants or might include plant loss in a discrete area due to rutting or from repeated use. Impacts on prairies and marshes from ORV use would be long term, minor, adverse, and localized.

Ongoing vegetation management, including the use of prescribed fire, and efforts to restore natural hydrologic processes would continue to improve conditions for native vegetation because water availability and connectivity would increase and competition from exotic plants would be minimized. Impacts on prairies and marshes from vegetation management would continue to be long term, beneficial, minor to moderate, and Addition-wide.

Some prairies and marshes would be accessible to nonmotorized users, and therefore could be subject to impacts, such as trampling of vegetation. Impacts would be greatest and more concentrated in frontcountry locations and less common in the backcountry. Impacts on prairies and marshes from visitor use would be long term, negligible, adverse, and localized.

Collectively, the impact on prairies and marshes under the preferred alternative would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be

long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be moderate, adverse, and localized; long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect plant communities and would likely improve plant vigor, abundance, and distribution. The impact of these efforts on prairies and marshes is expected to be long term, minor to moderate, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect plant communities. Prairies and marshes on private land outside of the Addition would continue to be impacted by population growth and development. The impact of these activities on prairies and marshes is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on prairies and marshes would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above on prairies and marshes would be long-term, minor, and adverse.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on prairies and marshes. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

**Conclusion.** Under the preferred alternative, impacts on prairies and marshes would be long term, minor, adverse, and localized.

There would be a long-term, minor, adverse cumulative impact on prairies and marshes. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of prairies and marshes in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### Vegetation — Mangrove Forests

**Analysis.** Impacts on mangrove forests under the preferred alternative would generally be the same as under the no-action alternative because recreational use in this vegetation community would be the same as in alternative A. As with the no action alternative, motorized boating would continue to be allowed south of U.S. 41 in the Western Addition in the deep, open water environs, outside of the dense mangrove forests. Motorized boating could continue to cause injury to individual plants or prevent their expansion into the shallower margins of the well-travelled boating corridors. Consequently, compared to alternative A, there would be no impact on mangrove forests in the Addition under the preferred alternative.

**Cumulative Impacts.** Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Regional growth and development,

including waterfront development, is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Mangroves receive special protection under state law, and any adverse impacts on mangrove forests would be expected to be negligible. Because the preferred alternative would not contribute any increment, there would be no cumulative impact.

**Conclusion.** The preferred alternative would have no impact on mangrove forests. Impacts on mangroves would be the same as what was accounted for under the no-action alternative.

There would be no cumulative impacts on mangrove forests under the preferred alternative.

Impacts from actions contained in this alternative would not result in impairment of mangrove forests in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Vegetation — Pinelands**

**Analysis.** Under the preferred alternative, impacts on pinelands would be attributed to new facility development, and visitor use.

Ongoing vegetation management, including the use of prescribed fire, would decrease competition from exotic plants and improve the integrity of native habitats. Impacts on pinelands from vegetation management would continue to be long term, beneficial, minor to moderate, and Addition-wide.

Development of trails, trailheads, and access points at mile marker 51, mile marker 63, Bear Island Grade, and Deep Lake would result in vegetation loss or injury from construction activities. Development of backcountry camping areas near the Nobles and Jones grades airstrips could have similar impacts on vegetation. Formalization and establishment of up to 130 miles of ORV trails would affect pinelands. Impacts on pinelands would likely

be proportionately greater than for the other vegetation communities because pinelands are uplands that are often targeted as appropriate development sites and trail corridors. The durability of the substrate present in pinelands (for ORV use) reduces adverse impacts from ORV use. The loss of pines from ORV use has not been documented in the original Preserve; however, wheeled use could have adverse impacts on other plant species present within these communities or within certain ecotonal areas. Adverse impacts could include injury to a plant or group of plants, reduced regeneration, or plant loss in a discrete area due to repeated use. Impacts on pinelands from facility development and trail development and use would be long term, moderate, adverse, and localized.

Impacts from nonmotorized visitor use, such as trampling due to hiking or equestrian use, would be more common at frontcountry destinations and less common in the backcountry. Although individual understory plants could be injured or killed, the integrity of the pineland community would not likely be affected due to the durable substrate and the resiliency of mature trees to relatively benign activities. Impacts on pinelands from these activities would be long term, negligible to minor, adverse, and localized.

Collectively, the impact on pinelands under the preferred alternative would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas could have adverse impacts on vegetation in the Addition; however, it is unknown what plant

communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be moderate, adverse, and localized; long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of pinelands. The assemblage of pines and palmettos could change as a result of changes in hydrology or periods of inundation. The impact is uncertain because drying often adversely impacts pinelands, and increasing the water table could also cause a net reduction in pinelands compared to current conditions. It is expected that restoring natural hydrologic conditions would have a beneficial impact on pinelands.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Studies have shown that pinelands are the most impacted by human land conversion. Pinelands on private land in the region would continue to be lost. The impact would be long term, moderate to major, and adverse.

Collectively, beneficial impacts on pinelands would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would be adverse on pinelands in the Addition.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as

described above, there would be a long-term, moderate to major, adverse cumulative impact on pinelands. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

**Conclusion.** Under the preferred alternative, impacts on pinelands would be long term, minor, adverse, and localized.

There could be a long-term, moderate to major, adverse cumulative impact on pinelands. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of pinelands in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

#### **Vegetation — Hardwood Hammocks**

**Analysis.** Under the preferred alternative, impacts on hardwood hammocks would be attributed primarily to new facility development and visitor use.

Ongoing vegetation management would decrease competition from exotic plants and improve the integrity of native habitats. Impacts on hardwood hammocks from vegetation management would continue to be long term, beneficial, minor to moderate, and Addition-wide.

Development of trails; trailheads; and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake could result in vegetation loss or injury from construction activities. Development of backcountry camping areas near the Nobles and Jones grades airstrips could have similar impacts on vegetation. Establishment of up to 130 miles of ORV trails would affect hardwood hammocks. Although the substrate present in hardwood hammocks is suitable for ORV use, use tends to be infrequent because of the size and density of trees present in these areas. However, this

infrequent ORV use could adversely impact understory plants. Adverse impacts could include plant injury or loss in a discrete area due to repeated use. Impacts on hardwood hammocks from facility development and ORV use would be long term, minor to moderate, adverse, and localized.

Impacts from nonmotorized visitor use, such as trampling due to hiking or equestrian use would be more common at frontcountry destinations and less common in the backcountry. Backcountry camping could cause trampling or loss of vegetation at localized sites. Although individual understory plants could be injured or killed, the integrity of the hammock community would not likely be affected due to the durable substrate and the resiliency of mature trees to relatively benign activities. Impacts on hardwood hammocks from these activities would be long term, negligible to minor, adverse, and localized.

Collectively, the impact on hardwood hammocks under the preferred alternative would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation in the Addition; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be adverse,

moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of hardwood hammocks. The impact is uncertain, but restoring natural conditions is expected to have a long-term, minor, beneficial impact.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect plant communities. The impact of these activities on hardwood hammocks is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on hardwood hammocks would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above on hardwood hammocks would be long term, minor, and adverse.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on hardwood hammocks. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

**Conclusion.** Under the preferred alternative, impacts on hardwood hammocks would be long term, minor, adverse, and localized.

There could be a long-term, minor, adverse cumulative impact on hardwood hammocks. The actions contained in the preferred

alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of hardwood hammocks in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### Exotic/Nonnative Plants

**Analysis.** Under the preferred alternative, impacts on exotic/nonnative plants would be attributed primarily to facility development and maintenance, visitor use, and expanded NPS administrative ORV use. Ongoing vegetation management (including the use of prescribed fire and chemical and mechanical treatment) in the Addition would continue to decrease competition from exotic plants and improve the integrity of native habitats. The continuation of monitoring efforts would also help to detect and mitigate new exotic species that could affect native plant communities. Impacts on exotic/nonnative species from ongoing resource management activities would be long term, beneficial, moderate, and Addition-wide.

New facility development — such as trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake — would create disturbed lands that would be subject to colonization by invasive plants. Development of backcountry camping areas near the Nobles and Jones grades airstrips could have similar impacts on vegetation. Construction materials and activities could also be a seed source for exotic plants and would increase the potential for their dispersion. Maintaining these facilities would also create disturbed habitats that could increase the density of exotic plants and affect the integrity of adjacent natural areas. Exotic plants can have severe effects on the integrity of native systems and habitats. The impact from these activities would be long term, moderate, adverse, and localized.

NPS administrative ORV use and expanded visitor use, including the establishment and use of up to 130 miles of ORV trails, would increase the dispersal of exotic plants and also create additional disturbed areas that would be subject to colonization by invasive plants. The impact on exotic plants from visitor use would be long term, moderate, adverse, and localized. Although the effects would be most pronounced along travel corridors and at disturbed sites, the impacts could extend beyond these immediate areas and become Addition-wide. However, ORV management includes education, prevention, and mitigation components that would limit the establishment and distribution of exotic plants in the Addition.

Collectively, impacts on exotic/nonnative plants under the preferred alternative would be long term, moderate, adverse, and potentially Addition-wide.

**Cumulative Impacts.** Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would help minimize the impacts of off-road vehicles on exotic plants and nonnative vegetation in the original Preserve and reduce the potential for dispersion into the Addition. The impact on exotic plants and nonnative vegetation in the region would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on native vegetation because of the potential for the spread of exotic and nonnative plants in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this would disturb soils and native vegetation. Short-term impacts could include the establishment of exotic plants on disturbed sites and the dispersal of seeds and plant stock. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on native vegetation because of the potential for the

spread of exotic and nonnative plants would be adverse, moderate, and localized; long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of exotic plants. The impact on exotic plants is uncertain, but restoring natural conditions is expected to have a long-term, minor to moderate, beneficial impact on native plants and vegetation.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect exotic plants, as would increases in the amount of disturbed land that is available for colonization by exotic species. The impact of these activities on exotic plants and nonnative vegetation is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on native vegetation would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above could be minor and adverse on exotic plants and nonnative vegetation.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on exotic plants. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

**Conclusion.** Under the preferred alternative, impacts on native vegetation because of the

potential for the spread of exotic and non-native plants would be long term, moderate, adverse, and potentially Addition-wide.

There could be a long-term, minor, adverse cumulative impact on exotic plants and nonnative vegetation. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of native vegetation in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Federal Threatened and Endangered Species**

**Florida Panther.** Under the preferred alternative, impacts on the Florida panther would be attributed to new facility development, expanded visitor use, and expanded NPS administrative ORV use.

New facility development — such as trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake — would impact panthers by causing short-term disturbances associated with construction activities and permanent loss of habitat. Development of backcountry camping areas near the Nobles and Jones grades airstrips could have similar impacts. Development footprints would be confined to previously disturbed areas to the greatest extent possible while also considering design needs and standards (e.g., using disturbed areas near existing access points along major highways). There would still be a loss of habitat within the panther home range. Facility development under the preferred alternative would be greater than under the no-action alternative. The impact would be long term, minor to moderate, adverse, and localized.

Public ORV use in the Addition under the preferred alternative would be substantially greater than the no-action alternative, with up to 130 miles of designated trails and 650 ORV

permits available. The ORV trails and permits would be phased in over time, depending on the results of monitoring. This approach would be more cautious and protective than the approach included under alternative B. Adverse impacts from ORV use could include displacement of panthers and their avoidance of certain areas within the Addition. Public hunting would also be allowed but is not expected to adversely impact the viability of the panther's prey base because game populations would be managed for sustainable harvests. Although no studies have shown that ORV use alone causes changes in panther behavior (NPS 2000), the Janis and Clark (1999) study on the effects of human activity in the original Preserve showed that panthers' home range shifted and they avoided designated ORV trails during higher levels of human activity associated with hunting season. Total human use and disturbance within panther habitat in the Addition would increase substantially relative to the no-action alternative. The impacts from these activities would be long term, moderate, adverse, and could be Addition-wide.

Nonmotorized visitor use (primarily back-country hiking) could continue to affect Florida panthers, potentially causing displacement of panthers and their avoidance of certain areas within the Addition. The impact would be long term, minor, adverse, and localized.

Designating lands as wilderness under the preferred alternative could result in beneficial impacts on the panther. Habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This could result in greater protection of panther habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Collectively, impacts on the Florida panther under the preferred alternative would be long term, moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on panthers in the region, a beneficial impact (because an individual panther's range may include the Preserve as well as the Addition and other adjacent lands). In other words, improving and protecting habitat value on the original Preserve could yield a regional benefit to the species. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on panthers. Adverse impacts on panthers would still occur from ORV use in the original Preserve, but the effects on the species would be less than with no ORV management. With implementation of the terms and conditions of the U.S. Fish and Wildlife Service's "Biological Opinion" (USFWS 2000), the plan is not likely to result in jeopardy to the panther. Overall, the impact of the ORV plan on the Florida panther would be long-term, moderate, and beneficial compared to no ORV management.

Implementation of future oil and gas could have adverse impacts on Florida panthers in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could create human disturbances and result in degradation and loss of panther habitat. Short-term adverse impacts from construction could include flushing and displacement of panthers, effects on feeding and sheltering behavior, and an increase in mortality from vehicle collisions. Panthers have been seen at

existing oil and gas operations in other portions of the Preserve. The same types of adverse impacts would be experienced over the long term due to ongoing operations and maintenance activities. These adverse impacts would be minor and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communities and in turn wildlife habitat. The impact on the Florida panther is uncertain, but restoring natural conditions is assumed to have a long-term, minor, beneficial impact because it would return vegetation communities to historic conditions and improve predator/prey relationships.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a substantial loss of panther habitat. Natural areas that remain are more fragmented and contain higher levels of human disturbance, both of which adversely affect panthers and their long-term survival. Increased panther mortality due to vehicle collisions could also be attributed to the effects of regional growth and development. The impact of these activities on the Florida panther is expected to be long term, moderate to major, and adverse.

Collectively, beneficial impacts on the Florida panther would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to Florida panthers in the region.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on the Florida panther. The actions contained in the preferred alternative would contribute a modest increment to this cumulative impact.

**Conclusion** — Impacts on the Florida panther under the preferred alternative would be long term, moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

There would be a long-term, moderate, adverse cumulative impact on the Florida panther. The actions contained in the preferred alternative would contribute a modest increment to this cumulative impact.

Impacts from actions contained in this alternative would not likely result in impairment of the Florida panther in the Addition because habitat conditions would be maintained or enhanced and the NPS would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**West Indian Manatee.** Impacts on the West Indian Manatee under the preferred alternative would generally be the same as under the no-action alternative. However, designating new paddling trails in tidal areas south of U.S. 41 could increase displacement or avoidance behavior, which could affect feeding and other behaviors. This impact would be long term, minor, adverse, and localized.

Overall, compared to the no-action alternative, impacts on the West Indian manatee would be long term, minor, adverse, and localized. The determination of effect

under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would increase the quantity of freshwater inputs into the estuarine system, a beneficial impact on the manatee. The quality of freshwater inputs is predicted to be less than current conditions, which could adversely impact manatee habitat. Overall, it is expected that restoring natural hydrologic conditions would produce long-term, minor beneficial impacts on the West Indian manatee.

Regional growth and development is expected to continue and could result in an increase in the number of recreational boaters in the region. Injury and mortality of the manatees associated with recreational boating could increase as a result of increased motorboat use. Incompatible coastal development could also adversely affect manatees by loss of habitat and feeding areas, as well as pollution discharges. These activities would adversely impact manatees and could affect their long-term survival. The impact on the West Indian manatee is expected to be long term, moderate to major, and adverse.

Overall, the effects of the projects discussed above would likely be adverse to West Indian manatees in the region.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on the West Indian manatee. The actions contained in the preferred

alternative would contribute a very small increment to this cumulative impact.

**Conclusion** — Impacts on the West Indian manatee under the preferred alternative would be long term, minor, adverse, and localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, moderate, adverse cumulative impact on the West Indian manatee. The actions contained in the preferred alternative would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the West Indian manatee in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Red-Cockaded Woodpecker.** Under the preferred alternative, impacts on potential habitat for the red-cockaded woodpecker would be attributed to new facility development and expanded visitor use.

New facility development — such as trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake — could impact potential habitat for woodpeckers by causing short-term disturbances associated with construction activities and permanent loss of habitat. Development footprints would be confined to previously disturbed areas to the greatest extent possible while also considering design needs and standards (e.g., using disturbed areas near existing access points along major highways). There would still be a loss of habitat. The impact would be long term, minor to moderate, adverse, and localized.

Public ORV use in the Addition under the preferred alternative would be allowed on up to 130 miles of designated trails. The ORV trails and permits would be phased in over time depending on the results of monitoring. This approach would be more cautious and protective than the approach under alternative B. Adverse impacts on woodpeckers from ORV use would include their displacement and avoidance of certain areas within the Addition. NPS administrative ORV use would add slightly to these impacts. Public hunting would also be allowed, but is not expected to adversely impact woodpecker habitat because the integrity of cavity trees and forage resources would be maintained. Total human use and disturbance in the Addition would increase substantially relative to the no-action alternative. Conditions that support woodpecker use of the area would continue to be maintained. Because there are currently no known nest sites within the Addition, effects on woodpeckers would be limited to impacts on foraging habitat and their avoidance of certain areas during periods of human activity. The impacts would be long term, minor to moderate, adverse, and localized.

Nonmotorized visitor use (primarily back-country hiking) would continue to affect woodpeckers, potentially causing displacement and their avoidance of certain areas within the Addition; the impact would be long term, negligible to minor, adverse, and localized.

Designating lands as wilderness under the preferred alternative could result in beneficial impacts on the woodpeckers. Habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of woodpecker habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Collectively, impacts on the red-cockaded woodpecker under the preferred alternative would be long term, minor to moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

***Cumulative Impacts*** — Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on red-cockaded woodpeckers in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on woodpeckers. Cavity trees and active clusters would be avoided as sites for the trails, thereby reducing adverse impacts. Adverse impacts on woodpeckers would still occur from ORV use in pinelands in the original Preserve, but the impact would be minor. Overall, the impact of the 2000 ORV plan on the red-cockaded woodpecker would be long term, negligible, and adverse.

Implementation of future oils and gas proposals could have adverse impacts on the red-cockaded woodpecker in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could degrade and reduce available woodpecker habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term adverse impacts could include flushing and displacement of the woodpeckers, while long-term impacts would include the loss of cavity nesting trees.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet

flow and hydrologic connectivity, which would affect vegetation communities (including pinelands) and in turn wildlife habitat. The impact on the red-cockaded woodpecker is uncertain, but restoring natural conditions is assumed to have a long-term, minor, beneficial impact because returning vegetation communities to historic conditions and improving foraging resources should be beneficial.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a substantial loss of woodpecker habitat (pinelands) in the region. Natural areas that remain are more fragmented and contain higher levels of human disturbance and displacement of the woodpeckers, both of which adversely affect woodpeckers and their long-term survival. The impact of these activities on the red-cockaded woodpecker is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on the red-cockaded woodpecker would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to red-cockaded woodpecker in the region.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on the red-cockaded woodpecker. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

**Conclusion** — Impacts on the potential habitat for and thus the red-cockaded

woodpecker under the preferred alternative would be long term, minor to moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

There would be a long-term, moderate, adverse cumulative impact on the potential habitat for and thus the red-cockaded woodpecker. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the red-cockaded woodpecker in the Addition because habitat conditions would be maintained or enhanced, and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Wood Stork.** Under the preferred alternative, impacts on the wood stork would be attributed to new facility development and expanded visitor use

Because there are currently no known nest sites within the Addition, and they have nested in the original Preserve only sporadically since 1996, effects on wood storks would be limited to impacts on foraging habitat and avoidance of certain areas during periods of human activity.

Because new facility development, such as trailheads and access points would be confined mostly to developed corridors and areas of existing disturbance, impacts on wood stork habitat would be negligible. Establishment of up to 130 miles of ORV trails could cause adverse impacts on storks by creating short-term disturbances associated with construction activities and permanent loss of habitat. Use of the ORV trails and the increase in human occupation and disturbance in the backcountry could displace birds and cause them to avoid certain areas.

NPS administrative ORV use could add slightly to these impacts. Public hunting would also be allowed, but is not expected to adversely impact wood stork habitat because the integrity of roost and nest trees and forage resources would be maintained. Total human use and disturbance in the Addition would increase substantially relative to the no-action alternative; however, conditions that support wood stork use of the area would continue to be maintained. The impact of these activities would be long term, minor, adverse, and localized.

Nonmotorized visitor use (primarily backcountry hiking) could affect wood storks to a greater degree than under the no-action alternative due to greater use levels, potentially causing displacement and their avoidance of certain areas within the Addition. The impact would be long term, negligible to minor, adverse, and localized.

Designating lands as wilderness under the preferred alternative would likely result in beneficial impacts on the wood stork. Potential habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of stork habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Collectively, impacts on the wood stork under the preferred alternative would be long term, minor, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

***Cumulative Impacts*** — Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original

Preserve would reduce the impacts of off-road vehicles on the wood stork's foraging habitat (prairies and marshes) in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on storks. Nesting habitat (cypress trees in open water) would likely not be affected because off-road vehicles typically avoid the deep, open water areas that storks commonly nest in. Consequently, the effect on nesting habitat in the region due to the actions in the ORV plan would be negligible. Overall, the impact of the ORV plan on the wood stork in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the wood stork in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in loss and degradation of wood stork habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Adverse impacts could include flushing and displacement of the wood storks. Short-term impacts on wood storks would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions, including food supply. The impact on the wood stork is unknown, but restoring natural hydrologic conditions is expected to have a long-term, minor to moderate, beneficial impact because returning vegetation communities to historic conditions and improving foraging resources should be beneficial.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Impacts such as the loss of wetlands and compromised water quality from discharge of urban pollutants into hydrologic systems would adversely affect storks. The impact of these activities on the wood stork is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on the wood stork would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse on wood storks in the region.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on the wood stork. The actions contained in the preferred alternative would add a very small increment to this cumulative impact.

**Conclusion** — Impacts on the wood stork under the preferred alternative would be long term, minor, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor, adverse cumulative impact on the wood stork. The actions contained in the preferred alternative would add a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the wood stork in the Addition because habitat conditions would be maintained or enhanced and the NPS would strive to

meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Everglade Snail Kite.** Under the preferred alternative, impacts on the Everglade snail kite would be attributed to new facility development, trail development, and expanded visitor use.

Because no snail kite nest sites are known within the Addition, effects on existing snail kite habitat would be limited to impacts on foraging and roosting habitat near marshes and open water bodies. However, the increased recreation and human activity associated with the preferred alternative might preclude future kite nesting in the Addition.

New facility development, such as trailheads and access points, would be confined mostly to developed corridors and areas of existing disturbance. Therefore, the impacts from construction of these facilities on snail kite habitat would be negligible. However, the establishment of 130 miles of ORV trails would cause adverse impacts on snail kite habitat. The noise and human activity associated with construction and maintenance of these trails could generate short-term disturbances on kite habitat in areas where trail segments are near marshes, lakes, and other snail kite foraging areas. These impacts would be short term, minor, adverse, and localized.

The long-term public use of the ORV trails and the increase in human presence and disturbance in the backcountry would also have adverse effects on snail kite habitat. Noise from off-road vehicles and nearby human presence and activity would disturb or flush kites that are roosting or foraging for apple snails in nearby marshes, ponds, and lakes in the Addition. Over time, this might cause snail kites to avoid foraging or roosting in certain habitat areas that are near ORV trail corridors or associated zones of human activity (which may radiate or spur off of the

designated ORV trails). Larger habitat areas that became fragmented into smaller habitat “islands” by ORV trail corridors might also be avoided because of diminished habitat value. NPS administrative ORV use could add to these impacts. Public hunting would also be allowed and could have adverse impacts on snail kite foraging habitat if the hunting takes places in or near the marshes and open water bodies. Human presence and gun noise would contribute to these hunting impacts. The total human use and disturbance in the Addition associated with the preferred alternative would be an increase relative to the no-action alternative. The impact of these activities would be long term, minor to moderate, adverse, and mostly localized.

Nonmotorized visitor use (primarily backcountry hiking) would continue to affect Everglade snail kites in a way and degree that is similar to the no-action alternative. Snail kites could avoid foraging in areas that receive high levels or repeated occurrences of human activity. The impact would be long term, negligible to minor, adverse, and localized.

Designating lands as wilderness under the preferred alternative would likely result in beneficial impacts on the snail kite. Potential habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of kite habitat. However, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Under the preferred alternative, ongoing NPS efforts to improve natural hydrologic processes, water quality, and invasive plant control would continue as in the no-action alternative. These NPS management actions could benefit apple snail populations in the Addition, as well as improve the snail kite’s accessibility to the apple snails.

Collectively, impacts on the Everglade snail kite under the preferred alternative would be long term, minor to moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under the preferred alternative would be similar to that of the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of off-road vehicles on the snail kite’s foraging, roosting, and nesting habitat (marshes and pond/lake fringes) in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on the kites in the region. However, foraging, roosting, or possible nesting habitat for snail kites could be adversely affected in areas where ORV use is permitted under the plan, particularly in specific ORV use areas that are near marshes, ponds, or lakes. Overall, the impact of the ORV management plan on the snail kite habitat in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the snail kite habitat in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in loss and degradation of snail kite habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Adverse impacts could include flushing and displacement of snail kites. Short-term impacts on snail kites would be adverse, moderate, and localized, while long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the

region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions, including food supply and water quality. This would be particularly beneficial to the snail kite because its diet predominantly consists of apple snails that depend on adequate hydrological conditions. Furthermore, the return of natural hydrological conditions and improved water quality to the region would also enhance or increase the availability of quality foraging, roosting, and nesting habitat for the Everglade snail kite. The restoration of natural hydrologic conditions would have long-term, moderate, beneficial impacts.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Impacts such as the loss of wetlands and compromised water quality from discharge of urban pollutants into hydrologic systems would adversely affect snail kites and their primary food source, the apple snail. The impact of these activities on the snail kite is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on the snail kite would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to snail kite habitat in the region.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the Everglade snail kite. The actions contained in the preferred alternative would add a small increment to this cumulative impact.

**Conclusion** — Impacts on the snail kite under the preferred alternative would be long term, minor to moderate, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

There would be a long-term, minor to moderate, adverse cumulative impact on the snail kite. The actions contained in the preferred alternative would add a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the Everglade snail kite in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**American Crocodile.** Impacts on the American crocodile and its habitat under the preferred alternative would generally be the same as under the no-action alternative because recreational use in and near mangrove forests of the Addition would be the same as in alternative A (no action).

Under the preferred alternative, impacts on the American crocodile and its habitat would primarily be attributed to continued human activities near mangrove forests, particularly motorized boating associated with recreational fishing in the Western Addition (airboat use is prohibited). Mangrove forests are the primary habitat for the American crocodile in south Florida, although crocodiles are generally rare in Big Cypress National Preserve. The mangrove habitat areas along creeks, canals, and estuaries south of U.S. 41 in the Western Addition are where effects would most likely occur.

In these areas, crocodiles might be affected by motorboat noise, boat wakes and waves, human noise or actions, or boat hulls or

propellers. Because most American crocodile activity occurs from just before sunset to just after sunrise, most of these human-induced actions would disturb the crocodiles when they are at rest during daytime hours. These disturbances might cause resting crocodiles to be flushed, resulting in unnecessary energy use and stress. Boating in early morning or evening hours might also alter crocodile foraging behavior or flush the possible prey of the crocodile. Depending on the level and frequency of human disturbances, crocodiles could avoid some areas entirely.

Crocodiles are not known to nest in the Addition. However, if nesting occurs, the hatching success would primarily depend on risks from flooding, predation, lack of soil moisture during incubation, and extreme storms. The nest success also depends on the female crocodile returning to the nest to excavate the hatchlings. Research suggests that some female crocodiles may abandon their nests if the area is subjected to repeated, close human presence (Kushlan and Mazzotti 1989). Once hatched, juveniles would then be affected by similar human disturbances as highlighted above. The young crocodiles would be at greatest risk during their journey through open water from their nest site to more distant nursery habitat.

Given the infrequent presence of crocodiles in the Addition, the above effects from human recreation activities such as boating would be long term, minor, adverse, and localized.

The preferred alternative would also continue current NPS vegetation management actions that would help maintain or improve habitat conditions in the Addition. These actions would help address invasive plant infestations that could degrade or displace habitat for the American crocodile. The impacts of ongoing NPS vegetation management would be long term, minor to moderate, beneficial, and localized.

Under the preferred alternative, the impacts on the American crocodile would continue to be long term, adverse, minor, and localized.

The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would increase the quantity of freshwater inputs into the estuarine system, a beneficial impact on the American crocodile. This restoration of hydrologic flows and connectivity would be most beneficial to the crocodile in the nonnesting season when they seek inland freshwater habitats. However, the water quality of freshwater inflows is predicted to be worse than current conditions, which could adversely impact crocodile habitat. Overall, it is expected that restoring natural hydrologic conditions would produce long-term, moderate, beneficial impacts for the American crocodile.

Regional growth and development, including waterfront development, is expected to continue in south Florida. This would result in the alteration or displacement of natural lands and changes to the local and regional hydrology. Because mangrove forests receive special protection under state law, any direct impacts on mangrove forests would be expected to be negligible. However, even if direct impacts on mangroves are avoided, urban encroachment might diminish mangrove habitat values if human activity and development is near the mangroves. Road mortality would likely increase as development and regional population increase. Growth and development could also result in an increase in boating and other recreational activities in the area. Crocodile foraging, breeding, resting, and nesting might be affected by increases in motorboat disturbances, boat wakes and waves, and human noise or actions.

Crocodiles could avoid some areas entirely depending on the level and frequency of human disturbances. The impact on the American crocodile from urban growth and development is expected to be long term, moderate, and adverse.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the American crocodile. The actions contained in the preferred alternative would contribute a very small increment to this cumulative impact.

**Conclusion** — Implementation of the preferred alternative would result in localized, long-term, minor, adverse impacts on the American crocodile. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor to moderate, adverse cumulative impact on the American crocodile. The actions contained in the preferred alternative would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the American crocodile in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Eastern Indigo Snake.** Under the preferred alternative, impacts on the potential habitat for the eastern indigo snake would be attributed to new facility development, ORV trail development, and expanded visitor use.

New facility development, such as the construction of trailheads and access points, would be confined mostly to developed corridors and areas of existing disturbance. Therefore, the impacts from construction of these facilities on eastern indigo habitat would be negligible. However, debris and brush piles generated during site construction might be an attractant to eastern indigo snakes. This could lead to snake injury or mortality during construction, which would be an impact that is short term, minor to moderate, adverse, and very localized. Also, the establishment and designation of 130 miles of ORV trails could cause adverse impacts on the snakes and their habitat. The noise and human activity associated with construction and maintenance of these trails could generate short-term disturbances on habitat areas where trail segments are close to active snake foraging, breeding, or burrowing areas. These disturbance impacts would be short term, minor, adverse, and localized.

The long-term public use of the ORV trails, radiating spur trails, and the increase in human occupation and disturbance in the backcountry would have adverse effects on potential eastern indigo snake habitat. Noise from off-road vehicles and nearby human presence and activity would disturb or flush snakes and thus might disrupt normal foraging, breeding, or dispersing. In addition, ORV use and spur trails that extend beyond the immediate vicinity of designated ORV trails would also displace a variety of potential snake habitat types. This off-trail activity by the public could disturb or degrade vegetative groundcover and soil substrates in areas that support foraging, breeding, and snake burrows or refuges, such as pinelands or successional hardwood hammocks. The combination of these impacts could cause eastern indigos to leave the area, abandon den sites, and miss foraging and mating opportunities. NPS administrative ORV use could add to these impacts. Also, the ORV use would also have similar impacts on many prey species of the eastern indigo, which would have adverse effects on the snake. Under the preferred alternative, the ORV use and

associated human disturbances in the Addition would be an increase relative to the no-action alternative. The impact of these activities would be long term, minor to moderate, adverse, and localized.

Given the snake's large home range and need to disperse across a variety of habitat types to sustain viable populations, the eastern indigo is particularly vulnerable to habitat fragmentation and the resulting "edge effect" (Layne and Steiner 1996, Breininger et al. 2004). Unlike the no-action alternative, large habitat areas would become fragmented into smaller habitat "islands" by ORV trail corridors. This would result in diminished habitat value for the snake throughout the Addition. The effect of this habitat fragmentation would be long term, minor to moderate, adverse, and Addition-wide.

Public hunting would also be allowed (walk-in or via ORV access), and this would have adverse impacts on eastern indigo habitat if the hunting frequently takes places in or near vegetation communities that are commonly occupied by the snake (e.g., pinelands, successional hardwood hammocks, and mangrove forests).

Other nonmotorized visitor use (primarily backcountry hiking) would continue to affect eastern indigo snake habitat in a way and degree that is similar to the no-action alternative. Although increased human use would be expected with the preferred alternative, these pedestrian activities would only cause sporadic flushing of the snake. Eastern indigos could avoid foraging in areas that receive high levels or repeated occurrences of human activity. The impact would be long-term, negligible to minor, adverse, and localized.

Designating lands as wilderness under the preferred alternative would likely result in beneficial impacts on eastern indigo habitat. Potential habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum

requirements process. This would likely result in greater protection of the snake's habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Under the preferred alternative, ongoing NPS efforts to improve natural hydrologic processes, water quality, and invasive plant control would continue as in the no-action alternative. Given the snake's dependence on a mosaic of habitat types throughout its lifecycle, these active NPS management actions could benefit the eastern indigo habitat directly. The snake would also benefit indirectly because NPS management actions would also enhance habitat values for the snake's prey species.

Collectively, impacts on the potential eastern indigo snake habitat under the preferred alternative would be short term and long term, minor to moderate, adverse, and localized to Addition-wide. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

***Cumulative Impacts*** — Cumulative impacts under the preferred alternative would be similar to that of the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of off-road vehicles on the wide variety of habitat types that support the eastern indigo. Most importantly, the improved ORV management efforts would reduce disturbance or degradation to vegetative groundcover and soil substrates in areas that provide for foraging, breeding, and snake burrows or refuges, such as pinelands or successional hardwood hammocks. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on the indigo snakes in the region. However, snake habitat might be

altered or displaced and individual snakes might be disturbed, in areas where ORV use is permitted under the plan. Overall, the impact of that plan on the eastern indigo in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the eastern indigo snake habitat in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in the loss and degradation of several habitat types that support the snake. Adverse impacts would include displacement of vegetative cover for the snake; soil and burrow disturbances; possible roadway injury/mortality; and disruption of normal foraging, breeding, and dispersal behaviors. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on the snake would be adverse, moderate, and localized, while long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions for many species. This hydrologic restoration could benefit the eastern indigo directly during times of the year when the snake uses wetter habitats in the area. At other times, it would benefit the eastern indigo indirectly by restoring a natural system that could improve conditions and increase populations of the snake's food base. However, the reintroduction of natural flows could displace some existing upland areas. This effect could decrease available upland habitat for the eastern indigo snake and its prey that depend on upland habitat. The restoration of natural hydrologic conditions would have long-term, minor to moderate impacts that could be both beneficial and adverse to the snake.

Regional growth and development is expected to continue and result in an increase in habitat displacement for the snake. Because the eastern indigo uses a variety of habitat types and has a large home range, it is particularly susceptible to habitat loss and habitat fragmentation from urban development. In addition to habitat displacement and fragmentation, urban development also brings injury or mortality threats from domestic animals, vehicles, property owners, and pesticides and rodenticides in the food chain. All of these would adversely affect eastern indigos. The impact of these activities on the snake is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on the eastern indigo snake would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to the snake's habitat in the region.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact and a short-term, minor to moderate adverse cumulative impact on the eastern indigo snake. The actions contained in the preferred alternative would contribute a small increment to this adverse cumulative impact.

**Conclusion** — Impacts on the potential habitat for and thus the eastern indigo snake under the preferred alternative would be short term and long term, minor to moderate, adverse, and localized to Addition-wide. The determination of effect under Section 7 of the Endangered Species Act would be *likely to adversely affect*.

There would be a short-term and long-term, moderate, adverse cumulative impact on the potential habitat for the eastern indigo snake. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the eastern indigo snake in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Major Game Species**

**Analysis.** Under the preferred alternative, impacts on the major game species of the Addition (white-tailed deer, feral hogs, and wild turkey) would be attributed to new facility development and expanded visitor use.

New facility development — such as trails, trailheads, and access points at mile marker 51, mile marker 63, Bear Island Grade, and Deep Lake — would impact game species by causing short-term disturbances associated with construction activities and permanent loss of habitat. Development of backcountry camping areas near the Nobles and Jones grades airstrips could have similar impacts. Development footprints would be confined to previously disturbed areas to the greatest extent possible (such as at existing access points along major highways and the interstate), but there would still be a loss of habitat. The impact would be short and long term, minor, adverse, and localized.

The formalization and establishment of up to 130 miles of ORV trails would fragment game habitat, and ongoing use of the trails would cause flushing, displacement, and avoidance of certain areas. NPS administrative ORV use could add slightly to these impacts. The impacts on game species from ORV use in the

Addition would likely be long term, minor, adverse, and localized. Game species typically adapt to changes in habitat conditions and can become habituated to the predictable use of designated ORV routes.

Public hunting would be allowed under the preferred alternative and the up to 130-mile network of ORV trails would allow hunters to access much of the Addition and increase hunting opportunities. The Addition would be expected to become part of the adjacent Big Cypress State Wildlife Management Area. As in the original Preserve, hunting would be regulated according to the requirements, seasons, and bag limits established by the Florida Fish and Wildlife Conservation Commission. Short-term, minor adverse impacts, such as flushing and displacement of game species, would continue. Long-term, moderate beneficial impacts could also occur from harvesting and management of game populations, such as disease mitigation and improvements in population genetics. Partnerships with the Florida Fish and Wildlife Conservation Commission would continue and would contribute to the monitoring and improved understanding of game populations.

Designating lands as wilderness under the preferred alternative would likely result in beneficial impacts on major game species. Habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of game habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Collectively, impacts on major game species under the preferred alternative would be long term, minor to moderate, adverse, and mostly localized.

**Cumulative Impacts.** Cumulative impacts under the preferred alternative would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the adverse impacts of off-road vehicles on major game species in the region — a beneficial impact. Eliminating some and designating new ORV trails would make ORV noise and movement more predictable, thereby displacing animals away from travel corridors but reducing the impacts on wildlife habitat and game populations. Conducting education, best management practices, research, and mitigation called for in the ORV plan would also limit impacts on wildlife. Adverse impacts on game species would still occur from ORV use in the original Preserve, but the effects on the species would be less than with no ORV management. Overall, the impact of the ORV plan on major game species would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on major game species in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this would create human disturbances and alter wildlife habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Adverse impacts could include flushing and displacement of game species. Short-term impacts on major game species would be moderate, adverse and localized; long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communities and in turn wildlife habitat. The impact on the major game species is unknown, but restoring natural conditions is expected to have a long-term, minor to moderate, beneficial impact.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a loss of wildlife habitat. The major game species are considered generalists and have demonstrated their resiliency and ability to adapt to changing conditions. Within the region, the three species (deer, hogs, and turkey) are widespread. However, continued urbanization has fragmented remaining natural areas and increased the risks and threats to these species, including automobile collisions, exotic species, and pathogens. The impact of these activities on the major game species is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on major game species would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to major game species in the region.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the major game species. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

**Conclusion.** Impacts on major game species under the preferred alternative would be long term, minor to moderate, adverse, and mostly localized.

There would be a long-term, minor to moderate, adverse cumulative impact on the major game species. The actions contained in the preferred alternative would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the major game species in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## **WILDERNESS RESOURCES AND VALUES**

### **Analysis**

Under the preferred alternative, impacts on wilderness resources and values would be attributed primarily to ORV trail development and use, and designation of lands as wilderness. Development of up to 130 miles of ORV trails would fragment native habitat and degrade natural conditions in certain areas that were evaluated as eligible for wilderness designation. ORV use would adversely affect the natural soundscape of the area. Impacts would be reduced by the use of a designated trail system, limiting changes to natural conditions and wilderness character outside of the trail system. Impacts from visitor use would be long term, moderate, and adverse.

Approximately 47,067 acres of the Addition would be proposed for designation as wilderness (66% of those lands considered eligible and 32% of the Addition's total acreage). The special status and protection afforded to these lands under the Wilderness Act would preserve their wilderness resources and values in perpetuity — a moderate to major beneficial impact. Opportunities for solitude and primitive and unconfined recreation would continue to be preserved and available, but the extent and availability of the opportunities would be reduced compared to the no-action alternative. Overall, the impacts on wilderness resources and values would be long term, moderate, beneficial, and Addition-wide.

### **Cumulative Impacts**

Cumulative impacts on wilderness resources and values under the preferred alternative would generally be the same as under the no-

action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the effects of off-road vehicles on wilderness resources and values by reducing the potential for dispersal and establishment of exotic plants, a beneficial impact. The impact on natural soundscapes resulting from the management of off-road vehicles in the original Preserve would be negligible because approximately the same number of off-road vehicles would be using the original Preserve and in roughly the same areas. Consequently, impacts on a visitor's wilderness experience (freedom and natural sights and sounds) resulting from the ORV plan would be negligible. Impacts on wilderness resources and values in the region would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on wilderness resources and values. If such proposals included using off-road equipment and constructing roads and pads, this would create human disturbances and alter natural habitats. NPS approval of the operations plan would require mitigative measures to eliminate or reduce the impact of activities on natural resources. Short-term impacts on wilderness resources and values would be moderate, adverse, and localized; residual long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect natural communities. Restoring natural conditions is expected to have a long-term, moderate, beneficial impact.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. Increasing urbanization, fragmentation of habitat, and the loss of natural areas have led to the degradation of natural resources, ecosystem function, and natural soundscapes in the region. The impact of these activities on wilderness resources and

values is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on wilderness resources and values would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to wilderness resources and values in the region.

When the likely effects of implementing the actions contained in the preferred alternative are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on wilderness resources and values in the region. The actions contained in the preferred alternative would contribute a modest beneficial increment to this cumulative impact.

## Conclusion

Impacts on wilderness resources and values in the preferred alternative would be long term, moderate, beneficial, and Addition-wide.

There would be a long-term, moderate, adverse cumulative impact on wilderness resources and values in the region. The actions contained in the preferred alternative would contribute a modest beneficial increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of wilderness resources and values in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## CULTURAL RESOURCES

### Archeological Resources

**Analysis.** Under the preferred alternative, impacts to archeological resources could

result from increases in motorized recreation, specifically ORV use. The construction of trails for ORVs that could also accommodate some mixed use (use by hikers, equestrians, and bicyclists), and additional trails for hiking, camping, bicycling, and equestrian use would pose the potential of impacts on archeological resources. Most of the archeological sites within the Addition are middens. These raised mound areas would be potentially attractive to ORV and backcountry users, and trampling or disturbance could result. Impacts related to these activities would be permanent, adverse, and of moderate intensity.

Increased visitor use under this alternative increases the potential for looting and vandalism. Related impacts would be permanent, adverse, and of moderate intensity.

As appropriate, archeological surveys would precede any ground disturbance for the construction of parking, restrooms, trailheads, and trails, and national register-eligible or -listed archeological resources would be avoided. No adverse impacts on archeological resources would be anticipated. If during construction previously unknown archeological resources were discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and, if the resources cannot be preserved *in situ*, an appropriate mitigation strategy developed in consultation with the state historic preservation officer and any associated Indian tribes.

**Cumulative Impacts.** Current research indicates relatively little disturbance of archeological sites in the Addition resulting from past actions such as hunting and camping, logging, looting, and energy exploration. These impacts would be characterized as permanent and negligible. Implementation of future oils and gas proposals could have adverse impacts on archeological resources. If such proposals included using off-road equipment and constructing roads and pads, this could affect archeological resources. However, because approval of the operations plan would require mitigation measures to eliminate or reduce the

impact of activities on archeological resources, the permanent effect of energy exploration on archeological resources should be negligible.

Large-scale water projects and commercial and residential development could pose some impacts on archeological resources in the vicinity of the Addition. The number and extent of these archeological resources is unknown so the potential impact cannot be assessed with any degree of accuracy. However, significant archeological resources would likely be avoided to greatest extent possible, and any impacts on archeological resources would be adverse and permanent and range in intensity from minor to moderate.

When the permanent, minor to moderate effects of implementing the actions in the preferred alternative are added to the permanent, minor to moderate, adverse effects of other past, present, and reasonably foreseeable actions, there would be a permanent, moderate, adverse cumulative impact on archeological resources. The actions contained in the preferred alternative would contribute a smaller increment to this cumulative impact than would the actions of other past, present, and reasonably foreseeable actions.

**Conclusion.** Under the preferred alternative, impacts on archeological resources would be permanent, adverse, and minor to moderate.

There would be a permanent, moderate, adverse cumulative impact on archeological resources. The actions contained in the preferred alternative would contribute a smaller increment to this cumulative impact than would the actions of other past, present, and reasonably foreseeable actions.

**Section 106 Summary.** As appropriate, archeological surveys would precede any ground disturbance for the construction of parking, restrooms, trailheads, and trails, and significant archeological resources would be avoided. After applying the Advisory Council

on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of the preferred alternative would result in a potential adverse effect on archeological resources.

Impacts from actions contained in this alternative would not result in impairment of archeological resources in the Addition.

### **Ethnographic Resources**

**Analysis.** Under the preferred alternative, there would be limited potential for impacts to ethnographic resources resulting from increases in motorized recreation, specifically ORV use. The construction of trails for off-road vehicles that could also accommodate some mixed use (use by hikers, equestrians, and bicyclists) and additional trails for hiking, camping, cycling, and equestrian use could impact ethnographic resources through trampling, looting, and vandalism. Increased ranger patrols and education programs informing visitors of the sensitive nature of these sites would result in long-term, negligible impacts.

The National Park Service would work with traditionally associated people to identify ethnographic resources and identify appropriate protection strategies for these resources. Consultation with traditionally associated peoples would precede construction in order to avoid or mitigate potential impacts resulting from trail or facility development (such as parking areas, restrooms, and trailheads). With this mitigation, no adverse impacts on ethnographic resources would be anticipated from construction.

**Cumulative Impacts.** Current research indicates negligible impacts on ethnographic resources in the Addition resulting from hunting and camping and looting. Past actions, including road construction, energy exploration, logging, and agricultural development, may have impacted

ethnographic resources at Deep Lake and other sites within the Addition. Any adverse impacts would have been long term and of negligible to minor intensity.

Large-scale water projects and commercial and residential development could pose some impacts on ethnographic resources in the vicinity of the Addition. However, ethnographic resources would likely be avoided to greatest extent possible, and any impacts on ethnographic resources would be adverse and permanent and range in intensity from negligible to minor.

Implementation of future oil and gas proposals could have adverse impacts on ethnographic resources. However, because approval of the operations plan would require mitigation measures to eliminate or reduce the impact of activities on ethnographic resources, the permanent effect of energy exploration on ethnographic resources should be negligible.

When the long-term, negligible, adverse effects of implementing the actions contained in the preferred alternative are added to the negligible to minor adverse effects of other past, present, and reasonably foreseeable actions, there would be a long-term, negligible to minor, adverse cumulative impact on ethnographic resources. The actions contained in the preferred alternative would contribute a very small increment to this cumulative impact.

**Conclusion.** Under preferred alternative, there could be long-term, negligible adverse impacts on ethnographic resources.

Combined with the impacts of past actions, including road construction and agricultural development, there would be a long-term, negligible to minor, adverse cumulative impact on ethnographic resources. The actions proposed in this alternative would contribute a very small increment to any cumulative impact.

**Section 106 Summary.** After applying the Advisory Council on Historic Preservation's

criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of the preferred alternative would generally result in a no adverse effect on ethnographic resources.

Impacts from actions contained in this alternative would not result in impairment of ethnographic resources in the Addition.

## VISITOR USE AND EXPERIENCE

### Recreational Opportunities

**Motorized Use.** ORV access and opportunities to explore, sightsee, and camp would be greatly expanded with the development of up to 130 miles of primary ORV trails, issuance of a maximum of 650 annual ORV permits, providing access points and visitor information at mile markers 51 and 63 and Bear Island Grade, and allowing backcountry camping near the Nobles and Jones grades. The number of primary ORV trail miles constructed and permits issued would be phased in over time if resource impacts remain at or below acceptable limits. Beneficial impacts would result from connecting the Bear Island Grade trailhead to existing ORV trails in the original Preserve and providing more convenient ORV access to Bear Island for visitors from the north. There would also be a potential future ORV trail connection from the Northeast Addition to the existing trail system in Bear Island. The development of backcountry campsites near the Nobles and Jones grades would also have beneficial impacts. The construction of a new visitor contact station and NPS operation facility at mile marker 63 would have beneficial impacts by greatly expanding education and interpretation opportunities, services, and NPS operational capacity in the Addition. An increased NPS staff presence also would improve visitor safety and increase opportunities for interpretation. Impacts resulting from ORV access and opportunities would be long term, moderate to major, beneficial, and Addition-wide.

Allowing ORV use in the Addition, along with the construction of a new contact station, might lead to user congestion and user conflicts at trailheads and along the primary and secondary ORV trail network, resulting in long-term, minor, adverse impacts on users. But, dispersing users across multiple access points as proposed would minimize the impacts. Finally, the provision of additional commercial services and/or partner organizations, including the provision of boat tours south of U.S. 41, would enhance the number and type of visitor services provided in the Addition. Impacts resulting from increased visitor services would be long term, minor, and beneficial.

Overall, implementation of the preferred alternative would result in long-term, moderate, and beneficial impacts on motorized users.

**Nonmotorized Use (including hiking, horseback riding, and bicycling).** The primary and secondary ORV trail network and new access points at MM51 and MM63 would also be open to hikers, expanding both access and opportunity. The construction of a new day use area and ADA-compliant boardwalk at Deep Lake would have beneficial impacts by providing a comfortable area to enjoy the natural surrounding and provide an easy, safe route to access the lake. The development of designated camping sites in backcountry recreation zones, and where needed for resource protection in primitive backcountry zones, would have beneficial impacts. Opportunities for challenging adventure and primitive solitude would be abundant, yet land would also be zoned for a less isolated backcountry recreation experience, providing ample opportunities for all nonmotorized users. Impacts resulting from expanded access and opportunities for hikers would be long-term, moderate to major, and beneficial.

The addition of ORV users and the construction of a new visitor contact station might result in user congestion and user conflict at trailheads and along the primary and

secondary ORV trail network and would reduce the quality of the natural soundscape. The addition of hunting under the preferred alternative would likely further increase encounters, reduce the quality of the natural soundscape, and could periodically affect ease of access. Impacts on hikers would be long term, minor to moderate, and adverse. Dispersing users across multiple access points as proposed would minimize the impact. Finally, the provision of additional commercial services and/or partner organizations at Carnestown would enhance the number and type of visitor services provided in the Addition. Impacts resulting from increased services would be long term, minor, beneficial, and localized.

Access to the Addition and parking would be improved in comparison to alternative A. Although bicycling would be allowed on all designated primary and secondary ORV trails, many of them would not be conducive to bicycling; therefore, bicycling opportunities would only be slightly expanded beyond alternative A. New access points and the ability to use the primary and secondary ORV trail network would disperse bicyclists across the Addition, reducing the potential for congestion and user conflicts. Impacts resulting from an expansion of access and opportunity would be long-term, minor, beneficial, and Addition-wide. Potential conflicts between user groups at trailheads and along the primary and secondary ORV trail network and a reduction of the quality of the natural soundscape due to ORV use would detract from the experience of bicycling in a natural setting, resulting in long-term, minor, adverse impacts on bicyclists. Finally, providing commercial services and/or partner organizations at Carnestown would result in negligible to minor, long-term, beneficial impacts on bicyclists seeking additional information and services. Overall, impacts on nonmotorized users would be long term, moderate, and beneficial.

**Hunting (including fishing and frogging).** Nonmotorized and ORV hunting would be allowed in designated areas and seasons as

determined by the National Park Service in cooperation with the Florida Fish and Wildlife Conservation Commission in the areas zoned as primitive backcountry, backcountry recreation. Hunters using off-road vehicles, however, would not have the opportunity to operate their vehicles off designated trails. Conflict between ORV and nonmotorized hunters and with other trail users at trailheads and along primary and secondary ORV trails would likely be infrequent due to sensible facility design, resulting in long-term, minor, adverse impacts. The operation of off-road vehicles might detract from the hunting experience of those that prefer walk-in hunting and solitude. Overall, impacts on hunters in the Addition would be long term, moderate, and beneficial.

Collectively, impacts on visitor use and experience resulting from the preferred alternative would be long term, moderate, and beneficial.

### Cumulative Impacts

Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* would provide up to 400 miles of designated ORV trails, 15 ORV access points, and up to 2,000 annual permits in the original Preserve. The quantity of trail miles and permits provides abundant opportunities for operating off-road vehicles. The availability of these opportunities adjacent to the Addition would have long-term, moderate, beneficial impacts on ORV users in the local area.

Implementation of future oil and gas proposals could adversely impact the experience of visitors. If included in the proposals, the construction of roads and pads and the use of off-road equipment could detract from the experience of those seeking a primitive experience and natural soundscape. Impacts resulting from a reduction in the natural settings of the Addition due to the operation of oil and gas equipment would be long term, minor, and adverse in localized areas.

The south Florida ecosystem restoration project is a large-scale effort among public, private, and nongovernmental entities to restore surface water flows within the region. Implementation of the proposals would improve sheet flows and hydrologic connectivity and likely restore natural conditions in the Addition. This effort would enhance the visitor use and experience by providing increased opportunities for wildlife viewing and experiencing natural settings. Opportunities for hunting in the Addition would also improve with more abundant, healthy wildlife populations. Impacts resulting from the effects of a healthy, fully functioning ecosystem would be long term, moderate, beneficial, and regionwide.

Regional growth and development would be expected to result in increased visitation to the Addition. More visitations over time might result in increased congestion and user conflicts at access points and along the primary and secondary ORV trail network. Impacts from growth and development would be long term, minor to moderate, and adverse as a result of increased congestion and user conflict.

Implementation of the *Commercial Services Plan* will initially only affect the original Preserve. The Addition will be addressed in an addendum to the *Commercial Services Plan* after the completion of this *General Management Plan* for the Preserve Addition. The *Commercial Services Plan* proposes to enhance the original Preserve's visitor services through the development of one or more new facilities; a new backcountry camping complex; hunting and fishing guides; buggy, van, and hiking tours; boat and bicycle rentals; and expanded opportunities for birding, wildlife viewing, and photography. Enhanced and expanded opportunities in the Preserve, before an addendum to include the Addition, would increase visitation and might result in increased congestion and user conflicts. Impacts resulting from increased visitation and congestion at access points and along the primary and secondary ORV trail network would result in long-term, minor, adverse

impacts on visitors. When the Addition is addressed in an addendum, visitor opportunities to explore and use the Addition could be expanded. If so, impacts from implementing the *Commercial Services Plan* in the Addition would be long term, minor to moderate, and beneficial as a result of expanded opportunities.

The likely effects of implementing the preferred alternative in combination with the effects of other past, present, and reasonably foreseeable actions described above, would result in long-term, moderate, beneficial cumulative impacts on visitor use and experience in the Addition. The actions contained in the preferred alternative would contribute an appreciable increment to this cumulative impact.

### **Conclusion**

Under the preferred alternative, designated access points and abundant trail opportunities would be provided for ORV use, hunting, and nonmotorized uses. Collectively, the resulting impacts on visitor use and experience would be long term, moderate, and beneficial.

The cumulative impact on visitor use and experience in the Addition would be long-term, moderate, and beneficial. The actions contained in the preferred alternative would contribute an appreciable increment to this cumulative impact.

### **SOCIOECONOMIC ENVIRONMENT**

Analysis of economic impacts under the preferred alternative was based on projected increases in visitation to the Preserve (including the Addition), which in turn would affect visitor spending patterns as well as estimated one-time capital expenditures due to construction activity. A total of 43,515 new visitors were estimated to visit the Preserve each year as a result of implementing this alternative. Of this total, it was assumed that 9,138 were local visitors, 16,536 were non-

local day visitors, 12,184 were motel visitors, and 5,657 were campers. In terms of capital expenditures, it was estimated that the preferred alternative would produce \$6.7 million in total construction costs.

### **Local Economy**

**Employment.** As a result of increased visitor spending under the preferred alternative, a total of 45 jobs would be created, representing 39 direct jobs and six indirect jobs. These increases would generate \$665,000 in total labor income, representing \$505,000 from direct labor income effects as a result of new job growth and \$160,000 from indirect labor income effects from new job growth in tourism-related industries. Similar to alternative B, approximately half of this direct employment would be attributable to increases in NPS staff needed to operate and maintain new facilities, trails, and services in the Addition; the remaining jobs would result from partnerships at Carnestown and businesses that cater to tourists. Indirect employment increases would occur in firms that support tourist-related businesses, as well as from firms that hire additional staff as a result of changes in direct employment spending. Because total employment in Collier County is approximately 140,184 (2006 estimate), these additional jobs would only represent about a .03% increase in county employment. As such, long-term impacts related to employment would be localized, negligible, and beneficial.

In terms of short-term impacts, approximately 55 temporary jobs would be created due to construction activity in the Addition, generating about \$1.7 million in personal labor income. Most direct employment would be attributable to additional temporary construction jobs. Secondary employment increases would occur as a result of staffing increases in industries that provide goods and services to the construction sector as well as from businesses that hire additional staff due to changes in direct employee spending. Compared to total employment in Collier

County, the additional jobs would only represent a .04% increase in county employment. Consequently, as a result of the preferred alternative, short-term impacts related to employment would be localized, negligible, and beneficial.

**Housing.** Similar to alternative B, long-term housing impacts would be minimal, and if felt at all, would likely be concentrated in the Naples and Marco Island areas, because the creation of 45 jobs is not large enough to create a discernable impact on the housing market at a county level. Consequently, the long-term impacts related to housing would be localized, negligible, and beneficial.

Short-term housing impacts from construction activity would also likely be minimal when compared to overall changes in the county's residential housing market. Although specific areas such as Naples and Marco Island might have a temporary increase in housing demand, such effects would not likely be felt throughout the remainder of the county. Consequently, the short-term impacts related to housing would be localized, negligible, and beneficial.

**Sales.** Long-term sales impacts, as a result of increased visitor spending under the preferred alternative, would generate an estimated \$1.96 million annually in direct and indirect taxable sales of goods and services by businesses within Collier County. Most businesses that would benefit from these sales are in industries that cater directly to tourism, such as retail, arts, entertainment, recreation, accommodation and food services. As a total of Collier County's annual taxable sales, estimated to be more than \$6.10 billion, such changes represent only a .03% increase. Consequently, the long-term impacts related to sales under the preferred alternative would be localized, negligible, and beneficial.

Short-term sales impacts due to construction activity would also have a marginal benefit. Total annual sales were estimated to be \$4.7 million, with \$3.6 million (75%) of that amount attributable to transactions occurring

within Collier County. Most direct sales would be attributable to construction-related businesses, with indirect sales attributable to industries that support the construction industry and temporary spending by construction workers. Consequently, the short-term impacts related to economic output under the preferred alternative would be localized, negligible, and beneficial.

**Tribal Impacts.** In qualitatively assessing long-term impacts to the Miccosukee and Seminole tribes, it appears that both reservations would realize some degree of positive long-term economic benefits under the preferred alternative. Increased visitation to the Preserve as a result of this alternative would likely generate a small to moderate boost in sales of tourist-related goods and services provided at these reservations (i.e. gaming, dining, and entertainment). Both tribes could also directly benefit from entering into select partnership agreements with the National Park Service, as specified under this alternative. However, the magnitude of such gains is based on reasonable speculation due to the limited amount of data available on the tribes' economic activities. Consequently, the long-term impacts related to economic output under the preferred alternative would be localized, negligible to moderate, and beneficial.

New construction activity in the Addition would generate temporary construction jobs. Additional construction workers in the area would likely increase visitation to the two reservations, leading to an increase in the sales of tourist-related goods and services. Consequently, the short-term impacts related to economic activity under the preferred alternative would be localized, negligible to moderate, and beneficial.

Collectively, the long-term and short-term impacts resulting from implementing the preferred alternative would be localized, negligible, and beneficial.

## **Cumulative Impacts**

The action area for evaluating cumulative impacts on the socioeconomic environment is Collier County. The likely effects of implementing the actions contained under the preferred alternative, in combination with the effects of other past, present, and reasonably foreseeable actions are described below.

The implementation of the Recreational Off-Road Vehicle (ORV) Plan, which provides for a maximum of 2,000 permits, 15 access points, and 400 miles of designated trails, has a strong likelihood of attracting new visitors and locals to the Preserve. Such an increase in Preserve visitation would translate into greater visitor spending in the area, resulting in positive long-term gains for Collier County in terms of employment, housing, and taxable annual sales, as well as increased economic activity for the Miccosukee and Seminole tribes. However, relative to the economy of the entire county, long-term economic impacts would likely be minimal. Short-term impacts as a result of one-time capital expenditures from building ORV trail access, facilities, and other structures are also likely to be minimal relative to the overall level of construction activity within the county. As a result, both long-term and short-term cumulative impacts would be localized, negligible, and beneficial.

Although the *Commercial Services Plan* does not include the Addition, social and economic impacts to the county as a whole would be positive due to increased visitation and visitor spending in the area, and expansion of facilities, services, and recreational opportunities in the Preserve. In particular, the implementation of the *Commercial Services Plan's* preferred alternative, which includes the potential to develop two new visitor facilities, partnership agreements for offering a variety of guided tours and equipment rentals, and the creation of a backcountry camping complex, could translate into moderate long-term gains in visitor spending at the county level. Depending on the level of construction activity generated from implementation of the *Commercial Services Plan*, short-term impacts

could be substantial at the county level. As a result, both long-term and short-term cumulative impacts would be localized, negligible to moderate, and beneficial.

The potential exists for exploration activities, as proposed under the oil and gas plan, to reduce visitation in the Preserve due to environmental disruptions from the use of off-road equipment and the development of roads and pads for oil and gas exploration. Due to multiplier effects, long-term impacts from reduced visitation could result in reductions in county employment, housing, and sales, as well as reduced economic activity for the Miccosukee and Seminole tribes. However, such effects will likely be minimal in relation to the entire county economy. Short-term impacts from construction could be both positive and substantial, depending on the level of construction and percentage of that economic activity that remains within the county. Long-term impacts would be localized, negligible, and adverse, while short-term impacts would be localized, negligible to moderate, and beneficial.

The south Florida ecosystem restoration projects would likely attract additional visitors to the region due to the rehabilitation of natural ecosystems within and near the Preserve through various water system improvements. In particular, the Big Cypress Interceptor Modification Plan would likely increase use across a variety of recreational activities offered in the Preserve, particularly for visitors interested in enjoying the natural habitat and wildlife. Collier County would also benefit from restoration efforts in nearby sites, such as Everglades National Park, because additional visitors may pass through or decide to make an additional stop at the Preserve. Because these restoration projects are relatively large in scale, are occurring at multiple sites, and are at a regional level, the long-term impacts on county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes could be substantial. Short-term impacts would also be positive because capital expenditures on water infrastructure improvements (estimated

at multi-billions of dollars) would likely generate substantial temporary gains to county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes. As a result, both long-term and short-term impacts would be localized, moderate, and beneficial.

The development of lands northwest of the Addition could increase Preserve visitation and result in positive long-term economic impacts at the county level. In particular, the availability of greater residential housing and the building of a new private and state university in the area could greatly increase the number of residents living in Collier County. The provision of additional services, goods, and facilities would also likely be expanded to accommodate these new residents, which in turn would also attract a greater number of visitors from outside the region. As a result, increased local and visitor spending would produce long-term positive gains to county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes. Short-term economic impacts could be substantial at the county level, because large scale construction activity would be needed to support new residents, the universities, and visitors. As a result, long-term and short-term impacts would be localized, moderate to major, and beneficial.

Combining the likely effects of implementing the preferred alternative with the effects of other past, present, and reasonably foreseeable actions described above, the cumulative long-term and short-term socioeconomic impacts would be localized, moderate to major, and beneficial. The preferred alternative would contribute a very small increment to this cumulative impact.

### **Conclusion**

Because of changes in visitor spending under the preferred alternative, long-term and short-term impacts on the socioeconomic environment would be localized, negligible, and

beneficial. As a result, county employment, housing, and sales, as well as economic activity associated with the Miccosukee and Seminole tribes, would realize some positive gains, although such increases would be minimal when compared to the county as a whole.

Long-term and short-term cumulative impacts would be localized, moderate to major, and beneficial. The preferred alternative would contribute a very small increment to this total cumulative impact.

## **NPS OPERATIONS AND MANAGEMENT**

### **Analysis**

The NPS preferred alternative proposes a visitor contact station, an operations center, and employee housing to be located in the Addition. The visitor contact station would allow staff to orient and educate visitors to the Addition, which would not be as easily done without a local visitor facility. An operations center, which would station employees and equipment in the Addition, would increase operational efficiency and reduce response time for fire, law enforcement, maintenance, and interpretation staff. Currently, staff must travel a minimum of an hour to reach the Northeast Addition from the original Preserve. Employee housing for three law enforcement and two fire division staff would increase efficiency and reduce response time for fire and enforcement scenarios. Having staff based at these NPS facilities in the Addition would result in moderate, long-term, beneficial impacts on NPS operations.

Oversight of design and construction processes for new facilities would require managerial and contracting staff time. Additionally, new facilities must be maintained, and this would burden maintenance staff. Campgrounds near the Nobles and Jones grades; a day use area at Deep Lake; up to 130 miles of ORV trails; trailheads; and interpretive panels are also proposed for development in the Addition.

Managing the Addition would require time and effort from administrative, visitor and resource protection, interpretation, resource management, and fire staff. Maintenance staff would be required to use the minimum requirements process to determine what kind of equipment and method to construct and maintain hiking trails in wilderness areas. Visitor protection and fire division staff would also be limited in their use of motorized vehicles in wilderness, which could reduce their effectiveness. Increased visitation due to the new facilities would also require time from all staff divisions. Therefore, management of the Addition and construction and maintenance of facilities under the preferred alternative would result in moderate, long-term, adverse impacts on NPS operations.

### **Cumulative Impacts**

Expansion of nearby communities, including the towns of Ave Maria and Big Cypress, Everglades ecosystem restoration activities, and oil and gas exploration activities would require time and attention by senior NPS staff. The expansion of commercial services offered in the original Preserve would require time from staff spent managing the commercial service authorizations and leases. Cooperation and coordination with neighboring agencies and entities regarding planning, land use resources, and development proposals near the Preserve also would require substantial amounts of staff time and result in minor to moderate, long-term, adverse impacts.

The NPS preferred alternative would place an additional burden on NPS staff, but this burden would be lessened with adequate staffing. Combined with other past, present, and reasonably foreseeable future impacts, the NPS preferred alternative would result in moderate, long-term, beneficial impacts on NPS operations. Although the extra staff time required to manage the Addition facilities and actions taken by other entities would have an adverse impact, the new facilities would play a much larger role in the overall impact by allowing staff to be located within the

Addition and respond to operational and visitor needs in an efficient and timely manner. The preferred alternative's proposed actions would contribute a modest increment to these cumulative impacts.

### **Conclusion**

Operational efficiencies achieved through development of new facilities in the Addition, along with the increased staffing burdens associated with managing those lands and constructing and maintaining new facilities, would have long-term, moderate, adverse and beneficial impacts on NPS operations.

The cumulative impacts of the preferred alternative and other actions would be moderate, long term, and beneficial. The preferred alternative's proposed actions would contribute a modest increment to these cumulative impacts.

### **EFFECTS ON ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL**

The construction of new facilities under the preferred alternative, such as trails, trailheads, access points, and visitor/operations facilities, would result in more energy use and consumption; however, the projects would follow NPS policies concerning sustainability and energy conservation to minimize the overall energy requirements. The carbon footprint of the facilities would be minimized through appropriate design and the use of green technology to the greatest extent possible. To maintain, operate, and protect the facilities, NPS travel to and within the Addition also would increase, and the increased travel would increase energy consumption. The fuel and energy consumed by visitors traveling to and within the Addition would increase as a result of the Addition being open to the public and the expansion of recreational opportunities.

### **UNAVOIDABLE ADVERSE IMPACTS**

Human use and the construction of new facilities under the preferred alternative would result in minor to moderate adverse impacts to natural resources, primarily vegetation and wildlife, in some areas throughout the Addition. Impacts on certain aspects of visitor experience, namely solitude and primitive conditions, would also be unavoidable. Mitigation to reduce these impacts would be carried out where possible.

### **IRRETRIEVABLE OR IRREVERSIBLE COMMITMENTS OF RESOURCES**

The additional energy requirements identified above would result in an irreversible commitment of resources. In addition, there would be a commitment of material used to construct new visitor facilities such as trailheads and access points and the visitor and operations facilities at mile marker 63.

### **RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY**

As in alternative A, most of the Addition would be protected in a natural state and would maintain its long-term productivity under the preferred alternative. Only a small percentage of the Addition would be converted to development. No actions in this alternative would jeopardize the long-term productivity of the environment. Short-term impacts might result from construction, such as local air and water pollution, as detailed in the analysis of specific impact topics. Noise and human activity from construction and restoration might displace some wildlife from the immediate area. However, these activities would not jeopardize the long-term productivity of the environment.

## ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE F

### NATURAL RESOURCES

#### Surface Water Flow

**Analysis.** Under alternative F, impacts on surface water flow would be attributed primarily to the development of new facilities, the maintenance of existing facilities, and restoration activities. Development of new facilities such as trails, trailheads, and access points would alter natural sheet flow, degrading hydrologic connectivity. Maintaining the Jones and Bear Island grades in their current state would continue to affect hydrologic connectivity within the Northeast Addition. Facilities and structures at Deep Lake (fill pad) and Copeland (Fire Operations Center) also would continue to affect natural hydrology in localized areas. NPS administrative ORV use also would continue to affect surface water flow in localized areas on a short-term basis. Most impacts on surface water flow are due to the presence of roads, grades, and trams. These impacts would continue to be long term, adverse, and of moderate intensity. The effects could extend beyond the boundaries of the Addition. Impacts related to the continued presence of NPS facilities and structures would be long term, minor, adverse, and localized.

The removal of the facilities at Carnestown and the rehabilitation of the site would restore hydrologic conditions and surface water flow. This would result in a long-term, minor to moderate, beneficial impact on surface water flow that would be localized. Removing and restoring Nobles Grade would improve hydrologic function in the Northeast Addition as well as perhaps across the entire Addition. Removing this road would restore natural sheet flow, resulting in a long-term, moderate to major, beneficial impact on surface water flow across the Northeast Addition.

Ongoing vegetation management could also improve surface water flow by eliminating exotic vegetation that impedes flow or reduces water availability. The impact would be long term, minor to moderate, beneficial, and Addition-wide.

Collectively, the impact of these activities on surface water flow would be long term, minor, beneficial, and mostly localized.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of ORVs on surface water flow into the portion of the Addition that abuts the original Preserve at localized sites because best management practices and mitigation would maintain or improve hydrologic flow. The impact on surface water flow in the watershed would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on surface water flow. If such proposals included using off-road equipment and constructing roads and pads, this would alter local hydrology. Construction and operations activities would affect the timing and intensity of surface water flows. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on surface water flow would be adverse, minor to moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. Proposals involving the Addition include the removal of the L-28 interceptor

canal levee, modification of the L-28 Tie Back canal, and operational changes to various water control structures. Decompartmentalization of Water Conservation Area 3 would also improve sheet flow and hydrologic connectivity. The impact of these efforts on the hydrology of the Addition, as well as within the watershed, is expected to be long term, major, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect hydrologic function and connectivity in the watershed. The impact of these activities is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on surface water flow would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would benefit surface water flow in the watershed.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, beneficial cumulative impact on surface water flow. The actions contained in alternative F would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative F, impacts on surface water flow would be long term, minor, beneficial, and mostly localized.

There could be a long-term, moderate, beneficial cumulative impact on surface water flow. The actions contained in alternative F would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of surface water flow in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### Water Quality

**Analysis.** Under alternative F, impacts on water quality would generally be the same as under the no-action alternative. Impacts would be attributed to visitor use at a few discrete sites as well as from NPS operations and maintenance activities. Visitor use, such as hiking and backcountry camping, could continue to cause soil erosion and generate human waste that would affect turbidity and surface water quality. Inadvertent leaks or spills of fuel or oil from NPS administrative ORV use could affect surface water quality by elevating chemical concentrations. Impacts from parked vehicles would be more common at destination sites, such as mile markers 51 and 63, or Deep Lake. The maintenance of roads, grades, and trails within the Addition would likely cause erosion that could enter canals and waterways and increase turbidity. The impacts of these activities would be long term, minor, adverse, and localized. Impacts would be minor due to the limited visitation in the Addition and the limited development and maintenance that would occur under alternative F.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on water quality at localized sites in the portion of the Addition that abuts the original Preserve because best management practices and mitigation would be used to minimize soil erosion and chemical contamination. The

impact of these activities on water quality in the watershed would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on water quality. If such proposals included using off-road equipment and constructing roads and pads, this could degrade water quality due to turbidity and chemical contamination. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on water quality would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized. This is due to the number and complexity of the proposals and uncertainty with their levels of success.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. Although the proposals would increase surface water flow and connectivity, the discharged waters are expected to have elevated chemical concentrations that would degrade water quality. Because the current condition of water resources in the Addition is cleaner than what is expected to be discharged, the impact is predicted to be long term, minor, adverse, and Addition-wide, but the intensity is unknown. The impact on water quality within the watershed is unknown. This is due to the number and complexity of the proposals and uncertainty with their levels of success.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Water quality would be affected by inputs from urban and suburban development, including increases in organic compounds and chemical concentrations. The impact on water quality within the watershed is expected to be adverse, but the intensity is unknown.

Collectively, adverse impacts could be expected from oil and gas operations, ecosystem restoration projects, and regional growth and development. Overall, the effects of the projects discussed above could be adverse on water quality in the watershed, but the intensity is unknown.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, adverse cumulative impact on water quality in the watershed. The intensity of the impact is unknown. The actions contained in alternative F would contribute a very small increment to this cumulative impact.

**Conclusion.** Under alternative F, impacts on water quality would be long term, minor, adverse, and localized.

There would be a long-term, adverse cumulative impact on water quality in the watershed. The intensity of the impact is unknown. The actions contained in alternative F would contribute a very small adverse increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of water quality in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## **Wetlands**

**Analysis.** Under alternative F, impacts on wetlands would be attributed primarily to the retention and maintenance of existing facilities, as well as from the removal of facilities. Maintaining roads, grades, and trails could impact wetlands. Impacts would include vegetation loss and alteration of soils, which would result in permanent effects on wetland size and integrity and would be long term, minor to moderate,

adverse, and localized. Indirect impacts, such as increased runoff and sedimentation, would be long term, minor, adverse, and localized.

NPS efforts to reestablish natural ground contours and restore soil integrity would have beneficial effects on wetlands. Removing and restoring Nobles Grade would improve the hydrologic function and connectivity of wetlands in the Northeast Addition as well as create new wetlands where the road is removed and restored. The impact would be long term, moderate to major, beneficial, and localized.

Collectively, impacts on wetlands under alternative F would be long term, minor to moderate, beneficial, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of future oil and gas proposals could have adverse impacts on wetlands. If such proposals included using off-road equipment and constructing roads and pads, this would alter wetland soils and vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on wetlands would be adverse, moderate, and localized; long-term residual impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would affect wetlands by increasing the availability of water, which in turn could increase the size and integrity and improve the function of wetlands. The impact of these efforts on wetlands is expected to be long term, moderate to major, and beneficial.

Regional growth and development is expected to result in an increase in the

conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow and water quality would affect the size, integrity, and function of wetlands in the watershed. The impact of these activities on wetlands would be long term, moderate to major, and adverse.

Collectively, beneficial impacts on wetlands would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would be slightly adverse to wetlands.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on wetlands. The actions contained in alternative F would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative F, impacts on wetlands would be long term, minor to moderate, beneficial and localized.

There would be a long-term, minor, adverse cumulative impact on wetlands. The actions contained in alternative F would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of wetlands in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Soils

**Analysis.** Under alternative F, impacts on soils would be attributed primarily to facility maintenance and new facility development, NPS administrative ORV use, and NPS restoration activities.

Maintaining facilities such as access points, trails, grades, and roads requires recurring maintenance. These maintenance activities could displace soils and/or cause increased soil erosion. Development of new recreational facilities, such as at mile markers 51 and 63, Bear Island Grade, and Deep Lake, would result in displacement or permanent loss of soil resources. The impacts from these activities would be long term, minor to moderate, adverse, and localized. Front-country development would typically compact previously disturbed/filled areas, while backcountry developments could impact native soils. Some rutting and displacement of soils might occur from permitted NPS administrative ORV use as well as from illegal ORV use; however, the use would be infrequent and the impact would be long term, negligible to minor, adverse, and localized.

Nonmotorized users could also cause erosion, but the adverse impacts would likely be negligible to minor.

NPS efforts to reestablish natural ground contours and restore natural hydrologic conditions would have beneficial long-term, minor to moderate, and localized effects on soils.

Collectively, impacts on soils from alternative F would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of future oil and gas proposals could have adverse impacts on soils. If such proposals included using off-road equipment and constructing roads and pads, this would alter soils. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on soils would be adverse,

moderate, and localized; long-term impacts would be minor, adverse, and localized.

Changes in the availability of water resources due to the south Florida ecosystem restoration project would affect soil properties. The integrity of hydrologic soils could be improved or restored by increases in water — a beneficial impact.

Decreases in water or permanent soil loss resulting from regional growth and development would adversely impact soils. The impact of these efforts on soils is expected to be long term, moderate to major, and adverse.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on soils. The permanent loss of soils would be expected to outweigh any beneficial impacts that might be realized from ecosystem restoration projects. The actions contained in alternative F would contribute a very small increment to this cumulative impact.

**Conclusion.** Under alternative F, impacts on soils would be long term, minor, adverse, and localized.

There would be a long-term, moderate, adverse cumulative impact on soils. The actions contained in alternative F would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of soils in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Floodplains

**Analysis.** Under alternative F, impacts on floodplains would be attributed to the removal of the NPS facilities at Carnestown, which is in the 100-year floodplain. The removal of this facility would restore the function, integrity, and capacity of the floodplain at this site. The impact would be long term, minor to moderate, beneficial, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Regional growth and development is expected to affect floodplains in the region. Floodplains could be physically altered, changing their capacity and altering the natural course of flood water flow. Natural flood patterns would be adversely affected, but any adverse impacts on property and life should be mitigated and eliminated through proper permitting. The impact of these activities on floodplains could be long term, minor to major (depending on the nature of the design), and adverse.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would affect floodplains by reclaiming some floodplains and improving their integrity and function – a beneficial impact. The impact of these efforts on floodplains would be long term and beneficial, but the intensity is unknown.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to major, adverse cumulative impact on floodplains. The actions contained in alternative F would contribute a very small increment to this cumulative impact.

**Conclusion.** Under alternative F, impacts on floodplains would be long term, minor to moderate, beneficial, and localized.

There would be a long-term, minor to major, adverse cumulative impact on floodplains. The actions contained in alternative F would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of floodplains in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## Vegetation — Cypress Strands and Domes, Mixed Hardwood Swamps, and Sloughs

**Analysis.** Under alternative F, impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would be attributed to new facility development, visitor use, NPS restoration efforts, and limited NPS administrative ORV use.

Development of trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake would result in vegetation loss or injury from construction activities. Impacts on cypress strands and domes, mixed hardwood swamps, and sloughs from facility development would be long term, minor, adverse, and localized.

Impacts on vegetation from visitor use, such as from trampling, would be more common at frontcountry destinations and less common in the backcountry. Impacts on cypress strands and domes, mixed hardwood swamps, and sloughs from visitor use would be long term, negligible to minor, adverse, and localized.

Ongoing vegetation management and efforts to restore natural hydrologic processes would continue to improve conditions for

native vegetation because water availability and connectivity would increase and competition from exotic plants would be minimized. Impacts on cypress strands and domes, mixed hardwood swamps, and sloughs from vegetation management would be long term, minor to moderate, beneficial, and Addition-wide.

ORV use by NPS staff (or from illegal public use) would remain infrequent. The conditions that often discourage ORV use (deep water, closely spaced trees, etc.) would continue, and adverse impacts from off-road vehicles would most often be limited to the margins of the plant community. Adverse impacts could include injury to a plant or group of trees, or might include plant loss in a discrete area due to repeated use. Impacts resulting from ORV use would be long term, minor, adverse, and localized.

Collectively, the impact on cypress strands and domes, mixed hardwood swamps, and sloughs under alternative F would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be adverse,

moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect plant communities and would likely improve plant vigor, abundance, and distribution. The impact of these efforts on cypress strands and domes, mixed hardwood swamps, and sloughs is expected to be long term, minor to moderate, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect plant communities. The impact of these activities on cypress strands and domes, mixed hardwood swamps, and sloughs is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above could slightly benefit cypress strands and domes, mixed hardwood swamps, and sloughs.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, beneficial cumulative impact on cypress strands and domes, mixed hardwood swamps, and sloughs. The actions contained in alternative F would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative F, impacts on cypress strands and domes, mixed hardwood swamps, and sloughs would be long term, minor, adverse, and localized.

There could be a long-term, minor, beneficial cumulative impact on cypress strands and domes, mixed hardwood swamps, and sloughs. The actions contained in alternative F would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of cypress strands and domes, mixed hardwood swamps, and sloughs in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### Vegetation — Prairies and Marshes

**Analysis.** Under alternative F, impacts on prairies and marshes would be attributed to visitor use, NPS restoration efforts, and limited NPS administrative ORV use.

Some prairies and marshes would be accessible to nonmotorized users, and therefore could be subject to visitor use impacts, such as trampling of vegetation. Impacts would be greatest and more concentrated in front-country locations and less common in the backcountry. Impacts on prairies and marshes from visitor use would be long term, negligible, adverse, and localized.

Ongoing vegetation management, including the use of prescribed fire, and efforts to restore natural hydrologic processes would continue to improve conditions for native vegetation because water availability and connectivity would increase and competition from exotic plants would be minimized. Impacts on prairies and marshes from vegetation management would be long term, minor to moderate, beneficial, and Addition-wide.

ORV use by NPS staff (or from illegal public use) would remain infrequent; however, even infrequent use could produce adverse impacts. The soil conditions in prairies and marshes cause poor traction for off-road vehicles, and rutting and braiding of trails is common. Most NPS operators understand the sensitivity of prairies and marshes and know to avoid these areas. Adverse impacts could include injury to a plant or group of plants, or might include plant loss in a discrete area due to rutting or repeated use. Impacts on prairies and marshes from ORV use would be long term, minor, adverse, and localized. The impacts of trampling of vegetation by nonmotorized visitors (i.e., hikers) would be negligible.

Collectively, the impact on prairies and marshes under alternative F would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be moderate, adverse, and localized; long-term impacts would be minor, adverse, and localized.

The south Florida ecosystem restoration project includes several proposals for

restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect plant communities and would likely improve plant vigor, abundance, and distribution. The impact of these efforts on prairies and marshes is expected to be long term, minor to moderate, and beneficial.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect plant communities. Prairies and marshes on private land outside the Addition would continue to be impacted by population growth and development. The impact of these activities on prairies and marshes is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on prairies and marshes would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above on prairies and marshes would be long term, minor, and adverse.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long term, minor, adverse cumulative impact on prairies and marshes. The actions contained in alternative F would contribute a very small increment to this cumulative impact.

**Conclusion.** Under alternative F, impacts on prairies and marshes would be long term, minor, adverse, and localized.

There could be a long-term, minor, adverse cumulative impact on prairies and marshes. The actions contained in alternative F would

contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of prairies and marshes in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Vegetation — Mangrove Forests**

**Analysis.** Impacts on mangrove forests under alternative F would generally be the same as under the no-action alternative because recreational use in this vegetation community would be the same as in alternative A. As with the no-action alternative, motorized boating would continue to be allowed south of U.S. 41 in the Western Addition in the deep, open-water environs outside the dense mangrove forests. Motorized boating could continue to cause injury to individual plants or prevent their expansion into the shallower margins of the well-travelled boating corridors. Consequently, compared to the no-action alternative, there would be no impact on mangrove forests in the Addition under alternative F.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Regional growth and development, including waterfront development, is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Mangroves receive special protection under state law, and any adverse impacts on mangrove forests would be expected to be negligible. Because alternative F would not contribute any increment, there would be no cumulative impact.

**Conclusion.** Alternative F would have no impact on mangrove forests. Impacts on mangroves would be the same as what was

accounted for under the no-action alternative.

There would be no cumulative impacts on mangrove forests under alternative F.

Impacts from actions contained in this alternative would not result in impairment of mangrove forests in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### Vegetation — Pinelands

**Analysis.** Under alternative F, impacts on pinelands would be attributed to new facility development, visitor use, NPS restoration efforts and limited NPS administrative ORV use.

Development of trails, trailheads, and access points (at mile markers 51 and 63, Bear Island Grade, and Deep Lake) would result in vegetation loss or injury from construction activities. Impacts on pinelands would likely be proportionately greater than for the other vegetation communities because pinelands are uplands that are often targeted as appropriate development sites. Impacts on pinelands from facility development would be long term, minor, adverse, and localized.

Impacts from visitor use, such as from trampling, would be more common at frontcountry destinations and less common in the backcountry. Although individual understory plants could be injured or killed, the integrity of the pineland community would not likely be affected due to the durable substrate and the resiliency of mature trees to relatively benign activities. Impacts on pinelands from visitor use would be long term, negligible to minor, adverse, and localized.

Ongoing vegetation management, including the use of prescribed fire, would decrease competition from exotic plants and improve the integrity of native habitats. Impacts on pinelands from vegetation management would be long term, beneficial, minor to moderate, and Addition-wide.

ORV use by NPS staff (or from illegal public use) would continue in the Addition. The durability of the substrate present in pinelands minimizes adverse impacts from ORV use. The loss of pines from ORV use has not been documented in the original Preserve; however, wheeled use could have adverse impacts on other plant species present within these communities or within certain ecotonal areas. Adverse impacts could include injury to a plant or group of plants, or might include plant loss in a discrete area due to repeated use. Impacts on pinelands from ORV use would be long term, adverse, minor, and localized.

Collectively, the impact on pinelands under alternative F would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation in the Addition; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-

term impacts on vegetation would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of pinelands. The assemblage of pines and palmettos could change as a result of changes in hydrology or periods of inundation. The impact is uncertain because drying often adversely impacts pinelands and increasing the water table could also cause a net reduction in pinelands compared to current conditions. It is expected that restoring natural hydrologic conditions would have a beneficial impact on pinelands.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Studies have shown that pinelands are the most impacted by human land conversion. Pinelands on private land in the region would continue to be lost. The impact would be long term, moderate to major, and adverse.

Collectively, beneficial impacts on pinelands would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would be adverse on pinelands in the Addition.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate to major, adverse cumulative impact on

pinelands. The actions contained in alternative F would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative F, impacts on pinelands would be long term, minor, adverse, and localized.

There could be a long-term, moderate to major, adverse cumulative impact on pinelands. The actions contained in alternative F would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of pinelands in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

#### **Vegetation — Hardwood Hammocks**

**Analysis.** Under alternative F, impacts on hardwood hammocks would be attributed to visitor use, NPS restoration efforts and NPS administrative ORV use.

Impacts on vegetation from visitor use, such as from trampling, would be more common at frontcountry destinations and less common in the backcountry. Impacts could include plant injury or mortality. Backcountry camping could also cause trampling or loss of vegetation at localized sites. Impacts on hardwood hammocks from visitor use would be long term, negligible to minor, adverse, and localized.

Ongoing vegetation management would decrease competition from exotic plants and improve the integrity of native habitats. Impacts on hardwood hammocks from vegetation management would be long term, beneficial, minor to moderate, and Addition-wide.

ORV use by NPS staff (or from illegal public use) would continue in the Addition.

Although the substrate present in hardwood hammocks is suitable for ORV use, use tends to be infrequent because of the size and density of trees present in these areas. However, infrequent ORV use could continue to adversely impact understory plants. Adverse impacts could include injury to a plant or group of plants, or might include plant loss in a discrete area due to repeated use. Impacts on hardwood hammocks from ORV use would be long term, minor, adverse and localized. Impacts would be expected to be minor because areas affected would be relatively small and dispersed.

Collectively, the impact on hardwood hammocks under alternative F would be long term, minor, adverse, and localized.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts, such as trampling, injury, or loss of plant cover, of off-road vehicles on vegetation. The impact would be long term, minor to moderate, beneficial, and localized.

Implementation of future oil and gas proposals could have adverse impacts on vegetation in the Addition; however, it is unknown what plant communities would be affected. If such proposals included using off-road equipment and constructing roads and pads, this would alter vegetation. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on vegetation would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet

flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of hardwood hammocks. The impact is uncertain, but restoring natural conditions is expected to have a long-term, minor, beneficial impact.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect plant communities. The impact of these activities on hardwood hammocks is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on hardwood hammocks would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above could slightly benefit hardwood hammocks.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, beneficial cumulative impact on hardwood hammocks. The actions contained in alternative F would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative F, impacts on hardwood hammocks would be long term, minor, adverse, and localized.

There could be a long-term, minor, beneficial cumulative impact on hardwood hammocks. The actions contained in alternative F would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of

hardwood hammocks in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Exotic/Nonnative Plants**

**Analysis.** Under alternative F, impacts on exotic/nonnative plants would be attributed to facility development and maintenance, visitor use and limited NPS administrative ORV use. Ongoing vegetation management (including the use of prescribed fire and chemical and mechanical treatment) in the Addition would continue to decrease competition from exotic plants and improve the integrity of native habitats. The continuation of monitoring efforts would also help to detect and mitigate new exotic species that could affect native plant communities. Impacts on exotic/nonnative species from ongoing resource management activities would be long term, beneficial, moderate, and Addition-wide.

New facility development — such as trails, trailheads, and access points at mile marker 51, mile marker 63, Bear Island Grade, and Deep Lake — would create disturbed lands that would be subject to colonization by invasive plants. Construction materials and activities could also be a seed source for exotic plants and would increase the potential for their dispersion. Maintaining these facilities would also create disturbed habitats that could increase the density of exotic plants and affect the integrity of adjacent natural areas. Exotic plants have severe effects on the integrity of native systems and habitats. The impact of these activities would be long term, minor to moderate, adverse, and localized.

Expanded visitor use would increase the dispersal of exotic plants and also create additional disturbed areas that would be subject to colonization by invasive plants. The impact on exotic plants from visitor use

would be long term, minor, adverse, and localized.

Limited NPS administrative ORV use could continue to cause impacts on the distribution and establishment of exotic plants. Visitors and off-road vehicles can be agents for seed dispersal, increasing the threat to native plant communities. Impacts on exotic/nonnative plants from these activities would be long term, minor, and adverse. Although the effects would be most pronounced along travel corridors and at disturbed sites, the impacts could extend beyond these immediate areas and become Addition-wide.

Collectively, impacts on exotic/nonnative plants under alternative F would be long term, minor, adverse, and potentially Addition-wide.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on exotic plants and nonnative vegetation in the original Preserve and reduces the potential for dispersal into the Addition — a beneficial impact on native vegetation. Furthermore, the designated trail system would facilitate management of exotic species, including reporting and removal. The impact on exotic plants and nonnative vegetation in the region would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on native vegetation because of the potential for the spread of exotic and nonnative plants in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this would disturb soils and native vegetation. Short-term impacts could include the establishment of exotic plants on disturbed sites and the dispersal of seeds and

plant stock. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on native vegetation because of the potential for the spread of exotic and nonnative plants would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect water tables and could impact the abundance and distribution of exotic plants. The impact on exotic plants is uncertain, but restoring natural conditions is expected to have a long-term, minor to moderate, beneficial impact on native plants and vegetation.

Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow, and its timing and intensity, would affect exotic plants, as would increases in the amount of disturbed land that is available for colonization by exotic species. The impact of these activities on exotic plants and nonnative vegetation is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on native vegetation would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above on exotic plants and nonnative vegetation could be minor and adverse.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described

above, there would be a long-term, minor, adverse cumulative impact on exotic plants. The actions contained in alternative F would contribute a small increment to this cumulative impact.

**Conclusion.** Under alternative F, impacts on native vegetation because of the potential for the spread of exotic and nonnative plants would be long term, minor, adverse, and potentially Addition-wide.

There could be a long-term, minor, adverse cumulative impact on exotic plants and nonnative vegetation. The actions contained in alternative F would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of native vegetation in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

### **Federal Threatened and Endangered Species**

**Florida Panther.** Under alternative F, impacts on the Florida panther would be attributed to new facility development, expanded visitor use, and limited NPS administrative ORV use.

New facility development — such as trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake — would impact panthers by causing short-term disturbances associated with construction activities and permanent loss of habitat. Development footprints would be confined to previously disturbed areas to the greatest extent possible (such as at existing access points along major highways), but there would still be a loss of habitat within the panther home range. The impact would be long term, minor, adverse, and localized.

Public recreational ORV use would continue to be prohibited in the Addition under alternative F. However, public hunting would be allowed via walk-in access only. Human use and disturbance in the Addition would continue to be minimal, but would be increased relative to the no-action alternative. The hunting pressure associated with walk-in access only would be expected to be minimal, with no substantial effect on the panther's prey base. Adverse impacts, such as flushing and displacement of panthers, would continue. The impact would be long term, minor, adverse, and localized.

Ongoing vegetation management efforts would continue to improve habitat for panthers as well as for the major game species in the Addition that serve as their primary food source. Partnerships with the Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service would continue and would contribute to the monitoring and improved understanding of the species. Impacts on panthers from ongoing resource management activities would be long term, minor, beneficial, and Addition-wide.

Limited NPS administrative ORV use, as well as nonmotorized public use (primarily backcountry hiking), would continue to affect Florida panthers, potentially causing displacement and avoidance of certain areas within the Addition. The impact would be long term, minor, adverse, and localized.

Designating lands as wilderness under alternative F could result in beneficial impacts on the panther. Habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of panther habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its

wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Collectively, impacts on the Florida panther under alternative F would be long term, minor, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

***Cumulative Impacts*** — Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on panthers in the region, a beneficial impact (because an individual panther's range may include the Preserve as well as the Addition and other adjacent lands). In other words, improving and protecting habitat value on the original Preserve could yield a regional benefit to the species. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on panthers. Adverse impacts on panthers would still occur from ORV use in the original Preserve, but the effects would be less than with no ORV management. With implementation of the terms and conditions of the U.S. Fish and Wildlife Service's "Biological Opinion" (USFWS 2000), the plan is not likely to result in jeopardy to the panther. Overall, the impact of the ORV plan on the Florida panther would be long term, moderate, and beneficial compared to no ORV management.

Implementation of future oil and gas could have adverse impacts on Florida panthers in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could create human

disturbances and result in degradation and loss of panther habitat. Short-term adverse impacts from construction could include flushing and displacement of panthers, effects on feeding and sheltering behavior, and an increase in mortality from vehicle collisions. The same types of adverse impacts would be long term due to ongoing operations and maintenance activities. These adverse impacts would be minor and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communities and in turn wildlife habitat. The impact on the Florida panther is unknown, but restoring natural conditions is assumed to have a long-term, minor, beneficial impact because it would return vegetation communities to historic conditions and improve predator/prey relationships.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a substantial loss of panther habitat. Natural areas that remain are more fragmented and contain higher levels of human disturbance, both of which adversely affect panthers and their long-term survival. Increased panther mortality due to vehicle collisions could also be attributed to the effects of regional growth and development. The impact of these activities on the Florida panther is expected to be long term, moderate to major, and adverse.

Collectively, beneficial impacts on the Florida panther would accrue from ORV management and ecosystem restoration

projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to Florida panthers in the region.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the Florida panther. The actions contained in alternative F would contribute a small increment to this cumulative impact.

**Conclusion** — Impacts on the Florida panther under alternative F would be long term, minor, adverse, and mostly localized across the Addition. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor to moderate, adverse cumulative impact on the Florida panther. The actions proposed in alternative F would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not likely result in impairment of the Florida panther in the Addition because habitat conditions would be maintained or enhanced and the NPS would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**West Indian Manatee.** Impacts on the West Indian Manatee under alternative F would generally be the same as under the no-action alternative. Impacts would be attributed primarily to continued motorboat use associated with recreational fishing

(airboat use would continue to be prohibited). Manatees in the creeks, canals, and estuarine area south of U.S. 41 in the Western Addition would be subjected to potential injury from collisions with boat hulls or propellers. Manatees would also be displaced from or avoid certain areas, which could affect feeding and other behaviors. Designating new paddling trails in tidal areas south of U.S. 41 could increase the displacement or avoidance behavior, but the impact would be negligible. The National Park Service already manages boating in this area to reduce impacts on manatees and their designated critical habitat. Partnerships with the Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service would continue and would help improve monitoring and recovery of the species. Essential features of critical habitat would not be impacted. Impacts on the West Indian manatee would be long term, minor, adverse, and localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

Designating the lands south of U.S. 41 in the Western Addition as wilderness under alternative F could result in beneficial impacts on the manatee. Habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. Because motorboating is a permissible activity in wilderness because of its historic use there and this use would continue to be allowed in the Addition, any beneficial impact would be negligible and the area would function and be managed similar to the no-action alternative.

***Cumulative Impacts*** — Cumulative impacts under alternative F would generally be the same as under the no-action alternative. The south Florida ecosystem restoration project includes several proposals for restoration of

surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would increase the quantity of freshwater inputs into the estuarine system, a beneficial impact on the manatee. The quality of freshwater inputs is predicted to be less than current conditions, which could adversely impact manatee habitat. Overall, it is expected that restoring natural hydrologic conditions would produce long-term, minor beneficial impacts on the West Indian manatee.

Regional growth and development is expected to continue and could result in an increase in the number of recreational boaters in the region. Injury and mortality of manatees associated with recreational boating could increase as a result of increased motorboat use. Incompatible coastal development could also adversely affect manatees by loss of habitat and feeding areas, as well as pollution discharges. These activities would adversely impact manatees and could affect their long-term survival. The impact on the West Indian manatee is expected to be long term, moderate to major, and adverse.

Overall, the effects of the projects discussed above would likely be adverse to West Indian manatees in the region.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, moderate, adverse cumulative impact on the West Indian manatee. The actions contained in alternative F would contribute a very small increment to this cumulative impact.

***Conclusion*** — Impacts on the West Indian manatee under alternative F would be long term, minor, adverse, and

localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, moderate, adverse cumulative impact on the West Indian manatee. The actions contained in alternative F would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the West Indian manatee in the Addition because habitat conditions would be maintained or enhanced and the NPS would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Red-Cockaded Woodpecker.** Under alternative F, impacts on potential habitat for the red-cockaded woodpecker would be attributed to new facility development, expanded visitor use, NPS restoration efforts, and limited NPS administrative ORV use.

New facility development — such as trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake — could impact potential habitat and thus woodpeckers by causing short-term disturbances associated with construction activities and permanent loss of habitat. Development footprints would be confined to previously disturbed areas to the greatest extent possible (such as at existing access points along major highways), but there would still be a loss of habitat. The impact would be long term, minor, adverse, and localized.

Public recreational ORV use would continue to be prohibited in the Addition under alternative F. However, public hunting would be allowed via walk-in access only. Public hunting would not be expected to impact

woodpecker habitat because the integrity of cavity trees and forage resources would be maintained. Human use and disturbance in the Addition would continue to be minimal but would be increased relative to the no-action alternative. Conditions that support woodpecker use of the area would continue to be maintained. Because there are currently no known nest sites within the Addition, effects on woodpeckers would be limited to impacts on foraging habitat and avoidance of certain areas during periods of human activity. The impacts would be long term, minor, adverse, and localized.

Nonmotorized visitor use (primarily back-country hiking) could continue to affect woodpeckers, potentially causing displacement and their avoidance of certain areas within the Addition; the impact would be long term, negligible to minor, adverse, and localized.

Designating lands as wilderness under alternative F could result in beneficial impacts on the woodpecker. Potential habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of woodpecker habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Limited NPS administrative ORV use would continue to affect woodpeckers, potentially causing displacement and avoidance of certain areas within the Addition. The impact would be long term, minor, adverse, and localized.

Collectively, impacts on the red-cockaded woodpecker under alternative F would be long term, minor, adverse, and mostly localized. The determination of effect under

Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the impacts of off-road vehicles on red-cockaded woodpeckers in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on woodpeckers. Cavity trees and active clusters would be avoided as sites for the trails, thereby reducing adverse impacts. Adverse impacts on woodpeckers would still occur from ORV use in pinelands in the original Preserve, but the impact would be minor. Overall, the impact of the 2000 ORV plan on the red-cockaded woodpecker would be long term, negligible, and adverse.

Implementation of future oil and gas could have adverse impacts on the red-cockaded woodpecker in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could degrade and reduce available woodpecker habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term adverse impacts could include flushing and displacement of woodpeckers, while long-term impacts would include the loss of cavity nesting trees.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communi-

ties (including pinelands) and in turn wildlife habitat. The impact on the red-cockaded woodpecker is uncertain, but restoring natural conditions is assumed to have a long-term, minor, beneficial impact because returning vegetation communities to historic conditions and improving foraging resources should be beneficial.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a substantial loss of woodpecker habitat (pinelands) in the region. Natural areas that remain are more fragmented and contain higher levels of human disturbance and displacement of woodpeckers, both of which adversely affect woodpeckers and their long-term survival. The impact of these activities on the red-cockaded woodpecker is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on the red-cockaded woodpecker would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to red-cockaded woodpecker in the region.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the red-cockaded woodpecker. The actions contained in alternative F would contribute a small beneficial increment to this cumulative impact.

**Conclusion** — Impacts on the potential habitat for and thus the red-cockaded woodpecker under alternative F would be long term, minor, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor to moderate, adverse cumulative impact on the potential habitat for and thus the red-cockaded woodpecker. The actions proposed in alternative F would contribute a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the red-cockaded woodpecker in the Addition because habitat conditions would be maintained or enhanced and the NPS would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Wood Stork.** Under alternative F, impacts on the wood stork would be attributed to expanded visitor use, NPS restoration efforts, and limited NPS administrative ORV use.

Public ORV use would continue to be prohibited in the Addition under alternative F. However, public hunting would be allowed via walk-in access only. Nonmotorized visitor use would also be allowed. Human use and disturbance in the Addition would continue to be minimal, but would be increased relative to the no-action alternative. Conditions that support wood stork's use of the area would continue to be maintained. Because there are currently no known nest sites within the Addition, and they have nested in the original Preserve only sporadically since 1996, effects on wood storks would be limited to impacts on foraging habitat and avoidance of certain

areas during periods of human activity. The impacts would be long term, negligible to minor, adverse, and localized.

Ongoing NPS efforts to improve natural hydrologic processes would continue, but the stork's habitat parameters also would continue to be affected primarily by water levels and drying conditions resulting from natural climatic events. The impacts on the wood stork would be negligible, long term, and beneficial.

Designating lands as wilderness under alternative F could result in beneficial impacts on the wood stork. Potential habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of stork habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Limited NPS administrative ORV use could affect storks, potentially causing displacement and avoidance of certain areas within the Addition — the impact would be long term, minor, adverse, and localized.

Collectively, impacts on the wood stork under alternative F would be long term, minor, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of off-road vehicles on the wood stork's

foraging habitat (prairies and marshes) in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on storks. Nesting habitat (cypress trees in open water) would likely not be affected because off-road vehicles typically avoid the deep, open water areas that storks commonly nest in. Consequently, the effect on nesting habitat due to the actions in the ORV plan would be negligible. Overall, the impact of the ORV plan on the wood stork in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the wood stork in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in loss and degradation of wood stork habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Adverse impacts could include flushing and displacement of wood storks. Short-term impacts on wood storks would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions, including food supply. The impact on the wood stork is unknown, but restoring natural hydrologic conditions is expected to have a long-term, minor to moderate, beneficial impact because vegetation communities would return to historic conditions and foraging resources would improve.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Impacts such as the loss of wetlands and compromised water quality from discharge of urban pollutants into hydrologic systems would adversely affect storks. The impact of these activities on the wood stork is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on the wood stork would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse on wood storks in the region.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on the wood stork. The actions contained in alternative F would add a very small increment to this cumulative impact.

**Conclusion** — Impacts on the wood stork under alternative F would be long term, minor, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor, adverse cumulative impact on the wood stork. The actions contained in alternative F would add a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the wood stork in the Addition because habitat conditions would be maintained or enhanced and the NPS would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Everglade Snail Kite.** Under alternative F, impacts on the snail kite would be attributed to expanded visitor use, NPS restoration efforts, and limited NPS administrative ORV use.

Public off-road vehicle use would continue to be prohibited in the Addition under alternative F. Walk-in public hunting would be allowed. Nonmotorized human activity and disturbance in the Addition would continue to be minimal but would increase somewhat relative to the no-action alternative. Limited human activity associated with NPS administrative ORV use would occur. However, the conditions that support the snail kite's foraging and roosting in the area would continue to be maintained. Although there are no known snail kite nest sites in the Addition, kites might occasionally use marshes and open water littoral zones in the Addition for foraging on apple snails. They might also roost in the vicinity of these water bodies. Effects on snail kites would primarily be limited to impacts on foraging habitat and avoidance of certain areas during periods of human activity. Over time, under alternative F, without substantial disturbances from recreation or hydrologic alterations, it might be possible for kites to nest in the Addition. The impacts from public use associated with this alternative would be long-term, negligible to minor, adverse, and localized.

Under alternative F, ongoing NPS efforts to improve natural hydrologic processes, water quality, and invasive plant control would continue as in the no-action alternative. These NPS management actions could

benefit apple snail populations in the Addition and improve the snail kite's accessibility to the apple snails.

Designating lands as wilderness under alternative F could result in beneficial impacts on the snail kite. Potential habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of snail kite habitat; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Collectively, impacts on the Everglade snail kite under alternative F would be long term, negligible to minor, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of off-road vehicles on the snail kite's foraging, roosting, and nesting habitat (marshes and pond/lake fringes) in the region, a beneficial impact. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on the kites that inhabit the region. However, foraging, roosting, or possible nesting habitat for snail kites in the original Preserve could be adversely affected in areas where ORV use is permitted under the ORV plan in the original Preserve, particularly in specific ORV use areas that are near marshes,

ponds, or lakes. Overall, the impact of that plan on the snail kite in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the snail kite habitat in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in loss and degradation of snail kite habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Adverse impacts could include flushing and displacement of snail kites. Short-term impacts on snail kites would be adverse, moderate, and localized, while long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions, including food supply and water quality. This would be particularly beneficial to the snail kite because its diet predominantly consists of apple snails, which are very dependent on adequate hydrological conditions. Furthermore, the return of natural hydrological conditions and improved water quality to the region would also enhance or increase the availability of quality foraging, roosting, and nesting habitat for the Everglade snail kite. The restoration of natural hydrologic conditions would have long-term, moderate, beneficial impacts.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Impacts

such as the loss of wetlands and compromised water quality from discharge of urban pollutants into hydrologic systems would adversely affect snail kites and their primary food source, the apple snail. The impact of these activities on the snail kite is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on the snail kite would result from improved ORV management in the original Preserve and ecosystem restoration projects in the region. Adverse impacts would be expected from oil and gas development and regional growth and urban development. Overall, the effects of the projects discussed above would likely be adverse to snail kite habitat in the region.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on the Everglade snail kite. The actions contained in alternative F would add a small increment to this cumulative impact.

**Conclusion** — Impacts on the snail kite under alternative F would be long term, negligible to minor, adverse, and mostly localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor, adverse cumulative impact on the Everglade snail kite. The actions proposed in alternative F would add a small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the snail kite in the Addition

because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**American Crocodile.** Impacts on the American crocodile and its habitat under alternative F would generally be the same as under the no-action alternative because recreational use in and near mangrove forests of the Addition would be the same as in alternative A (no action).

Under alternative F, impacts on the American crocodile and its habitat would primarily be attributed to continued human activities near mangrove forests, particularly motorized boating associated with recreational fishing in the Western Addition (airboat use is prohibited). Mangrove forests are the primary habitat for the American crocodile in south Florida, although crocodiles are generally rare in Big Cypress National Preserve. The mangrove habitat areas along creeks, canals, and estuaries south of U.S. 41 in the Western Addition are where effects would most likely occur.

In these areas, crocodiles might be affected by motorboat noise, boat wakes and waves, human noise or actions, or boat hulls or propellers. Because most American crocodile activity occurs from just before sunset to just after sunrise, most of these human-induced actions would disturb the crocodiles when they are at rest during daytime hours. These disturbances might cause resting crocodiles to be flushed, resulting in unnecessary energy use and stress. Boating in early morning or evening hours might also alter crocodile foraging behavior or flush the possible prey of the crocodile. Depending on the level and frequency of human disturbances, crocodiles could avoid some areas entirely.

Crocodiles are not known to nest in the Addition. However, if nesting occurs, the hatching success would primarily depend on risks from flooding, predation, lack of soil moisture during incubation, and extreme storms. The nest success also depends on the female crocodile returning to the nest to excavate the hatchlings. Research suggests that some female crocodiles may abandon their nests if the area is subjected to repeated, close human presence (Kushlan and Mazzotti 1989). Once hatched, juveniles would then be affected by similar human disturbances as highlighted above. The young crocodiles would be at greatest risk during their journey through open water from their nest site to more distant nursery habitat.

Given the infrequent presence of crocodiles in the Addition, the above effects from human recreation activities such as boating would be long term, minor, adverse, and localized.

Alternative F would also continue current NPS vegetation management actions that would help maintain or improve habitat conditions in the Addition. These actions would help address invasive plant infestations that could degrade or displace habitat for the American crocodile. The impacts of ongoing NPS vegetation management would be long term, minor to moderate, beneficial, and localized.

Under alternative F, the impacts on the American crocodile would continue to be long term, adverse, minor, and localized. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

**Cumulative Impacts** — Cumulative impacts under alternative F would generally be the same as under the no-action alternative. The south Florida ecosystem restoration project includes several proposals for restoration of

surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would increase the quantity of freshwater inputs into the estuarine system, a beneficial impact on the American crocodile. This restoration of hydrologic flows and connectivity would be most beneficial to the crocodile in the nonnesting season when they seek inland freshwater habitats. However, the water quality of freshwater inflows is predicted to be worse than current conditions, which could adversely impact crocodile habitat. Overall, it is expected that restoring natural hydrologic conditions would produce long-term, moderate, beneficial impacts for the American crocodile.

Regional growth and development, including waterfront development, is expected to continue in south Florida. This would result in the alteration or displacement of natural lands and changes to the local and regional hydrology. Because mangrove forests receive special protection under state law, any direct impacts on mangrove forests would be expected to be negligible. However, even if direct impacts on mangroves are avoided, urban encroachment might diminish mangrove habitat values if human activity and development is close to the mangroves. Road mortality would likely increase as development and regional population increase. Growth and development could also result in an increase in boating and other recreational activities in the area. Crocodile foraging, breeding, resting, and nesting might be affected by increases in motorboat disturbances, boat wakes and waves, and human noise or actions. Crocodiles could avoid some areas entirely depending on the level and frequency of human disturbances. The impact on the American crocodile from urban growth and development is

expected to be long-term, moderate, and adverse.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the American crocodile. The actions contained in alternative F would contribute a very small increment to this cumulative impact.

**Conclusion** — Implementation of alternative F would result in localized, long-term, minor, adverse impacts on the American crocodile. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

There would be a long-term, minor to moderate, adverse cumulative impact on the American crocodile. The actions contained in alternative F would contribute a very small increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the American crocodile in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

**Eastern Indigo Snake.** Under alternative F, impacts on potential habitat for the eastern indigo snake would be attributed to new facility development, expanded visitor use, NPS restoration efforts, and limited NPS administrative ORV use.

The continuation of NPS vegetation management efforts would continue to improve habitat values for the indigo snake and its prey. Given the snake's dependence on a mosaic of habitat types throughout its lifecycle and its generalist nature in south Florida, the combination of these Addition-wide active management efforts and natural restoration processes (that restore previously disturbed lands) would enhance the conditions for the eastern indigo. Impacts on the snake from these ongoing resource management activities would continue to be long-term, beneficial, minor, and Addition-wide.

New facility development — such as hiking trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake — would impact potential eastern indigo habitat by causing short-term disturbances associated with construction activities and permanent loss of habitat. Development footprints would be confined to previously disturbed areas to the greatest extent possible (such as at existing access points along major highways), but there would still be a loss of habitat. The impact would be long term, minor, adverse, and localized.

Public ORV use would continue to be prohibited in the Addition under alternative F. Therefore, little or no disturbance to vegetative groundcover or soil substrates would be expected. Other impacts, such as disturbance from public ORV noises, would also be avoided. This continued effect would be particularly beneficial to the eastern indigo in the upland areas of the Addition, such as pinelands or successional hardwood hammocks, which provide habitat conditions for foraging, breeding, and snake burrows or refuges. The prohibition of ORV use under this alternative would also retain the Addition as a large, unfragmented, mosaic of undisturbed snake habitat types, which is essential for viable eastern indigo

populations (Layne and Steiner 1996, Breininger et al. 2004).

The hunting pressure associated with walk-in access only would be expected to be minimal, with negligible effect on the eastern indigo or its prey. In addition, continued enforcement of the Endangered Species Act and the Lacey Act would limit the risk of illegal snake capture for the pet trade. Other nonmotorized public use (e.g., backcountry hiking) would also continue and would be increased relative to that of the no-action alternative. However, this nonmotorized use would cause sporadic disturbance to the snake or its prey and would yield negligible to minor degradation of eastern indigo habitat. Limited administrative ORV use by NPS staff would also be an occasional, short-term disturbance. Consequently, human use and disturbance in the Addition would continue to be minimal under alternative F and would maintain habitat conditions that support the eastern indigo snake and its prey. The impact from human activity would be long term, negligible to minor, adverse, and localized.

Designating lands as wilderness under alternative F could result in beneficial impacts on potential eastern indigo habitat. The snake's habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of the snake's habitat. However, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Overall, the impacts on the potential habitat for the eastern indigo snake under alternative F would result in long-term, minor to moderate, beneficial, impacts on this species across the Addition. The determination of

effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

***Cumulative Impacts*** — Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the impacts of off-road vehicles on the wide variety of habitat types that support the eastern indigo. Most importantly, the improved ORV management efforts in the original Preserve would reduce disturbance or degradation to vegetative groundcover and soil substrates in areas that provide for foraging, breeding, and snake burrows or refugia, such as pinelands or successional hardwood hammocks. This would benefit snakes in the region. Eliminating some and designating new ORV trails and conducting education, best management practices, research, and mitigation would limit impacts on the indigo snakes in the region. However, snake habitat might be altered or displaced, and individual snakes might be flushed in areas where ORV use is permitted under the plan. Overall, the impact of that plan on the eastern indigo in the region would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on the eastern indigo snake habitat in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this could result in the loss and degradation of several habitat types that support the snake. Adverse impacts would include displacement of vegetative cover for the snake; soil and burrow disturbances; possible roadway injury/mortality; and disruption of normal foraging, breeding, and dispersal behaviors. The impacts of these

activities would be reduced because NPS approval of the operations plan would require mitigative measures. Short-term impacts on snake would be adverse, moderate, and localized, while long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect habitat conditions for many species. This hydrologic restoration could benefit the eastern indigo directly during times of the year when the snake uses wetter habitats in the area. At other times, it would benefit the eastern indigo indirectly by restoring a natural system that could improve conditions and increase populations of the snake's food base. However, the reintroduction of natural flows could displace some existing upland areas. This effect could decrease available upland habitat for the eastern indigo snake and its prey that depend on upland habitat. The restoration of natural hydrologic conditions would have long-term, minor to moderate impacts that could be both beneficial and adverse to the snake.

Regional growth and development is expected to continue and result in an increase in habitat displacement for the snake. Because the eastern indigo uses a variety of habitat types and has a large home range, it is particularly susceptible to habitat loss and habitat fragmentation from urban development. In addition to habitat displacement and fragmentation, urban development also brings injury or mortality threats from domestic animals, vehicles, property owners, and pesticides and rodenticides in the food chain. All of these would adversely affect eastern indigos. The impact of these activities on

the snake is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on the eastern indigo snake would result from improved ORV management in the original Preserve and ecosystem restoration projects in the region. Adverse impacts would be expected from oil and gas development and regional growth and urban development. Overall, the effects of the projects discussed above would likely be adverse to the snake's habitat in the region.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor to moderate, adverse cumulative impact on the eastern indigo snake. The actions contained in alternative F would add a small beneficial increment to this cumulative impact.

**Conclusion** — Under alternative F, impacts on the eastern indigo snake would be long term, minor to moderate, and beneficial. The determination of effect under Section 7 of the Endangered Species Act would be *not likely to adversely affect*.

However, there would be a long-term, minor to moderate, adverse cumulative impact on the eastern indigo. The actions contained in alternative F would add a small beneficial increment to this cumulative impact.

Impacts from actions contained in alternative F would not result in impairment of the eastern indigo snake in the Addition because habitat conditions would be maintained or enhanced and the National Park Service would strive to meet the species recovery goals. (See specific definition of impairment in the

"Impairment of Addition Resources" section.)

### Major Game Species

**Analysis.** Under alternative F, impacts on the major game species of the Addition (white-tailed deer, feral hogs, and wild turkey) would be attributed to new facility development, expanded visitor use, and limited NPS administrative ORV use.

New facility development — such as trails, trailheads, and access points at mile markers 51 and 63, Bear Island Grade, and Deep Lake — would impact game species by causing short-term disturbances associated with construction activities and permanent loss of habitat. Development footprints would be confined to previously disturbed areas to the greatest extent possible (such as at existing access points along major highways), but there would still be a loss of habitat. The impact would be long term, minor, adverse, and localized.

Public recreational ORV use would continue to be prohibited in the Addition under alternative F. However, public hunting would be allowed via walk-in access only. The Addition would be expected to become part of the adjacent Big Cypress State Wildlife Management Area. As in the original Preserve, hunting would be regulated according to the requirements, seasons, and bag limits established by the Florida Fish and Wildlife Conservation Commission. Human use and disturbance in the Addition would continue to be minimal, but would be increased relative to the no-action alternative. The hunting pressure associated with walk-in access only would be expected to be minimal, with no important effect on the viability of game populations. Short-term, minor adverse impacts, such as flushing and displacement of game species, would continue. Long-term, moderate beneficial impacts could also occur from hunting and

management of game populations, such as disease mitigation and improvements in population genetics. Partnerships with the Florida Fish and Wildlife Conservation Commission would continue and would contribute to the monitoring and improved understanding of game populations.

Designating lands as wilderness under alternative F would likely result in beneficial impacts on major game species. Habitat would be preserved, and all uses and activities in wilderness would be subject to the provisions of the Wilderness Act, including the use of the minimum requirements process. This would likely result in greater protection of habitat for major game species; however, compared to the no-action alternative and the fact that eligible land in the Addition must be maintained to preserve its wilderness characteristics and its eligibility as wilderness, the beneficial impact would be negligible.

Limited NPS administrative ORV use would continue to affect game species, potentially causing displacement and avoidance of certain areas within the Addition. The impact would be long term, minor, adverse, and localized.

Collectively, impacts on major game species under alternative F would be long term, minor, adverse, and mostly localized.

**Cumulative Impacts.** Cumulative impacts under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would reduce the adverse impacts of off-road vehicles on major game species in the region — a beneficial impact. Eliminating some and designating new ORV trails would make ORV noise and movement more predictable, thereby displacing animals away from travel corridors but reducing the impacts on wildlife habitat and game populations.

Conducting education, best management practices, research, and mitigation called for in the ORV plan would also limit impacts on wildlife. Adverse impacts on major game species would still occur from ORV use in the original Preserve, but the effects on the species from the actions in the 2000 ORV plan would be less than with no ORV management. Overall, the impact of implementing the ORV plan on major game species would be long term, minor, and beneficial.

Implementation of future oil and gas proposals could have adverse impacts on major game species in the Addition. If such proposals included using off-road equipment and constructing roads and pads, this would create human disturbances and alter wildlife habitat. The impacts of these activities would be reduced because NPS approval of the operations plan would require mitigative measures. Adverse impacts could include flushing and displacement of game species. Short-term impacts on major game species would be adverse, moderate, and localized; long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect vegetation communities and in turn wildlife habitat. The impact on the major game species is unknown, but restoring natural conditions is expected to have a long-term, minor, beneficial impact.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led to a loss of wildlife habitat. The major game species are considered generalists and have demonstrated their resiliency and ability to adapt to

changing conditions. Within the region, the three species (deer, hogs, and turkey) are widespread. However, continued urbanization has fragmented remaining natural areas and increased the risks and threats to these species, including automobile collisions, exotic species, and pathogens. The impact of these activities on the major game species is expected to be long term, minor to moderate, and adverse.

Collectively, beneficial impacts on major game species would accrue from ORV management and ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to major game species in the region.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on the major game species. The actions contained in alternative F would contribute an appreciable beneficial increment to this cumulative impact.

**Conclusion.** Impacts on major game species under alternative F would be long term, minor, adverse, and mostly localized.

There would be a long-term, minor, adverse cumulative impact on the major game species. The actions contained in alternative F would contribute an appreciable beneficial increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of the major game species in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## WILDERNESS RESOURCES AND VALUES

### Analysis

Under alternative F, the wilderness resources and values of the Addition would be enhanced and protected compared to the no-action alternative. Ongoing NPS resource management activities, as well as natural reclamation processes, would continue to improve the long-term naturalness of the Addition, but could cause some short-term adverse impacts on soundscapes and visitor opportunities from restoration actions. Several man-made features and sites (Nobles Grade and Carnestown facilities) would be removed, improving natural hydrologic function and permanently removing remnants of man's imprint on the land, a beneficial impact. Because no public ORV use would be allowed, fragmentation of habitats would be minimized and the current condition of the natural soundscape would be preserved. Opportunities for solitude and primitive and unconfined recreation would continue to be preserved and available. Hunting, frogging, and fishing would be allowed but would be accommodated by walk-in access only.

Approximately 71,260 acres of the Addition would be proposed for designation as wilderness (100% of those lands considered eligible under the wilderness study and 48% of the Addition's total acreage). The special status and protection afforded to these lands under the Wilderness Act would preserve their wilderness resources and values in perpetuity — a beneficial impact. The portion of the Addition south of U.S. 41 would be managed consistent with adjacent designated "marine" wilderness in Everglades National Park.

Overall, the impacts on wilderness resources and values would be long term, major, beneficial, and Addition-wide.

## **Cumulative Impacts**

Cumulative impacts on wilderness resources and values under alternative F would generally be the same as under the no-action alternative. Implementation of the 2000 *Recreational Off-road Vehicle Management Plan* within the original Preserve would minimize the effects of off-road vehicles on wilderness resources and values by reducing the potential for the dispersal and establishment of exotic plants, a beneficial impact. The impact on natural soundscapes resulting from the management of off-road vehicles in the original Preserve would be negligible because approximately the same number of off-road vehicles would be using the original Preserve and in roughly the same areas. Consequently, impacts on a visitor's wilderness experience (freedom and natural sights and sounds) resulting from implementing the 2000 ORV plan would be negligible. Impacts on wilderness resources and values in the region would be negligible.

Implementation of future oil and gas proposals could have adverse impacts on wilderness resources and values. If such proposals included using off-road equipment and constructing roads and pads, this would create human disturbances and alter natural habitats. NPS approval of the operation plan would require mitigative measures to eliminate or reduce the impact of activities on natural resources. Short-term impacts on wilderness resources and values would be adverse, moderate, and localized; residual long-term impacts would be adverse, minor, and localized.

The south Florida ecosystem restoration project includes several proposals for restoration of surface water flow within the region. The proposals would improve sheet flow and hydrologic connectivity, which would affect natural communities. Restoring natural conditions is expected to have a long-term, moderate, beneficial impact.

Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. Increasing urbanization, fragmentation of habitat, and the loss of natural areas have led to the degradation of natural resources, ecosystem function, and natural soundscapes in the region. The impact of these activities on wilderness resources and values is expected to be long term, moderate, and adverse.

Collectively, beneficial impacts on wilderness resources and values would accrue from ecosystem restoration projects. Adverse impacts would be expected from oil and gas operations and regional growth and development. Overall, the effects of the projects discussed above would likely be adverse to wilderness resources and values in the region.

When the likely effects of implementing the actions contained in alternative F are added to the effects of other past, present, and reasonably foreseeable actions as described above, there would be a long-term, minor, adverse cumulative impact on wilderness resources and values in the region. The actions contained in alternative F would contribute a modest beneficial increment to this cumulative impact.

## **Conclusion**

Impacts on wilderness resources and values under alternative F would be long term, major, beneficial, and Addition-wide.

There would be a long-term, minor, adverse cumulative impact on wilderness resources and values in the region. The actions contained in alternative F would contribute a modest beneficial increment to this cumulative impact.

Impacts from actions contained in this alternative would not result in impairment of

wilderness resources and values in the Addition. (See specific definition of impairment in the "Impairment of Addition Resources" section.)

## CULTURAL RESOURCES

### Archeological Resources

**Analysis.** Under alternative F, there would be no impacts on archeological resources resulting from authorized ORV use. No ORV use would be allowed other than NPS administrative use and use by owners of inholdings operating under special permits. Illegal ORV use could displace soils and cause erosion of archeological sites. These impacts would be permanent, adverse, and of minor intensity.

Most of the archeological sites in the Addition are middens. These raised mound areas would be potentially attractive to backcountry users, and trampling or disturbance could result in a loss of surface archeological materials, alteration of artifact distribution, and a reduction of contextual evidence. Continued ranger patrol and emphasis on visitor education would help minimize adverse effects, and any adverse effects would be permanent and of minor intensity.

As appropriate, archeological surveys would precede any ground disturbance for the construction of parking, trailheads, new access points, and the operations facility and national register-eligible or -listed archeological resources would be avoided. No adverse impacts on archeological resources from such construction would be anticipated. If during construction previously unknown archeological resources were discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented. If the resources cannot be preserved in situ, an appropriate mitigation

strategy would be developed in consultation with the state historic preservation officer and any associated Indian tribes.

**Cumulative Impacts.** Current research indicates relatively little disturbance of archeological sites in the Addition resulting from past actions such as hunting and camping, logging, looting, and energy exploration. These impacts would be characterized as permanent and negligible.

Implementation of future oil and gas proposals could have adverse impacts on archeological resources. If such proposals included using off-road equipment and constructing roads and pads, this could affect archeological resources. However, because approval of the operations plan would require mitigation measures to eliminate or reduce the impact of activities on archeological resources, the permanent effect of energy exploration on archeological resources should be negligible.

However, significant archeological resources would likely be avoided to the greatest extent possible, and any impacts on archeological resources would be adverse, permanent, and negligible.

When the permanent, minor, adverse effects of implementing the actions in alternative F are added to the permanent, negligible, adverse effects of other past, present, and reasonably foreseeable actions, there would be a permanent, minor, adverse cumulative impact on archeological resources. The actions contained in alternative F would contribute a slightly larger increment to the cumulative impact than past, present, and reasonably foreseeable actions.

**Conclusion.** Under alternative F, impacts on archeological resources would be permanent, adverse, and minor.

There would be a permanent, negligible, adverse cumulative impact on archeological

resources. The actions contained in alternative F would contribute a slightly larger increment to the cumulative impact than past, present, and reasonably foreseeable actions.

**Section 106 Summary.** After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of alternative F would generally result in a no adverse effect on archeological resources.

Impacts from actions contained in this alternative would not result in impairment of archeological resources in the Addition.

### **Ethnographic Resources**

**Analysis.** Under alternative F, there would be minimal potential for impacts to ethnographic resources. No ORV use would be allowed other than NPS administrative use and use by owners of inholdings operating under special permits. The construction of trails for hiking, camping, cycling, and equestrian use, parking, trailheads, and interpretive signs could have impacts on previously unknown ethnographic resources. The National Park Service would work with traditionally associated people to identify ethnographic resources and identify appropriate protection strategies for these resources. Consultation with traditionally associated peoples would precede construction in order to avoid or mitigate impacts resulting from trail, parking, or other facility development. With this mitigation, no adverse impacts on ethnographic resources would be anticipated from construction.

**Cumulative Impacts.** Although other past, present, and reasonably foreseeable future actions may affect ethnographic resources in the area, alternative F would have no impacts on ethnographic resources and therefore would not contribute to the effects

of other actions. Consequently, there would be no cumulative impacts on ethnographic resources under alternative F.

**Conclusion.** Under alternative F, there would be no impacts on ethnographic resources. Therefore there would be no cumulative impacts.

**Section 106 Summary.** After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of alternative F would generally result in a no adverse effect on ethnographic resources.

Impacts from actions contained in this alternative would not result in impairment of ethnographic resources in the Addition.

## **VISITOR USE AND EXPERIENCE**

### **Recreational Opportunities**

**Motorized Use.** ORV access and use would not be allowed under alternative F, with the exception of private property owners with a special use permit and limited NPS administrative use. The development of formal access points at Bear Island Grade and Deep Lake would provide additional pull-offs/stopping points and visitor information and interpretation opportunities for visitors passing traveling on SR 29. Compared to alternative A, an increase in pull-offs/stopping points and visitor information would have a long-term, negligible, beneficial effect.

**Nonmotorized Use (including hiking, horseback riding, and bicycling).** Most of the Addition would be zoned as either primitive backcountry or would be proposed wilderness. The primitive backcountry zone would be compatible with the legal requirements associated with wilderness. Backcountry hiking, horseback riding, and

dispersed camping would continue to be allowed, and result in beneficial impacts. Hikers and horseback riders would be able to experience a natural landscape and soundscape with opportunities for solitude and primitive and unconfined recreation in the Addition. The Florida National Scenic Trail would be formally designated, and new access points, including parking and visitor information, would be added at Bear Island Grade and Deep Lake. The mile marker 63 access point would be enhanced and would include parking, a trailhead, visitor information and a new NPS operation facility. An increased NPS staff presence would have beneficial impacts by improving visitor safety and increasing opportunities for interpretation. The Deep Lake access point would include the addition of a boardwalk that would provide a safe and comfortable trail to the lake for frontcountry hikers. Existing use of the Nobles Grade as a trail would be eliminated, but would be offset by new trail opportunities and improved access. Existing facilities at Carnestown would also be removed. The expansion of access, recreational opportunities, visitor information and interpretation opportunities, and NPS operations in the Addition would result in long-term, moderate, and beneficial impacts on nonmotorized users.

Existing roads and grades would be open to bicyclists, and new access points with additional visitor information and interpretation opportunities would be developed at mile markers 51 and 63 and Bear Island Grade. The trails leading from them would expand opportunities to explore and enjoy the Addition on a bike. User conflicts with other nonmotorized users at trailheads and along developed trails would be infrequent. Impacts on bicyclists would be long term, minor to moderate, and beneficial because of increased access and opportunity to enjoy the Addition.

**Hunting (including fishing and frogging).** Nonmotorized hunting would be allowed in

designated areas and seasons as determined by the National Park Service in cooperation with the Florida Fish and Wildlife Conservation Commission. New access points and visitor information and interpretation opportunities at mile markers 51 and 63 and Bear Island Grade would increase accessibility to many parts of the Addition and enhance understanding of the Addition's resources for nonmotorized hunters. Although hunting with the use of an ORV would not be allowed in the Addition, ORV hunters traveling through the Addition would benefit from additional stopping points. Camping access and opportunities would be the same for all nonmotorized users, including hunters as described above. The ability to hunt in the Addition and an increase in the number of access points would have a long-term, minor to moderate, beneficial impact on nonmotorized hunters and a long-term, negligible, beneficial impact on hunters with off-road vehicles because of more pull-offs/stopping points.

Collectively, implementation of alternative F would result in long-term, minor, beneficial impacts on visitor use and experience.

### Cumulative Impacts

Implementation of the 2000 *Final Recreational Off-road Vehicle Management Plan* would provide up to 400 miles of designated primary ORV trails, 15 ORV access points, and up to 2,000 annual permits in the original Preserve. This quantity of trail miles and permits provides abundant opportunities for operating off-road vehicles and results in long-term, moderate, beneficial, impacts on ORV users in the local area.

Implementation of future oil and gas proposals for exploration activities could adversely impact the experience of visitors. Noise and human activity from the construction of roads and pads and the use of off-road equipment, if included in the proposals,

could detract from the experience of those seeking a primitive experience and natural soundscape. Impacts resulting from a reduction in the natural settings of the Addition due to the operation of oil and gas equipment would be long term, minor, and adverse in localized areas.

The south Florida ecosystem restoration project is a large-scale effort among public, private, and nongovernmental entities to restore surface water flows within the region. Implementation of the proposals would improve sheet flows and hydrologic connectivity and likely restore natural conditions to the Addition. This effort would enhance the visitor use and experience by providing increased opportunities for wildlife viewing and experiencing natural settings. Opportunities for hunting in the Addition would also improve with more abundant, healthy wildlife populations. Impacts resulting from the effects of a healthy, fully functioning ecosystem would be long term, moderate, beneficial, and regionwide.

Regional growth and development would be expected to result in increased visitation to the Addition. More visitations over time might result in increased congestion and user conflicts at access points and along trails. Resulting impacts from growth and development would be long term, minor to moderate, and adverse.

Implementation of the *Commercial Services Plan* will initially only affect the original Preserve. The Addition will be addressed in an addendum to the *Commercial Services Plan* after the completion of this *General Management Plan* for the Preserve Addition. The *Commercial Services Plan* proposes to enhance the original Preserve's visitor services through the development of one or more new facilities — a new backcountry camping complex; hunting and fishing guides; buggy, van, and hiking tours; boat and bicycle rentals; and expanded oppor-

tunities for birding, wildlife viewing, and photography. Enhanced and expanded opportunities in the Preserve, before an addendum to include the Addition, would increase visitation and might result in increased congestion and user conflicts. Impacts resulting from increased visitation and congestion at access points would result in long-term, minor, adverse impacts on visitors. When the Addition is addressed in an addendum, visitor opportunities to explore and use the Addition could be expanded, but only minimally given the lack of motorized access. If so, impacts from implementing the *Commercial Services Plan* in the Addition would be long term, negligible, and beneficial as a result of expanded opportunities.

Combining the likely effects of implementing alternative F with the effects of other past, present, and reasonably foreseeable actions described above, the cumulative impact on visitor use and experience in the Addition would be long-term, minor, and beneficial. The actions contained in alternative F would contribute an appreciable increment to this cumulative impact.

## **Conclusion**

Under alternative F recreational ORV riding and ORV hunting opportunities would be unavailable, whereas designated nonmotorized access and opportunities would increase. Collectively, the resulting impacts on visitor use and experience would be long term, minor, and beneficial.

The cumulative impact on visitor use and experience in the Addition would be long-term, minor, and beneficial. The actions contained in alternative F would contribute an appreciable increment to this cumulative impact.

## SOCIOECONOMIC ENVIRONMENT

Analysis of economic impacts under alternative F were based on projected increases in visitation to the Preserve (including the Addition) (which in turn would affect visitor spending patterns), as well as estimated one-time capital expenditures because of construction activity. A total of 18,656 new visitors were estimated to visit the Preserve each year as a result of implementing this alternative. Of this total, it was assumed that 3,918 were local visitors, 7,089 were non-local day visitors, 5,224 were motel visitors, and 2,425 were campers. In terms of capital expenditures, it was estimated that alternative F would produce \$4.9 million in total construction costs.

### Local Economy

**Employment.** The long-term impacts on employment as a result of implementing alternative F would be the creation of 19 new jobs (17 direct and two indirect) in Collier County. This additional employment would generate a total labor income of \$285,000 annually (covering wages, salaries, and payroll benefits), representing \$216,000 in direct labor income effects as a result of new job growth and \$69,000 in indirect labor income effects from new job growth in tourism-related industries. Approximately half of this direct employment would be attributable to increases in staff needed to operate and maintain new facilities, trails, and services in the Addition; the remainder of new jobs would be created at businesses that cater to tourist-related activities. Indirect employment increases would be found in firms that support tourist-related businesses, as well as in firms that hire additional staff because of changes to direct employment spending. Because employment in Collier County is approximately 140,184 (2006 estimate) these additional jobs would only increase county employment by .01%. Consequently, as a result of alternative F,

long-term impacts related to employment would be localized, negligible, and beneficial.

In terms of short-term impacts, approximately 37 temporary jobs would be created due to construction activity in the Addition, generating about \$1.1 million in labor income. Most direct employment would be temporary labor during the construction period. Secondary employment increases would be the result of staffing increases in industries that provide goods and services to the construction sector as well as from businesses that hire additional employees as a result of changes in direct employee spending. The temporary jobs only represent a .02% increase in county employment. Consequently, as a result of alternative F, short-term impacts related to employment would be localized, negligible, and beneficial.

**Housing.** Similar to alternative B and the preferred alternative, long-term housing impacts would be minimal due to such a small increase in employment, and if felt at all, would likely be concentrated in the Naples and Marco Island areas. Consequently, the long-term impacts related to housing would be localized, negligible, and beneficial.

Short-term impacts from construction activity would also likely be minimal compared to total housing impacts at the county level. Although specific areas such as Naples and Marco Island might have a temporary increase in residential housing demand, such effects would not be felt throughout the rest of the county. Consequently, short-term impacts related to housing would be localized, negligible, and beneficial.

**Sales.** Long-term sales impacts, as a result of increased visitor spending under alternative F, would generate a total of \$839.0 million annually in taxable sales of goods and

services by businesses in Collier County. This represents the smallest increase in county sales of all the alternatives (aside from alternative A which would have no impact at all). Most businesses realizing these financial gains are within tourist-related industries, such as retail, arts, entertainment, recreation, accommodation and food services. As a total of Collier County's annual taxable sales, estimated to be more than \$6.10 billion, such a change roughly translates into a .01% increase. Consequently, the long-term impacts related to sales under alternative F would be localized, negligible, and beneficial.

Short-term sales impacts related to construction activity would also be positive. Total annual sales under alternative F were estimated to be \$3.1 million, with \$2.5 million (80%) of that amount attributable to transactions occurring within Collier County. Most direct sales would be linked to construction-related businesses, with indirect sales linked to industries that support the construction industry as well as spending by construction workers. Consequently, short-term impacts related to sales under alternative F would be localized, negligible, and beneficial.

**Tribal Impacts.** In qualitatively assessing long-term economic impacts to the Miccosukee and Seminole tribes, both reservations would realize some positive long-term benefits under alternative F. Increased visitation to the Preserve as a result of this alternative would likely generate a small to moderate boost in sales of tourist-related goods and services provided at these reservations. However, the magnitude of such gains is based on reasonable speculation due to the limited amount of data available on the tribes' economic activities. It can be assumed that any economic benefits realized under this alternative would be less than the gains realized under alternatives B and the preferred. This is in part because there would be no new partnership oppor-

tunities in the Addition under this alternative and the tribes would not realize any benefits as third-party vendors. Consequently, long-term impacts related to economic activities under alternative F would be localized, negligible to moderate, and beneficial.

New construction activity in the Addition would generate temporary construction jobs. Additional construction workers in the area would likely increase visitation to the two reservations, leading to an increase in the sales of tourist-related goods and services. Positive affects would likely be less under this alternative than under alternatives B and the preferred. Consequently, short-term impacts related to economic activity under alternative F would be localized, negligible to moderate, and beneficial.

Collectively, the long-term and short-term impacts resulting from implementing alternative F would be localized, negligible, and beneficial.

### **Cumulative Impacts**

The action area for evaluating cumulative impacts on the socioeconomic environment is Collier County. The likely effects of implementing the actions contained under alternative F, in combination with to the effects of other past, present, and reasonably foreseeable actions are described below.

The implementation of the *Final Recreational Off-Road Vehicle Plan*, which provides for a maximum of 2,000 permits, 15 access points, and 400 miles of designated trails, has a strong likelihood of attracting new visitors and locals to the Preserve. Such an increase in Preserve visitation would translate into greater visitor spending in the area, resulting in positive long-term gains for Collier County in terms of employment, housing, and taxable annual sales, as well as increased economic activity for the Miccosukee and Seminole tribes. However, relative to the

economy of the entire county, long-term economic impacts would likely be minimal. Short-term impacts as a result of one-time capital expenditures from building ORV trail access, facilities, and other structures are also likely to be minimal relative to the overall level of construction activity within the county. As a result, both long-term and short-term cumulative impacts would be localized, negligible, and beneficial.

Although the *Commercial Services Plan* does not include the Addition, social and economic impacts to the county as a whole would be positive due to increased visitation and visitor spending in the area, and expansion of facilities, services, and recreational opportunities in the Preserve. In particular, the implementation of the *Commercial Services Plan's* preferred alternative, which includes the potential to develop two new visitor facilities, partnership agreements for offering a variety of guided tours and equipment rentals, and the creation of a back-country camping complex, could translate into moderate long-term gains in visitor spending at the county level. Depending on the level of construction activity generated from implementation of the *Commercial Services Plan*, short-term impacts could be substantial at the county level. As a result, both long-term and short-term cumulative impacts would be localized, negligible to moderate, and beneficial.

The potential exists for exploration activities, as proposed under the oil and gas plan, to reduce visitation in the Preserve due to environmental disruptions from the use of off-road equipment and the development of roads and pads for oil and gas exploration. Due to multiplier effects, long-term impacts from reduced visitation could result in reductions in county employment, housing, and sales, as well as reduced economic activity for the Miccosukee and Seminole tribes. However, such effects will likely be minimal in relation to the entire county economy. Short-term impacts from

construction could be both positive and substantial, depending on the level of construction and percentage of that economic activity that remains within the county. Long-term impacts would be localized, negligible, and adverse, while short-term impacts would be localized, negligible to moderate, and beneficial.

The south Florida ecosystem restoration projects would likely attract additional visitors to the region due to the rehabilitation of natural ecosystems within and near the Preserve through various water system improvements. In particular, the Big Cypress Interceptor Modification Plan would likely increase use across a variety of recreational activities offered in the Preserve, particularly for visitors interested in enjoying the natural habitat and wildlife. Collier County would also benefit from restoration efforts in nearby sites, such as Everglades National Park, because additional visitors may pass through or decide to make an additional stop at the Preserve. Because these restoration projects are relatively large in scale, are occurring at multiple sites, and are at a regional level, the long-term impacts on county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes could be substantial. Short-term impacts would also be positive because capital expenditures on water infrastructure improvements (estimated at multi-billions of dollars) would likely generate substantial temporary gains to county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes. As a result, both long-term and short-term impacts would be localized, moderate, and beneficial.

The development of lands northwest of the Addition could increase Preserve visitation and result in positive long-term economic impacts at the county level. In particular, the availability of greater residential housing and the building of a new private and state university in the area could greatly increase

the number of residents living in Collier County. The provision of additional services, goods, and facilities would also likely be expanded to accommodate these new residents, which in turn would also attract a greater number of visitors from outside the region. As a result, increased local and visitor spending would produce long-term positive gains to county employment, housing, and sales, as well as economic activity for the Miccosukee and Seminole tribes. Short-term economic impacts could be substantial at the county level, because large scale construction activity would be needed to support new residents, the universities, and visitors. As a result, long-term and short-term impacts would be localized, moderate to major, and beneficial.

Combining the likely effects of implementing the no-action alternative with the effects of other past, present, and reasonably foreseeable actions described above, the cumulative long-term and short-term socioeconomic impacts would be localized, moderate to major, and beneficial. The preferred alternative would represent a very small increment to this cumulative impact.

## **Conclusion**

Because of changes in visitor spending under alternative F, long-term and short-term impacts to the socioeconomic environment would be localized, negligible and beneficial. As a result, county employment, housing, sales, and economic activity associated with the Miccosukee and Seminole tribes would realize some positive gains, although such increases would be minimal when viewed at a county level.

In terms of cumulative effects, long-term and short-term impacts would be localized, moderate to major, and beneficial. Alternative F would contribute a very small increment to this total cumulative impact.

## **NPS OPERATIONS AND MANAGEMENT**

### **Analysis**

Alternative F proposes an operations center and employee housing to be located in the Addition. An operations center, which would station employees and equipment in the Addition, would increase operational efficiency and reduce response time for fire, law enforcement, maintenance, and interpretation staff. Currently, staff must travel a minimum of an hour to reach the Northeast Addition from the original Preserve. Employee housing for three law enforcement and two fire division staff would increase efficiency and reduce response time for fire and enforcement scenarios. Alternative F also proposes interpretive panels to orient and educate visitors to the Addition, which would reduce staff time required to orient visitors. These new facilities would result in moderate, long-term, beneficial impacts on NPS operations.

However, the new facilities must be built, and oversight of design and construction processes would require managerial and contracting staff time. Additionally, new facilities must be maintained, and this would burden maintenance staff. Formalized trailheads at Deep Lake and Bear Island Grade and interpretive panels are also proposed for development in the Addition. Managing the Addition would require time and effort from administrative, visitor and resource protection, interpretation, resource management, and fire division staff. Maintenance and resource management in areas proposed as wilderness would require the use of the minimum requirements process, which would require staff time and, in some cases, could increase the cost of management actions. Increased visitation due to the new facilities would also require time from all staff divisions. Therefore, management of the Addition and construction and maintenance of facilities under alternative F

would result in moderate, long-term, adverse impacts on NPS operations.

### **Cumulative Impacts**

Expansion of nearby communities, including the towns of Ave Maria and Big Cypress, Everglades ecosystem restoration activities, and oil and gas exploration activities, would require time and attention by senior NPS staff. The expansion of commercial services offered in the original Preserve would require time from staff spent managing the commercial service authorizations and leases. Cooperation and coordination with neighboring agencies and entities regarding planning, land use resources, and development proposals near the preserve also would require substantial amounts of staff time and result in minor to moderate long-term adverse impacts. Alternative F would place an additional burden on NPS staff, but this burden would be lessened with adequate staffing. Combined with other past, present, and reasonably foreseeable future impacts, alternative F would result in minor to moderate, long-term, beneficial cumulative impacts on NPS operations. Although the extra staff time required to manage the Addition facilities and actions taken by other entities would have adverse impact, the new facilities would play a much larger role in the overall impact by allowing staff to be located within the Addition and respond to operational and visitor needs in an efficient and timely manner. Alternative F's proposed actions would contribute a modest increment to these cumulative impacts.

### **Conclusion**

Operational efficiencies achieved through development of new facilities in the Addition, along with the increased staffing burdens associated with managing those lands and constructing and maintaining new facilities, would have overall moderate, long-

term, beneficial and adverse impacts on NPS operations.

The cumulative impacts of alternative F and other actions would be minor to moderate, long term, and beneficial. Alternative F's proposed actions would contribute a modest increment to these cumulative impacts.

### **EFFECTS ON ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL**

The construction of new facilities under alternative F, such as trails, trailheads, access points, and an operations center, would result in more energy use and consumption; however, the projects would follow NPS policies concerning sustainability and energy conservation to minimize the overall energy requirements. The carbon footprint of the facilities would be minimized through appropriate design and the use of green technology to the greatest extent possible. To maintain, operate, and protect the facilities, NPS travel to and within the Addition also would increase, and the increased travel would increase energy consumption. The fuel and energy consumed by visitors traveling to and within the Addition would increase because visitation would be expected to increase slightly as a result of the Addition being open to the public and the offering of new nonmotorized recreational opportunities.

### **UNAVOIDABLE ADVERSE IMPACTS**

Human use and the construction of new facilities under alternative F would result in minor adverse impacts on natural resources in some areas throughout the Addition. The impacts on wildlife, vegetation, and the visitor experience, which are discussed in detail under each of the impact topics, would be unavoidable. Although all these impacts

would be unavoidable, mitigation to reduce them would be carried out where possible.

**IRRETRIEVABLE OR IRREVERSIBLE COMMITMENTS OF RESOURCES**

The additional energy requirements identified above would result in an irreversible commitment of resources. In addition, there would be a commitment of material used to construct new visitor facilities such as trailheads and access points and the operations center at mile marker 63.

**RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY**

As in alternative A, most of the Addition would be protected in a natural state and

would maintain its long-term productivity under alternative F. Only a small percentage of the Addition would be converted to development. No actions in this alternative would jeopardize the long-term productivity of the environment. Short-term impacts might result from construction, such as local air and water pollution, as detailed in the analysis of specific impact topics. Noise and human activity from construction and restoration might displace some wildlife from the immediate area. However, these activities would not jeopardize the long-term productivity of the environment.





# CHAPTER 5

## CONSULTATION AND COORDINATION



## PUBLIC AND AGENCY INVOLVEMENT

This *Final General Management Plan / Wilderness Study / Off-road Vehicle Management Plan / Environmental Impact Statement* for the Big Cypress National Preserve Addition was based on input from the National Park Service, other agencies, American Indian tribes, and the public. Consultation and coordination among these groups were vitally important throughout the planning process. The public had several available avenues to provide comments during the development of the plan, including public meetings, postal mail, email, and the Internet.

### PUBLIC MEETINGS AND NEWSLETTERS

Public meetings and seven newsletters were used to keep the public informed and involved in the planning process for the Addition. A mailing list was compiled that consisted of governmental agencies, nongovernmental organizations, businesses, legislators, local governments, and interested citizens.

The notice of intent to prepare an environmental impact statement was published in the *Federal Register* on June 12, 2001.

The first newsletter concerning the general management plan for the Addition was issued in July 2001, and it outlined the purpose of the Preserve and the Addition. It also stated the Addition's significance, including its natural and cultural heritage, and outlined the planning process for completing the general management plan. It urged the public to actively participate in the process by commenting on the purpose and significance statements and by attending one of the four public scoping meetings held during the summer of 2001 in Everglades City, Naples, Miami, and the Big Cypress Seminole Reservation.

The public was engaged in the project as shown by the number of responses received following the release of the first newsletter. Approximately 90 people attended the scoping meetings, and more than 100 comments and suggestions were received from individuals, organizations, and agencies.

Comments received following publication of the first newsletter focused on the Addition's role in the Comprehensive Everglades Restoration Plan (CERP); the need to implement science-based resource management; restoration of previously disturbed lands; and the need to address exotic species, fire, threatened and endangered species recovery, and protection of contemporary cultural sites.

The planning staff paid close attention to comments and suggestions received. In addition, the Addition's enabling legislation, legislative history, and federal law and policy were carefully reexamined. This process resulted in the revision of the purpose and significance statements proposed in the first newsletter.

The second newsletter was issued in August 2002 and included revised purpose and significance statements, an overview of the issues and comments received in response to the first newsletter, and a description of the next steps for the project.

The third newsletter, issued in October 2005, outlined the preliminary alternatives and management zones for the Addition. Three public meetings were held in December 2005 in Everglades City, Naples, and Weston to discuss and receive feedback on the preliminary alternatives. A total of 794 individuals provided comments in response to this newsletter, with more than 70% of the responses attributed to commenters from outside Florida. The comments indicated

support for both ends of the spectrum of preliminary alternatives — from full motorized ORV access to little or no ORV access.

A fourth newsletter was released in May 2006 outlining the need for a wilderness study and off-road vehicle management plan for the Addition. The expansion of the scope of the planning process was a result of the strong response received from interested individuals, organizations, and public agencies as well as legal requirements. The notice of intent to expand the scope of the plan was published in the *Federal Register* on April 25, 2006. Three public meetings were announced and held in May 2006 in Everglades City, Naples, and Fort Lauderdale to gather comments on expanding the scope of the project to include the additional planning elements.

A fifth newsletter was released in April 2007 that outlined the revised preliminary alternatives and management zones for the Addition, incorporating proposed wilderness and ORV trails. Three public meetings were held in May 2007 in Everglades City, Naples, and Weston to gather input concerning the revised preliminary alternatives. Public interest was again significant, with about 4,800 responses. Common issues and concerns included impacts of off-road vehicles on wildlife and vegetation; level of ORV access provided for recreational riding, hunting, and game management; trailhead parking capacities; impacts on the Florida panther from motorized use at Bear Island; and spending on proposed visitor facilities.

A sixth newsletter published in February 2008 provided a status update, with emphasis on how the general management plan would address access to the Addition from I-75.

A seventh and final newsletter was issued in July 2010 updating the public on the next steps of the project and the expected dates for release of the final management plan and the agency's "Record of Decision" on the project.

## **RELEASE OF THE DRAFT GENERAL MANAGEMENT PLAN / WILDERNESS STUDY / OFF-ROAD VEHICLE MANAGEMENT PLAN / ENVIRONMENTAL IMPACT STATEMENT**

*The Draft General Management Plan / Wilderness Study / Off-road Vehicle Management Plan / Environmental Impact Statement* was released to the public on July 10, 2009. Four public meetings/wilderness hearings were held across south Florida to review the draft plan and receive public input: August 10, 2009, in Miami, Florida; August 11, 2009, in Naples, Florida; August 12, 2009, in Everglades City, Florida; and September 22, 2009, in Weston, Florida. The public comment period closed on September 30, 2009.

A total of four wilderness hearings were held in the project area. These hearings were held in conjunction with the public meetings for the draft plan, but included a specific opportunity to provide input and comments on the wilderness study and proposal. A total of 104 individuals spoke and provided oral comments. A hearing officer presided over the hearings and moderated the public comment session. A certified court reporter attended all four meetings, recorded all testimony, and prepared an official transcript of the meetings.

A total of 16,912 pieces of correspondence about the draft plan were received from individuals, organizations, tribes, and agencies:

- 15,481 pieces of correspondence were received from individuals responding to an e-mail action alert produced by the National Parks Conservation Association. Of these, 14,326 were form letters (where the text content was the same as what was included in the action alert message) and 1,155 were personalized.
- 778 form letters were received from individuals using language prepared

by the Big Cypress Sportsmen's Alliance.

- 653 comments were received via the NPS online comment system (Planning, Environment, and Public Comment (PEPC), through e-mail, or from comment forms or letters submitted via postal mail.

All comment letters received from agencies and organizations, as well as the transcripts from the wilderness hearings, are posted to the PEPC Internet site (<http://parkplanning.nps.gov/bicy>) for public inspection. A report was also prepared that summarized the comments that were received during the review period for the draft plan; it was posted to the PEPC site in December 2009.

## RELEASE OF THE FLOODPLAINS STATEMENT OF FINDINGS

To comply with Executive Order 11988, "Floodplain Management" and NPS Director's Order 77-2, a "Floodplain Statement of Findings" was prepared and released to the public on May 11, 2010. The document was posted to the PEPC site and was available for review and comment for three weeks. A direct mailing was sent to all parties that received a copy of the draft plan informing them of the availability of the "Floodplain Statement of Findings" and inviting their review and comment. A news release was also prepared and was issued.

No comments were received on the document, and it was approved by the NPS southeast regional director on June 22, 2010 (see appendix D).

## CONSULTATION WITH AGENCIES, TRIBES, AND ORGANIZATIONS

### National Historic Preservation Act Section 106 Consultation

Federal agencies that have direct or indirect jurisdiction over historic properties are required by Section 106 of the National Historic Preservation Act of 1966, as amended (16 *United States Code* 270, et seq.) to take into account the effect of any undertaking on properties eligible for listing in the National Register of Historic Places. To meet the requirements of 36 *Code of Federal Regulations* 800, the National Park Service mailed a letter to the Florida state historic preservation officer on February 22, 2001, inviting their participation in the planning process.

The National Park Service determined that the draft plan would have no adverse effect on cultural resources and mailed a copy of the draft management plan to the state historic preservation officer with a request for written concurrence with that determination.

In a letter dated September 18, 2009, from the Florida Department of State, Division of Historical Resources, the state historic preservation office stated that cultural and historical resources were adequately addressed by the draft plan and that they agreed that the preferred alternative has the potential to adversely affect cultural resources (see appendix C). Therefore, continued consultation will be required before the initiation of ground-disturbing activities.

### Endangered Species Act Section 7 Consultation

During the preparation of this document, NPS staff coordinated with the U.S. Fish and Wildlife Service (USFWS), Vero Beach, Florida office, and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA-NMFS). A

letter was sent to the U.S. Fish and Wildlife Service on August 21, 2001 (see appendix C), initiating informal consultation and requesting a species list.

The USFWS South Florida Ecological Services Office provided comments throughout the planning process, including a response in June 2007 on the revised preliminary alternatives issued in newsletter #5. The list of threatened and endangered species included in this plan was compiled using lists and information received from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.

In accordance with the Endangered Species Act and relevant regulations at 50 CFR Part 402, the National Park Service determined that the preferred alternative is *likely to adversely affect* four listed species — the Florida panther, red-cockaded woodpecker, Everglade snail kite, and eastern indigo snake; and *not likely to adversely affect* another three listed species — the West Indian manatee, wood stork, and American crocodile. NPS managers sent a copy of the draft management plan to the U.S. Fish and Wildlife Service with a request to initiate formal consultation. The letter included references to the sections and pages of the draft plan that contain a description of the impacts on listed species and will serve as the “Biological Assessment.”

The National Park Service determined that the draft plan would have no effect on listed species that are under the jurisdiction of the National Marine Fisheries Service and also mailed a copy of the draft plan to the National Marine Fisheries Service in accordance with section 7 (a)(2) of the Endangered Species Act.

In addition, the National Park Service has committed to consult on future actions conducted under the framework described in this management plan to ensure that such actions are not likely to adversely affect threatened or endangered species.

In a letter dated October 9, 2009, the USFWS South Florida Ecological Services Office stated that the draft plan did not contain sufficient analysis of the potential effects of the alternatives on federally listed species, especially the Florida panther (see appendix C). They indicated that additional information was needed for the plan and the “Biological Assessment.” In particular, they indicated that three species, the Everglade snail kite, eastern indigo snake, and American crocodile could be affected by the actions included in the plan and that these species should be included in the environmental impact analysis and “Biological Assessment.”

In response to their letter, the National Park Service has continued to consult with the U.S. Fish and Wildlife Service on information needs for appropriate analysis of effects on federal threatened and endangered species. In particular, the two agencies have been working collaboratively to evaluate the applicability of certain studies and data to be used in evaluating impacts on the Florida panther. A study is to be completed by the University of Florida evaluating historical data and the correlation between ORV use and panther impacts. Another analysis being done using GIS evaluates the relationship between the NPS proposed ORV trail system and panther habitat. Both studies are being completed to assist the U.S. Fish and Wildlife Service in evaluating effects on the Florida panther and developing their “Biological Opinion” (see chapter 4 for more information). Several conference calls and in-person meetings have been conducted with the U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission since the release of the draft plan to discuss data needs and potential improvements to the plan. USFWS staff also accompanied NPS staff on field trips to further evaluate the trail system.

The plan has been revised to meet their requirements and respond to their comments and concerns. Please see the next section of this chapter for detailed information on their

comments, the NPS response, and how the document was revised to address their concerns.

### **National Environmental Policy Act (NEPA) and Clean Air Act Compliance**

The Environmental Protection Agency (EPA) has the authority and duty to evaluate federal agency compliance with the National Environmental Policy Act and the Clean Air Act. A copy of the *Draft General Management Plan / Wilderness Study / Off-road Vehicle Management Plan / Environmental Impact Statement* was mailed to the Environmental Protection Agency with a request for their review and concurrence.

In a letter dated September 3, 2009, the Environmental Protection Agency, Region 4, stated that the draft plan did not contain sufficient information to fully assess the environmental impacts that should be avoided in order to protect the environment (see appendix C). They rated the draft plan EC-2 (Environmental Concerns, additional information requested) and indicated that additional information should be included in the final plan.

The plan has been revised to meet their requirements and respond to their comments and concerns. Please see the next section of this chapter for detailed information on their comments, the NPS response, and how the document was revised to address their concerns.

### **Coastal Zone Management**

The Coastal Zone Management Act was enacted in 1972 to preserve, protect, develop, and where possible, to restore and enhance the resources of the nation's coastal zone. The act requires federal agency activities (i.e., "direct" agency activities) to be fully consistent with a state's approved coastal

management program, unless full consistency is prohibited by federal law. The Florida coastal management program was approved by the National Oceanic and Atmospheric Administration in 1981 and is codified at Chapter 380, Part II, F.S. The Florida Coastal Management Program consists of a network of 23 Florida statutes that are administered by eight state agencies and five water management districts. This framework allows the state to make integrated, balanced decisions that ensure the wise use and protection of the state's water, property, cultural, historic, and biological resources; protect public health; minimize the state's vulnerability to coastal hazards; ensure orderly, managed growth; protect the state's transportation system; and sustain a vital economy.

The National Park Service proposes no development in any area of the Addition that would conflict with the coastal zone management program.

A copy of the *Draft General Management Plan / Wilderness Study / Off-road Vehicle Management Plan / Environmental Impact Statement* was mailed to the Florida State Clearinghouse with a request for their review and concurrence.

In a letter dated September 29, 2009, the Florida Department of Environmental Protection, on behalf of all state agencies that reviewed the draft plan, stated that the draft plan was inconsistent with the state's coastal management program (see appendix C). They stated that for the plan to receive a "consistency determination," two specific conditions must be met.

The plan has been revised to meet their requirements and respond to their comments and concerns. Please see the next section of this chapter for detailed information on their comments, the NPS response, and how the document was revised to address their concerns.

## The State of Florida

The Preserve's enabling legislation, PL 93-440, as amended by the Addition Act, PL 100-301, requires the National Park Service to consult and cooperate with the state of Florida on such issues as implementation of hunting restrictions and the establishment of recreational access points into the Preserve along I-75. During preparation of this document, NPS staff conducted several meetings with the Florida Department of Transportation and the Florida Fish and Wildlife Conservation Commission (FFWCC) to gather input and to ensure that facilities and activities contemplated in the alternatives were consistent with the plans, standards, and regulatory requirements of these agencies. The 1990 *I-75 Recreational Access Plan* called for two access points in the Addition, and NPS staff met several times with the transportation department concerning planning of these sites to ensure consistency with that plan and the alternatives described in this document. Because hunting is mandated by the enabling legislation and regulated by the Florida Fish and Wildlife Conservation Commission, close consultation with that agency was essential to consider expanding hunting opportunities in the Addition. The Florida Fish and Wildlife Conservation Commission was regularly briefed on the status of this management plan at commission meetings, and a two-day workshop attended by several state and regional FFWCC representatives was held at the Preserve in November 2008 to review and comment on the draft document.

A copy of the *Draft General Management Plan/Wilderness Study / Off-road Vehicle Management Plan / Environmental Impact Statement* was mailed to the Florida State Clearinghouse with a request for their review and concurrence. The draft plan was distributed to the following state agencies for review: Department of Environmental Protection; Department of Agriculture and Consumer Services, Division of Forestry; Fish and Wildlife Conservation Commission;

Department of Community Affairs; South Florida Water Management District; Southwest Florida Regional Planning Council; and the Department of State.

In a letter dated September 29, 2009, the Florida Department of Environmental Protection, on behalf of all of the state agencies that reviewed the draft plan, stated that the draft plan was inconsistent with the department's statutory authorities under Chapters 253, 259 and 373 of Florida Statute. (see appendix C). The letter included a number of concerns, requests, and recommendations that reflect the consensus position of the state on this project.

The plan has been revised to meet their requirements and respond to their comments and concerns. Please see the next section of this chapter for detailed information on their comments, the NPS response, and how the document was revised to address their concerns.

## Consultation with Native Americans

The National Park Service recognizes that indigenous peoples may have traditional and contemporary interests and ongoing rights in lands now under NPS management, as well as concerns and contributions to make for the future via the scoping process for general management plans and other projects. Related to tribal sovereignty, 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 Alaska Natives and Native Hawaiians, are required by various federal laws, executive orders, regulations, and policies. For example, such consultations are needed to comply with Section 106 of the National Historic Preservation Act of 1966, as amended. Implementing regulations

of the Council on Environmental Quality (CEQ) for the National Environmental Policy Act of 1969), as amended, also call for Native American consultations.

Letters were sent to the Seminole Tribe of Florida, the Seminole Nation of Oklahoma, and the Miccosukee Tribe of Indians of Florida on December 12, 2001, to invite their participation in the planning process. Each tribe was invited to meet at his or her convenience, at a tribally selected place such as the headquarters of the tribe. The purpose of the meeting was to discuss the general management planning process underway and any concerns the tribal government, on behalf of the members of the tribe, might have about protecting, preserving, and managing Big Cypress National Preserve's cultural and natural resources.

The tribes were briefed on the scope of the planning project and the preliminary alternatives by newsletter and follow-up telephone calls soliciting comments. Oral comments by the tribes included recommendations to adopt alternative A with hunting and no proposed wilderness. Conversations have been ongoing throughout the planning process to inform the tribes about the progress of the plan and identify how and to what extent they would like to be involved.

The rights, privileges, concerns, and interests of the Preserve's American Indian neighbors are very important to consider; it is equally important to work out mutually acceptable arrangements on particular issues. The tribes have been kept fully informed throughout the planning process and have been sent all newsletters and a copy of the *Draft General Management Plan / Wilderness Study / Off-road Vehicle Management Plan / Environmental Impact Statement*.

**Seminole Tribe of Florida.** A number of concerns, requests, and recommendations were stated in a letter dated September 30, 2009, from the law firm of Lewis, Longman &

Walker, P.A. representing the Seminole Tribe of Florida (see appendix C).

The plan has been revised to meet their requirements and respond to their comments and concerns. Please see the next section of this chapter for detailed information on their comments, the NPS response, and how the document was revised to address their concerns.

**Seminole Nation of Oklahoma.** No comments were received from the Seminole Nation of Oklahoma.

**Miccosukee Tribe of Indians of Florida.** A consultation meeting was held with the Miccosukee Tribe for this project on September 24, 2009, where several concerns were raised.

The plan has been revised to meet their requirements and respond to their comments and concerns. Please see the next section of this chapter for detailed information on their comments, the NPS response, and how the document was revised to address their concerns.

#### **Communications with Other Native Americans**

In addition to consulting with federally recognized tribes, the National Park Service met with the Council of the Original Miccosukee Simanolee Nation, Aboriginal People in September 2009. The National Park Service received and considered comments from the council as well as from the Independent Traditional Seminole Nation of Florida and posted them on the NPS PEPC website.

#### **Other Outreach Efforts**

In addition to consultation required by law, Preserve staff conducted outreach with

various stakeholder groups and agencies. In April 2006 Preserve staff convened a focus group meeting attended by representatives of the Florida-based recreational and environmental groups closely involved in the planning process. The purpose was to seek common ground between the polarized groups. In spring 2008 Preserve staff met separately with stakeholder groups, congressional staff, agencies, and tribes, concluding with a joint stakeholder meeting in May 2008. Additional outreach with interested or affected parties

will be continued until the plan is approved and also during its implementation.

**FUTURE COMPLIANCE REQUIREMENTS**

The National Park Service will comply with all appropriate laws in implementing the preferred alternative. In the following table the specific future compliance requirements of the preferred alternative are listed. Other compliance, as appropriate, is also listed.

**TABLE 29: FUTURE COMPLIANCE REQUIRED FOR IMPLEMENTATION OF SPECIFIC ACTIONS UNDER THE PREFERRED ALTERNATIVE**

<b>Action</b>	<b>Compliance Requirement</b>
<ul style="list-style-type: none"> <li>• Routinely monitoring and stabilizing archeological sites.</li> <li>• Monitoring cultural landscapes and historic structures to protect, preserve, maintain, and research them.</li> </ul>	<p>These items are programmatically excluded from future Section 106 review and state historic preservation officer consultation.</p>
<ul style="list-style-type: none"> <li>• If eligible for the National Register of Historic Places, discovery of archeological sites that cannot be avoided via surveying new trails or formalizing existing trails.</li> </ul>	<p>Future Section 106 review and state historic preservation officer consultation would likely be necessary and required before construction at the project implementation planning or design stages. Consultations with associated American Indian groups would also be necessary.</p>
<ul style="list-style-type: none"> <li>• I-75 recreational access facility design and levels of ORV use by area</li> </ul>	<p>Before any access facilities are built and open to the public, compliance with Section 7 of the Endangered Species Act would be required for the proposed recreation access points that are included in the preferred alternative. Although NEPA compliance for the I-75 access points was completed in 1991 with the <i>I-75 Recreational Access Plan Environmental Assessment</i>, this Section 7 compliance would include consideration and assessment of appropriate levels of ORV use, by area, within the Addition. Any new research and data regarding special status species, such as the Florida panther, would be incorporated into the Section 7 compliance and access decisions. This compliance would also include consultation with the U.S. Fish and Wildlife Service, the Florida Fish and Wildlife Conservation Commission, and other appropriate resource agencies.</p>

<ul style="list-style-type: none"> <li>• Ground-disturbing activities and construction associated with new trail development, formalizing existing social trails, trailhead and parking lot development, and the development of visitor facilities such as visitor contact stations and interpretive facilities.</li> </ul>	<p>Relevant permits, such as Section 404 permits from the U.S. Army Corps of Engineers, would be required for construction in jurisdictional wetlands.</p> <p>Also, according to NPS policies, the National Park Service would be required to develop a “Wetlands Statement of Findings” that quantifies all wetland impacts from trail and facility development in the Addition. This analysis would be completed before any NPS facilities or trail development were constructed that could affect wetland resources in the Addition. The “Wetlands Statement of Findings” would include a functional analysis of wetland impacts throughout the Addition. As per NPS policy, this analysis would address a wide variety of wetland values and functions (i.e., beyond the areas that are directly dredged or filled, as per Clean Water Act, Section 404 requirements). The “Wetlands Statement of Findings” would also identify all possible impact mitigation measures to be included in facility or trail development. These environmental documents will tier from this management plan and include additional site-specific data needed for impact assessment and mitigation.</p> <p>Threatened and endangered species surveys and coordination with the U.S. Fish and Wildlife Service would be required before, during, and after implementation of new developments within the Addition.</p>
<ul style="list-style-type: none"> <li>• Hunting management in the Addition</li> </ul>	<p>Before the Addition is open for hunting, the National Park Service would develop a hunting management plan that would follow NEPA compliance requirements. The environmental impact analysis in this compliance process would include an assessment of the effects of hunting activities on special status species such as the Florida panther. This would include both the effects of human presence (i.e., hunters dispersed throughout the Addition) and the effects of white-tailed deer management on the panther’s primary food source. Any new research and data regarding special status species, such as the Florida panther, would be incorporated into the hunting management decisions. This NEPA compliance would also necessitate consultation with the appropriate resource agencies. The National Park Service would work closely with the Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service in the development of the hunting management plan.</p>

# COMMENTS ON, CHANGES TO, AND RESPONSES TO COMMENTS ON THE DRAFT PLAN

## INTRODUCTION

This section of the plan describes the comments that the National Park Service received on the *Draft General Management Plan / Wilderness Study / Off-road Vehicle Management Plan / Environmental Impact Statement* (the Draft GMP/EIS, DGMP/EIS, the general management plan, the draft EIS, or the draft plan). It includes a list of commenters, an overview of the range of comments received, a summary of the changes and clarifications made to the plan as a result of the comments, and specific responses to substantive comments.

## COMMENTERS ON THE DRAFT PLAN

The *Draft General Management Plan / Wilderness Study / Off-road Vehicle Management Plan / Environmental Impact Statement* was made available for public review on July 10, 2009. The public comment period ended on September 30, 2009. The document was sent to about 60 agencies, tribes, organizations, businesses, and elected officials. Other copies were also provided to individuals upon request. The draft plan was also posted on the Internet and distributed at meetings. Nearly 17,000 comments were received.

### Federal Government Agencies

The following government agencies submitted comments on the draft plan. Copies of all letters received from agencies are posted to the NPS planning (PEPC) website at <http://parkplanning.nps.gov/bicy>.

Environmental Protection Agency  
U. S. Fish and Wildlife Service

### American Indian Tribes

The following American Indian tribes submitted comments on the draft plan. Copies of all letters received from tribes are posted to the PEPC website.

Miccosukee Tribe of Indians of Florida  
Seminole Tribe of Florida

Comments were also received from the Council of the Original Miccosukee Seminole Nation, Aboriginal People and the Independent Traditional Seminole Nation of Florida.

### State Agencies

The following state government agencies submitted comments on the draft plan. Copies of all letters received from agencies are posted to the PEPC website.

Florida Department of Environmental Protection (Florida State Clearinghouse)

### Organizations

The following organizations submitted comments on the draft plan. Copies of all letters received from organizations are posted to the PEPC website.

Allied Sportsmen's Associations of Florida  
Audubon of Florida and Collier County  
Audubon Society  
Big Cypress Sportsmen's Alliance  
Collier Sportsmen and Conservation Club, Inc.  
Collier Resources Company  
Conservancy of Southwest Florida

Council of the Original Miccosukee  
Simanolee Nation, Aboriginal People  
Defenders of Wildlife  
Everglades Coordinating Council  
Florida Trail Association  
Florida Wildlife Federation  
Independent Traditional Seminole Nation  
of Florida  
Jetport Conservation and Recreation Club  
National Parks Conservation Association  
National Wild Turkey Federation —  
Everglades Longbeards Chapter  
National Wild Turkey Federation —  
Florida State Chapter  
North American Butterfly Association —  
Miami Blue Chapter  
Pegasus Foundation  
Public Employees for Environmental  
Responsibility  
Safari Club International  
Sierra Club  
The Future of Hunting in Florida, Inc.  
Tropical Audubon Society

### **Individuals**

More than 16,000 individuals provided comments on the draft plan. Copies of all comments received from individuals are posted to the NPS PEPC website.

### **RANGE OF COMMENTS**

A summary of the public comments received on the draft plan was prepared and posted to the PEPC website (at <http://parkplanning.nps.gov/bicy>) in December 2009. This report summarized the range and nature of comments received from individuals, organizations, government agencies, and American Indian tribes.

Commenters expressed both support and opposition to motorized access in the Addition for a variety of reasons. Commonly cited concerns included ORV access and trail opportunities, hunting, ORV administration,

impacts to wildlife including federally listed species, wilderness preservation, exotic species management, and visitor experience. Commenters also expressed both support and opposition to wilderness designation in the Addition. Commonly cited reasons included ORV access, fire management, exotic species management, and opportunities for solitude.

### **CHANGES AND CLARIFICATIONS TO THE DOCUMENT**

#### **Changes to the Alternatives**

In response to comments received on the draft plan, the following key changes were made to the alternatives.

#### **1. Wilderness**

A final “Wilderness Eligibility Determination” was completed (see appendix B). The amount of wilderness proposed in each of the alternatives was updated based on the findings of this process. Wilderness proposed in the preferred alternative is limited to the Northeast Addition south of I-75 only.

#### **2. ORV Trails and Permits**

Additional field investigation of the sustainable ORV trail system was conducted, which resulted in minor changes to the trail system. The number of miles of trail in the preferred alternative was reduced to further limit impacts to sensitive species and their habitats. The number of miles included in alternative B was adjusted to correlate to the number of sustainable trail miles available for ORV use. The number of permits included in alternative B and the preferred alternative was reduced to correspond to the reduction in the number of trail miles included in each of the alternatives.

#### **3. ORV Management and Administration**

The user capacity section was revised to better explain and justify the proposed system of indicators and standards.

4. Future Compliance Requirements  
Additional details were added to the “Future Studies and Implementation Plans Needed” section, as well as to the table 29 in “Chapter 5: Consultation and Coordination” that describes future compliance requirements so that the public and agencies are clear on what decisions would be made by this plan and which actions would need future compliance (and/or permits).

The next section, “Responses to Comments on the Draft Plan,” includes more detail on specific changes made to the alternatives chapter, including sections and page numbers that were revised.

### **Changes to the Affected Environment and Environmental Consequences**

Changes were made throughout the document to clarify language and respond to questions and concerns that were raised by comments received on the draft plan. Sections that include the most new information include water resources (surface water flows, wetlands, and floodplains), wildlife (protected wildlife species and exotic and nonnative wildlife species), and cultural resources (archeological resources and ethnographic resources). The next section, “Responses to Comments on the Draft Plan,” includes more detail on specific changes made to the “Affected Environment” and “Environmental Consequences” chapters, including sections that were revised.

### **RESPONSES TO COMMENTS ON THE DRAFT PLAN**

All comments submitted by government agencies, American Indian tribes, organizations, and members of the public were carefully reviewed. Substantive comments were identified, and categories were developed to organize similar comments. A

substantive comment is defined by NPS Director’s Order 12 (Section 4.6A) as one that does one or more of the following:

- Questions, with a reasonable basis, the accuracy of information in the environmental impact statement;
- Questions, with a reasonable basis, the adequacy of the environmental analysis;
- Presents reasonable alternatives other than those presented in the EIS; and/or
- Causes changes or revisions in the proposal.

The substantive comments have been summarized below along with NPS responses. The comments are presented as summaries or paraphrases of the original comments.

Comments from, and responses to, government agencies and American Indian tribes are presented first, followed by comments and responses from state agencies, organizations, and individuals. Comments from individuals and nongovernmental organizations are presented and organized by broad categories. The comments included are intended to characterize the concern and sentiment of individual respondents.

Responses to the substantive comments are provided only once. For example, if an individual and an organization raise the same concern or substantive comment, then it is presented only once along with the NPS response.

Agency and tribal letters are reprinted in appendix C.

### **COMMENTS FROM FEDERAL GOVERNMENT AGENCIES**

#### **Environmental Protection Agency (EPA)**

1. **Comment:** *“The FEIS should identify how it was determined that 140 miles of ORV trails is*

*the least amount necessary in order to provide access throughout the site and still maintain an ecological balance within the Addition. Also, information on the use of the remaining 113 miles of ORV trails located within the Addition should be provided. EPA recommends that any trails not used be restored to its natural community type.”*

**Response:** As stated in the draft plan on page 100, NPS staff evaluated the existing trails in the Addition to determine if they were sustainable for ORV use. NPS staff also considered the presence and needs of sensitive species in the design of the conceptual primary trail system. Based on comments received, the NPS staff reevaluated certain areas of the conceptual trail system and determined that the number of miles of sustainable trails should be reduced to 135. The miles of trails proposed in the ORV trail system were determined by the planning team to meet public access needs while affording necessary environmental protection. The amount of trails included in the preferred alternative was reduced from 140 miles to 130 miles to further minimize impacts on wetlands and sensitive species.

As stated in the draft plan on page 108, the remaining trails that would not be used for public ORV use would be reclaimed (natural elevations and plant communities restored) as funding permits.

**2. Comment:** *“The DEIS did not include information on efforts taken to avoid or minimize wetland and other waters of the US impacts. EPA requests that the FEIS provide information on measures that have been taken to avoid or minimize onsite waters of the US impacts.”*

**Response:** Trail siting criteria, as described on page 100 of the draft plan, included avoidance and minimization of impacts on wetlands. Evaluation of

substrate was a component of the trail sustainability evaluation. Impacts on wetlands were further minimized by locating most of the ORV trails in upland areas north of I-75 where the substrate is more suitable for ORV riding. South of I-75, the trail system was limited to existing roads and trails. The NPS planning team evaluated trail conditions in the field again in January 2010 in certain areas south of I-75 and made adjustments to the proposed trail system to further minimize impacts on wetlands and the environment.

Furthermore, ORV access is limited to designated trails only. Based on initial evaluations, the National Park Service has determined that less than 1 acre of direct impact on wetlands would occur from needed trail treatment activities. The National Park Service would apply to the South Florida Water Management District and U.S. Army Corps of Engineers for the necessary permits to accomplish this activity and would work cooperatively with them to further minimize impacts on wetlands. As described in table 29 of this plan, a “Wetlands Statement of Findings” would also be prepared that describes measures to avoid or minimize wetland impacts.

Additional information on wetland impacts and mitigation actions, as well as future compliance activities, has been added to the document in chapter 4 in the “Wetlands” topic for each alternative. Mitigation would be completed as required.

**3. Comment:** *“The DEIS did not include information on the total amount of wetland impacts that will occur per alternative and the mitigation necessary to offset those impacts. The FEIS should provide a description of the wetland impacts which will occur by alternative and how those impacts will be mitigated. In addition, a wetland functional analysis for all proposed wetland impacts and mitigation*

*necessary to offset those impacts should be provided. Technical rationale for each score should also be included.”*

**Response:** Wetland impacts for each of the alternatives have been quantified to the degree possible at this stage of planning (see chapter 4 in the “Wetlands” topic for each alternative. Additional mitigation measures have been added and existing ones clarified to ensure proper mitigation. Based on initial evaluations, NPS staff has determined that less than 1 acre of direct impact to wetlands would occur from needed trail treatment activities. The National Park Service would apply to the U.S. Army Corps of Engineers for the necessary permits to accomplish this activity and would work cooperatively with them to further minimize impacts on wetlands.

A wetlands functional analysis, although not completed as part of this GMP/EIS process, would be completed before implementation of any action that would affect wetlands, as required by Executive Order 11990, “Protection of Wetlands.” A “Wetlands Statement of Findings” (as required by NPS Director’s Order 77-1) would be prepared and released to the public for review and comment before initiation of any ORV trail or facility development that could impact wetlands. Mitigation of wetland impacts would be completed as required.

**4. Comment:** *“The DEIS lacked detailed information on the cumulative impacts the proposed alternatives would have on the environment. EPA requests that the FEIS provide a cumulative impact analysis for the entire Big Cypress National Preserve, including the Addition.”*

**Response:** The EIS does include an analysis of cumulative impacts (see chapter 4). According to Council on

Environmental Quality implementing regulations for the National Environmental Policy Act, a cumulative effect is derived by assessing the impacts of the actions proposed in the alternatives in combination with the impacts of other present, past, and reasonably foreseeable future actions in the project area. The scope of this plan is the Addition of Big Cypress National Preserve. To determine cumulative effects, the planning team identified several projects (see pages 246-249 in the draft plan) in the original Preserve that could affect the resource topics to be analyzed. Accordingly, the document includes an analysis of how these projects and actions, in combination with the actions proposed in the alternatives, would affect the resources of the project area and the impact topics included in the EIS. A cumulative impact analysis was not completed based on the notion of the NPS Preserve boundary, but rather was completed for the action area determined to be appropriate for each of the impact topics. Often, this action area greatly exceeds the physical boundary of the Preserve.

**5. Comment:** Page 80 of the DEIS — *“The DEIS states that a maximum of 700 ORV permits would be issued annually for the Addition. How was it determined that the issuance of 700 ORV permits would not have a negative impact on the aquatic environment?”*

**Response:** As stated on pages 98–100 of the draft plan, the approach that was used to develop the ORV permit cap was based on the ratio of trail miles to permits (5:1 ratio) in the original Preserve. In the original Preserve, where this ratio has been used in on-the-ground management for nearly 10 years, monitoring results indicate that ecological conditions are acceptable and actually improving for certain sensitive species. Therefore, the National Park Service applied this ratio to the Addition to determine the total number of permits.

Monitoring and adaptive management are a component of the preferred alternative that would ensure that unacceptable impacts to the aquatic environment do not occur.

**6. Comment:** Page 108 of the DEIS — *“The DEIS states that the NPS would restore areas that have been impacted by off-road vehicles within the Addition. The FEIS should document the total number of acres impacted by off-road vehicles, the restoration efforts proposed, and how future off-road impacts will be restricted.”*

**Response:** Approximately 244 miles of ORV trails have been documented in the Addition. These trails were established and used before the federal government became the owner and the National Park Service became manager of the Addition. A formal quantification of the extent of impacts attributed to these trails has not been conducted. However, given that an average ORV trail is about 12 feet wide, the National Park Service estimates that about 355 acres have been impacted by prior ORV use. As stated in the draft plan, the National Park Service intends to reclaim the trails that would not be used as part of the ORV trail system. Future impacts from ORV use would be restricted by requiring ORV use on designated trails only, by monitoring and adjusting management actions, and through education of ORV users and enforcement of regulations.

**7. Comment:** Page 200 of the DEIS — *“The DEIS states that no developed campgrounds currently exist in the Addition. It is unclear if the NPS is proposing to develop these types of campgrounds within the Addition. The FEIS should be clear on this point and identify any ecological impacts should developed campgrounds be proposed.”*

**Response:** Currently, dispersed camping is allowed in the Addition. The preferred

alternative includes a proposal for providing designated camping opportunities at the terminus of Jones and Nobles grades. Primitive backcountry group campsites (see “Preferred Alternative” section on Nobles and Jones grades) would be established in previously disturbed locations. These campsites would not be accessible by street legal vehicles, only by backcountry motorized and nonmotorized users. The environmental consequences of this action have been evaluated in the EIS.

**8. Comment:** Page 336 of the DEIS — *“The DEIS did not provide any discussions on the proposed authorization of horseback riding within the Addition. EPA believes that the FEIS should include restrictions on horseback riding to insure it does not have an adverse impact on the aquatic functions of the Addition.”*

**Response:** Horseback riding restrictions are given in the descriptions of the alternatives. Horseback riding is currently allowed in the Preserve, including the Addition, except in developed areas and on the Florida National Scenic Trail. Very little horseback riding occurs, and this is not expected to change because the terrain, substrate, and water conditions are generally not conducive to this activity. Because of the low level of activity, environmental impacts would be negligible for all alternatives. The environmental consequences section for each alternative has been revised accordingly.

#### U. S. Fish and Wildlife Service (USFWS)

**9. Comment:** *“While we agree with most of the “topics” that are dismissed, we believe that some topics should be evaluated further. The Everglade snail kite, American crocodile, and eastern indigo snake should be retained and analyzed because the description in Table 1 suggests a “may affect, not likely to adversely affect” determination. In order to fulfill the*

*requirement of the implementing regulations (50 CFR Section 402), an informal consultation is likely to be necessary for those species. Therefore, a complete analysis of the potential effects should be documented in either the GMP or a Biological Evaluation.”*

**Response:** The Everglade snail kite, American crocodile, and Eastern indigo snake were added as impact topics in the final plan, along with a complete analysis of the potential effects on these species (see chapter 4 in the final plan).

**10. Comment:** *“The draft GMP does not include information on administrative (NPS, FWC, researchers, oil and gas operators, contractors) ORV use. Please include information on the type of administrative ORV use that would be allowed in each of the alternatives.”*

**Response:** Administrative ORV use by NPS staff, its agency partners, and cooperators would be managed the same as it is in the original Preserve, except that activities in eligible or proposed wilderness would be consistent with requirements of the Wilderness Act and NPS *Management Policies 2006*. See “ORV Administration and Management” subsection of Chapter 2 (under “The Alternatives and User Capacity, Adaptive Management, ORV Administration and Management, and Wilderness”) for more information.

**11. Comment:** *“Information presented on the Florida panther (*Puma concolor coryi*) is dated. This section should present the most current science on the species as well as its status and the status of recovery actions taking place within BICY. Please update the science of the species to enable the NPS to make informed decisions regarding the potential effects of the alternatives on the Florida panther. Updated information on the Florida panther may be*

*found in the 2008 revision of the Florida panther recovery plan (Service 2008).”*

**Response:** The “Affected Environment” (chapter 3, pages 170-174 in the draft plan) and “Environmental Consequences” (chapter 4, pages 262-264, 291-293, 324-326, and 358-360 in the draft plan) sections for the Florida panther were revised to include more recent information and data. The National Park Service consulted with the U.S. Fish and Wildlife Service on their information requirements and worked collaboratively with them to prepare updated material for inclusion in the final plan. See “Chapter 5: Consultation and Coordination” in the final plan for more information.

**12. Comment:** *“Level of use restrictions such as management unit quotas for hunting or ORV use, are not mentioned in the draft GMP. As noted in our June 13, 2007, memorandum providing comments on the alternatives described in NPS' Newsletter 3, we recommend determining management unit quotas by vehicle type and number of permits appropriate for a given management unit. We recommend level of use quotas to be established for all management units in BICY, which will help in assessing the effects of specific levels of use on federally-listed species and their habitats.”*

**Response:** Management units and quotas were not included in the plan; however, the plan does include a maximum number of ORV permits that could be issued for the entire Addition. Although NEPA compliance for the I-75 access points was completed in 1991 with the *I-75 Recreational Access Plan Environmental Assessment*, the National Park Service has committed to assessing levels of ORV use in the Addition through future compliance with Section 7 of the Endangered Species Act that is required for the development of the I-75 recreational access points (see table 29 in the final plan. The access points along I-75

will accommodate visitor entry into the Addition, and ORV use levels could be established for areas based on entry site. The National Park Service would consult with the U.S. Fish and Wildlife Service and prepare the required materials to support analysis of effects to federal listed species.

The Addition would not be opened to public hunting until a hunting management plan is developed. The National Park Service has committed to developing such a plan in consultation with the Florida Fish and Wildlife Conservation Commission and U.S. Fish and Wildlife Service. The hunting management plan would determine appropriate game harvest levels by evaluating species population status and trends, hunter densities, and impacts on the Florida panther. Best practice game management techniques would be used as needed in the development of proposed regulations by the Florida Fish and Wildlife Conservation Commission.

The Addition would not be opened to public ORV use until the recreational access points are developed and trails are treated (as needed), designated, and adequately marked. This could be accomplished in phases; but areas that do not meet this standard would not be opened for public motorized use.

**13. Comment:** *“We recommend greater analysis of the impact of non-native animals on fish and wildlife resources in the Addition Lands. Most discussion of impacts of non-native species is limited to plants. Non-native animals, such as the Mexican bromeliad weevil (Metamasius callizona), have an impact on rare native plant species. Additionally, the proliferation of exotic fish in south Florida impacts the aquatic ecosystems in the area. Please address the potential impacts of the spread of invasive non-native animals by human activity in the Addition.”*

**Response:** Additional information on nonnative animals was added to “Chapter 3: Affected Environment” and to the mitigation measures included in chapter 2. The “Guiding Principles for Management” subsection included in chapter 1 also references the need and desire to eliminate and manage nonnative/exotic species.

**14. Comment:** *“Climate change is not mentioned in the draft GMP. Please clarify how climate change was considered in the development of the alternatives and the analysis of the environmental consequences for each alternative.”*

**Response:** Climate change was included in the “Guiding Principles for Management” subsection of chapter 1 of the draft plan (see page 28). A climate change action plan was also included as one of the “Future Studies and Implementation Plans Needed” in chapter 2 (see page 124 of the draft plan). This climate change action plan would provide a more detailed, specific evaluation of climate science, predicted impacts to Preserve resources, and potential adaptation responses or strategies. Climate change was considered in the development of the alternatives by limiting new facility development, using sustainable design and development principles in the facility proposals, and developing a balance of actions that afford recreational access and protect the conservation values of the Addition. The resource management activities that are a part of the alternatives would increase the resiliency and integrity of the resources in the Addition so that they will better adjust and respond to future impacts from climate change. The environmental impact analysis included in chapter 4 was developed with these assumptions in mind.

**15. Comment:** *“Page 64 — The section describing how the alternatives were developed*

*should include a description of the analyses used to develop the different alternatives.”*

**Response:** Additional language was added to chapter 2 that explains the process and analyses used to develop the alternatives.

**16. Comment:** *“Pages 75 and 81 — Please describe the methodology used to conclude that 140 miles of designated trail system was appropriate for the Addition Lands. We recommend using an analysis similar to that developed during the development of the ORV Plan. This analysis included the resiliency of the substrate, sensitivity of the resources present, and proximity to sensitive resources among other parameters. Also, please specify how many miles of secondary trails may be created or opened in the Addition Lands under Alternative B and the Preferred Alternative.”*

**Response:** The process used to evaluate the sustainability of ORV trails and determine the number of trail miles was included on page 100 of the draft plan. No maximum number of miles of secondary trails was established for the alternatives; however, secondary trails are intended to be short spur trails that receive less use than the primary trail system and would be allowed only within the backcountry recreation management zone. Trails allowing motorized use would be prohibited in the primitive backcountry zone.

**17. Comment:** *“Pages 80 and 81 — The Preferred Alternative does state that connecting trails from the Addition Lands to Bear Island would require additional NEPA, but Alternative B does not include this statement. Please clarify why this statement was not included in the description of Alternative B or include it in the description of this alternative. Please specify in greater detail how 700 permits were derived and what the environmental effects of issuance of these permits would be on natural resources.*

*The amount of additional parking proposed for the access areas is not enumerated in this alternative either.”*

**Response:** This statement has been added to alternative B. The process for determining the ORV permit cap is described on page 98 of the draft plan, and the potential impacts on natural resources from ORV use are analyzed in chapter 4 for each of the relevant resource topics. The amount of parking spaces proposed for access points or trailheads was described in the *I-75 Recreational Access Plan* (1990). Additional detail would be determined at the site planning and design stage.

**18. Comment:** *“Page 105 — The wood stork (*Mycteria americana*) and Florida panther criteria lacks supporting scientific citations. Please ensure that the most current guidelines are referenced and include them in an appendix. In addition, if the guidelines are revised, the version used during development of this document needs to be clear to future readers. For the Florida panther, what research or data were used to determine that a trail would be closed if a den was located within 0.5 miles? Please provide information or citations on the development of these criteria.”*

**Response:** Citations and clarifying language were added to the final plan. For the wood stork and the Florida panther, pages 574 and 575 respectively of the *Final Recreational Off-Road Vehicle Management Plan and Supplemental Environmental Impact Statement: Big Cypress National Preserve* (NPS 2000) contains the USFWS “Biological Opinion” concurring with the NPS plans to use the *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (USFWS 1990) “to ensure that setbacks for ORV trails from colony sites are consistent with the recommendations in the referenced document.” Page 46 of the 2000 *Recreational ORV Management Plan* prescribes the determination

method for wood storks using the revised guidelines being prepared (at that time) by Rodgers. The ORV plan “Biological Opinion” similarly prescribes a change in the extent of designated trails in the Bear Island Unit of the Preserve that could provide additional buffer in popular denning areas.

**19. Comment:** *“Page 121 — We suggest the last word of the first sentence should be changed from ‘plants’ to ‘species’ since nonnative plants are not the only invasive species present within the Preserve.”*

**Response:** The wording has been updated in the same section of the final plan.

**20. Comment:** *“Page 121 — Under the ‘Wildlife’ section, please change the word ‘spawning’ to ‘breeding’ as not all species are considered to spawn.”*

**Response:** The wording has been updated in the same section of the final plan.

**21. Comment:** *“Page 121 — Under the Threatened and Endangered Species section, second bullet, we do not believe any of the alternatives would completely eliminate human disturbance.”*

**Response:** We have revised the mitigation measure to acknowledge that human disturbance would be eliminated to the greatest extent possible, in accordance with USFWS recommendations.

**22. Comment:** *“Page 137 — Summary of Key Impacts Table. ...the eastern indigo snake (Drymarchon corais couperi) should be added to this list.”*

**Response:** The table has been updated in the same section of the final plan.

**23. Comment:** *“Page 170 — This section should be updated with information contained in the 2008 Florida Panther Recovery Plan.”*

**Response:** The wording has been updated in the same section of the final plan.

**24. Comment:** *“Page 240 — In Table 28, the categories of Negligible, Minor, Moderate, and Major are used to categorize the intensity levels of the potential effects the proposed alternatives may have on different resources. For threatened or endangered species, the resulting effect determination included in these columns may not correlate to the Endangered Species Act (16 U.S.C. 1531 et seq. as amended, in 1988) definition of minor. For an activity to be “not likely to adversely affect,” the effects of the activity must be insignificant and discountable, that is, they should not be measurable. If this was the intention, then the text should be clarified.”*

**Response:** Language has been added and clarified in the same table in the final plan.

**25. Comment:** *“Page 263 — The first paragraph described effects including “flushing and displacement” of panthers. These types of effects are measurable and not likely insignificant or discountable; therefore, they would not qualify as minor effects to the panther. Also, the mention of the 2000 ORV Management Plan is confusing with respect to its relevance to this GMP. The ORV Management Plan specifically excluded the Addition Lands since a GMP was not in place. Please clarify its relevance or remove references to the 2000 ORV Management Plan.”*

**Response:** The impact intensity was revised from minor to minor to moderate. References and analysis of the relationship and effects of the 2000 Recreational ORV Management Plan are included because it is part of the cumulative impacts analysis

required by the National Environmental Policy Act.

**26. Comment:** *“Page 292 — Under Cumulative Impacts, the 2000 ORV Management Plan is referenced without any clarification on its relevance to the GMP. In addition, the Collier Resources Company Oil and Gas Plan of Operations is mentioned but no details or indication of its relevance to the GMP is included. In the second to last paragraph on this page, reference is made to regional growth and development. How is this a cumulative effect of the proposed alternative? Please provide clarification on these points.”*

**Response:** An analysis of cumulative effects is required by the National Environmental Policy Act and the Council on Environmental Quality’s implementing regulations. Pages 246-249 of the draft plan included a description of the projects or actions that would be included in the cumulative effects analysis. The 2000 *Recreational ORV Management Plan* was one of the cumulative projects listed because it was an action or past project that could influence resource conditions in the Addition or in the region. Consequently, each of the resource impact topics includes an analysis of cumulative impacts that may be attributed to ORV management in the original Preserve. The same is true for the “future oil and gas operations” and “regional growth and development projects.” Furthermore, the relationship of these plans to this general management planning effort was described on pages 34 and 42 of the draft plan.

**27. Comment:** *“Page 368 — In the environmental consequences section for this alternative and all the alternatives, there is insufficient analysis of the potential effects of the actions on federally listed threatened or endangered species. We look forward to discussing the information necessary for a*

*complete analysis of the potential effects of the alternatives on threatened and endangered species that should be included in the GMP or Biological Evaluation.”*

**Response:** Since the time of releasing the draft plan and receiving the USFWS response letter, the National Park Service has consulted with the U.S. Fish and Wildlife Service to further discuss their concerns and requirements. Additional language and analysis of potential impacts has been added to all of the alternatives to further describe the potential effects on listed species. Further consultation and compliance with Section 7 of the Endangered Species Act for listed species would be necessary for certain actions included in this plan, including the development of the I-75 recreational access points and the opening of the Addition to public hunting.

## COMMENTS FROM AMERICAN INDIAN TRIBES

### Miccosukee Tribe of Indians of Florida

A consultation meeting was held on September 24, 2009. The following comment came from that meeting.

**28. Comment:** *There was a concern about impacts to the Reservation from public access into the Addition from the L-28 Canal.*

**Response:** The National Park Service would work with the tribe and the South Florida Water Management District to define and implement public access strategies to ensure that Reservation lands are not accessed by the public without permission from the tribe. Public access to the L-28 exists already, and it is anticipated that this can be managed in a manner similar to the existing locked gate system.

## Seminole Tribe of Florida

**29. Comment:** *Public use of the area will disrupt the migration patterns of large mammals (Florida panthers, black bears, deer, turkey) traveling between the Preserve and the Addition, adversely impact wood stork rookeries and potential nesting habitat for the red-cockaded woodpecker near the Reservation's southern border, degrade browse and ground cover that are needed to support game and panther prey habitat, and degrade panther denning habitat.*

**Response:** Although Janis and Clark (1999) did find that the average distance of panther locations from trails increased, and that the frequency of panther use in one area decreased when human presence in the area increases during the hunting season, they surmised that those changes in behavior were biologically minor and probably related to prey behavior. Although eight variables were examined — (1) morning activity, (2) movement, (3) predation success, (4) home range size, (5) home range shifts, (6) habitat selection, (7) distance from trails, and (8) frequency of use in Bear Island — the authors failed to detect any relationship between ORV use and the first six variables. There is no evidence that supports the comment above with regard to the areas comprising the original Preserve boundary; in fact with regard to Florida panthers, they demonstrate a high tolerance to human presence, to the point of lingering around developed areas in east Naples, Florida. Limiting the levels of use in the Addition, through implementation of permitting and temporal and spatial closures, and using conservation measures derived through consultation with the U.S Fish and Wildlife Service should mitigate the potential for adverse impacts on listed species.

**30. Comment:** *Surface water flow and wetlands will be adversely impacted by ORV use*

*and would degrade the investment that the Tribe and Army Corps of Engineers have put into the restoration of natural sheet flow. The plan should more specifically describe impacts to surface water flow and wetlands and identify best management practices and compensatory mitigation.*

**Response:** The plan acknowledges that localized (site-specific) impacts to water resources could occur from ORV use. However, the actions included in the plan would not adversely affect water resources on a regional scale and would not adversely affect the investments that the Tribe or any government agencies have made in hydrologic and ecosystem restoration in the Everglades system. It is important to note that ORV use would be restricted to existing trails, and that trails not designated for use would be eventually restored to natural elevations and vegetation. Furthermore, the National Park Service would strive to add additional water conveyance structures to existing raised grades where appropriate. Additional language was added to further describe and evaluate potential impacts to surface water flow and wetlands in each of the alternatives. The mitigative measures for water resources were also revised to include additional conservation measures.

## COMMENTS FROM THE STATE OF FLORIDA

**31. Comment:** *“Ongoing south Florida ecosystem restoration projects include several proposals for the restoration of surface water flows in the region, including the Big Cypress/L-28 Interceptor Modifications and the Seminole Tribe Big Cypress Water Conservation Plan, designed to reestablish sheet flow and restore the more natural water flows from the Big Cypress Reservation and into the Big Cypress National Preserve. The final Plan/EIS must evaluate the potential effects that ORV trail development will have on restoration benefits expected from these*

*projects. The selected plan should detail the proposed activities to facilitate the Department's determination of anticipated adverse impacts to south Florida ecosystem restoration projects identified under 373.470, F.S., and whether the proposed activities comply with the requirements of Chapters 373 and 403, F.S.*

**Response:** Additional information was added to the cumulative impact analysis of each of the alternatives to indicate that the actions proposed in the alternatives would have only localized adverse effects on surface water flow and hydrology (i.e., limited to the Addition and to site-specific areas) and that the overall effects on ecosystem restoration projects included in 373.470 Florida Statutes would be negligible. The investment that the state is making in projects near the Preserve would not be adversely affected by the actions included in this general management plan. The National Park Service would apply to the state for the necessary permits and licenses that are required to implement actions that are a part of this plan and would work cooperatively to ensure that the actions are consistent with Florida statute. It is also important to note that the National Park Service is not developing a new trail network, but rather intending to allow use on trails that already exist. Actions associated with the south Florida ecosystem restoration effort are also scheduled for implementation beyond the intended life of this plan. Nothing proposed would inhibit the federal, state, or local efforts to engage in comprehensive ecosystem restoration.

**32. Comment:** *“In addition to the foregoing, the Department has several other concerns that should be addressed in the final plan and prior to the commencement of any activity that would require the issuance or renewal of a state license under Chapters 373 and 403, F.S. Final agency action on an application (i.e., issuance or renewal of a license) for any activity regulated*

*by the Department shall constitute the state's final determination on whether an activity is consistent with the federally approved Florida Coastal Management Program. See Sections 373.428 and 380.23, F.S. The Department has the following additional concerns:*

- A. *Paragraph 2 of the Department's letter dated August 27, 2001, identified several important issues, including the designation of waters and wetlands as “special waters” — a category of Outstanding Florida Waters that prohibits dredge-and-fill activities not clearly in the public interest. Public access features that involve adverse impacts to wetlands should be avoided. A copy of the 2001 letter is available upon request.*
- B. *The Florida Scenic Trail traverses the northeast portion of the Addition land and the portion of the Preserve that begins south of I-75. The maps for Alternative B and the Preferred Alternative depict some overlap between ORV and other trails. Potential conflicts should be evaluated and explained in the final Plan/EIS.*
- C. *Typically, in draft federal actions related to projects or plans of this importance, the NPS consults with the FWC and the U.S. Fish and Wildlife Service regarding Section 7 of the Endangered Species Act. The Department was unable to find in Appendix C any letters or comments from either agency addressing compliance with the Endangered Species Act.”*

**Response:** The National Park Service recognizes that the Addition is classified as Outstanding Florida Waters. The National Park Service has avoided and minimized impacts to wetlands in developing its proposed ORV trail system. Preliminary analysis included in the plan indicates that dredge-and-fill needs for trail treatment would be limited to less than 1 acre. The National Park Service would apply to the state for the necessary permits and licenses that are required to implement actions that

are a part of this plan and would work cooperatively to ensure that the actions are in the public interest and are consistent with Florida statute.

The National Park Service has documented the potential for user conflict on multiuse trails and has developed a system of indicators and standards to ensure that conflicts are minimized and that the quality of the visitor experience is maintained (see the “User Capacity” subsection (under “The Alternatives and User Capacity, Adaptive Management, ORV Administration and Management, and Wilderness”) in chapter 2 of the final plan. Furthermore, the plan specifically states that the National Park Service would work cooperatively with the Florida Trail Association and U.S. Forest Service to establish a route for the Florida National Scenic Trail that minimizes trail conflicts. This route would be formally designated through the Addition and the Preserve.

The National Park Service has been working cooperatively with the Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service for more than 10 years on this project. The planning process has included many public and agency comment opportunities. Both the Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service have provided extensive comments on the general management plan. These comments are included in the administrative record of the project. Informal consultation under Section 7 of the Endangered Species Act has occurred to date. A consultation response letter from the U.S. Fish and Wildlife Service (dated October 9, 2009 and included in appendix C) indicated that additional information was necessary to complete consultation requirements for listed species. The National Park Service has completed the necessary information for the “Biological Assessment” required by the U.S. Fish and

Wildlife Service and has responded to all concerns and requests that were included in the USFWS response letter. USFWS staff will evaluate the information included in this final plan and prepare a “Biological Opinion” necessary to complete Section 7 consultation under the Endangered Species Act.

**33. Comment:** *“In accordance with 15 C.F.R. § 930.4, the Draft Plan/EIS will be consistent with the enforceable policies of the Florida Coastal Management Program and the Department will concur with the NPS’ determination that the Draft Plan/EIS is consistent with the previously cited provisions of state law (in Chapters 253, 259 and 373, F.S.), if and only if the following conditions are satisfied:*

- I. Any Wilderness designation in the Addition must include specific language that directs the Park Superintendent of Big Cypress National Preserve to work with other federal, state and local agencies to eradicate exotic plants and animals and prevent their spread into and out of the Addition; to use prescribed fire as a management tool for restoring and maintaining native plant communities; and to conduct necessary law enforcement activities. Any Wilderness designation must also include language directing the Park Superintendent to use the most effective and timely methods for conducting these critical management activities, including the use of mechanized equipment. In addition, any Wilderness designation must allow the Park Superintendent and cooperating agencies to suppress and contain fires that threaten adjacent natural or built areas using the most effective and timely methods, including the use of mechanized equipment.*
- II. The final Plan/EIS must evaluate the potential effects that recreational development activities, including ORV trail modifications, will have on the surface hydrology of the area and the anticipated*

*benefits of the south Florida ecosystem restoration projects identified in § 373.470, F.S. The selected alternative must provide details regarding proposed trail development and improvement activities, so the Department can determine whether the activities will adversely impact south Florida ecosystem restoration projects and whether the activities may be eligible for licensing under Chapters 373 and 403, F.S. The Department's evaluation of the trail development or improvement activities during its review of the final Plan/EIS will not bind or prejudice any future determination of the Department or the South Florida Water Management District in their evaluation of applications submitted pursuant to Chapters 373 and 403, F.S., nor shall the fulfillment of this condition for the purpose of the final Plan/EIS's consistency with state law be considered the final consistency determination for any of those applications."*

**Response:** Appropriate language was added to the description of proposed wilderness for all action alternatives that directs the National Park Service (and other parties involved in the wilderness designation process) to include certain language in the wilderness transmittal package (and ultimately the bill that seeks to designate wilderness in the Addition). Wilderness is created and designated by Congress; therefore, the language included by the National Park Service in this plan must be considered a recommendation that would require Congress to include and act upon. As discussed in *NPS Management Policies 2006*, the National Park Service would apply the minimum requirement concept to determine the techniques and types of equipment needed to ensure that impacts on wilderness resources and character are minimized.

Additional language was added to the plan that further describes the impact that the plan would have on surface water flow and ecosystem restoration projects included in

Florida statutes. The National Park Service would apply to the state (or its designee) for the necessary permits and licenses that are required to implement actions that are a part of this plan and would work cooperatively to ensure that the actions are consistent with the Florida Coastal Management Program.

## COMMENTS FROM INDIVIDUALS AND NONGOVERNMENTAL ORGANIZATIONS

### Analysis and Use of Scientific Data and Supporting Information

**34. Comment:** *The Addition should not be subject to seasonal or nightly closures because there is no science that supports these limitations on use.*

**Response:** The plan allows for an annual 60-day seasonal closure to allow resources a time free from any pressures related to ORV use (this does not apply to landowners who hold special use permits to access their private properties via a designated route through the Addition). The Addition would be closed to ORV use between the hours of 10 p.m. and 5 a.m. to ensure visitor safety. These temporal and spatial closures would minimize impacts on wildlife by reducing the potential for direct mortality, increased legal and illegal harvest, disturbance, and habitat loss.

Seasonal and nightly closures were a part of the 2000 *Recreational ORV Management Plan* and have been used by the National Park Service in the original Preserve since that time. These conservation and safety measures are supported by scientific literature and the professional judgment of agency staff.

**35. Comment:** *The National Park Service has failed to adequately study the effects of ORV use*

*on natural resources in the Addition and use the best available science to develop the plan.*

**Response:** It is acknowledged that ORV use in the Addition would have an effect on the natural resources of that area. The plan for ORV use is designed to minimize and mitigate those effects so that the use does not represent a detriment to the purposes of the Preserve. It was the intent of Congress in creating the Preserve that certain uses of this landscape be authorized, even though those uses may be consumptive in nature and may not necessarily represent the same experience one might have had in other national park system units. The objective of the Addition ORV plan is to fulfill the will of Congress and provide diverse visitor use experiences while conserving those values articulated in the legislation establishing the Preserve. ORV use would also be restricted to designated trails, would be monitored, and would be modified to conform to the standards developed for balancing sustained use while providing natural resource protection.

Several studies recommended in the 2000 *Recreational ORV Management Plan* and the corresponding U.S. Fish and Wildlife Service's "Biological Opinion" have been completed or are in progress. Florida-panther-related research includes an ongoing study of levels of ORV use and panther response in Bear Island. In addition, the National Park Service has established 20 permanent water quality and water monitoring stations that could alert NPS staff to changing conditions resulting from not only ORV use but also from other land uses. The monitoring of endangered/threatened species began before the ORV planning process started. The National Park Service would continue to rely on science to support management decisions and update and refine its plans and actions with new science and information as it becomes available.

**36. Comment:** *The National Park Service should not open panther habitat to ORV use because research has shown that ORV traffic impacts panther habitat and use of an area.*

**Response:** NPS staff has consulted with the U.S. Fish and Wildlife Service regarding all listed species within the Addition to determine if the actions proposed would have any potential adverse affect on them or their habitats. Conservation measures would be followed in accordance with the USFWS recommendations if and when the actions in this management plan are implemented. Although Janis and Clark (1999) did find that the average distance of panther locations from trails increased, and that the frequency of panther use in one area decreased when human presence in the area increases during the hunting season, they surmised that those changes in behavior were biologically minor and probably related to prey behavior. Although eight variables were examined — (1) morning activity, (2) movement, (3) predation success, (4) home range size, (5) home range shifts, (6) habitat selection, (7) distance from trails, and (8) frequency of use in Bear Island — the authors failed to detect any relationship between ORV use and the first six variables. NPS and USFWS staff are currently working on at least two projects that will assist them in evaluating human use impacts on panthers. NPS staff would work with USFWS staff to mitigate any adverse impacts on the panther from the actions in the plan.

**37. Comment:** *ORV use and hunting should not be allowed in the Addition because studies have shown that these uses will have significant adverse effects on the Florida panther and its prey base.*

**Response:** Per Public Law 100-301 the National Park Service is required to allow for hunting, fishing, and frogging in the

Addition and to cooperate with the state of Florida to establish the rules and regulations associated with such activities. Accordingly, the agencies involved in panther management in south Florida have agreed that panther recruitment can be improved in part by reducing hunting pressure on panther prey species, especially deer and hogs. The National Park Service would cooperate and work closely with the U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission (FFWCC) to manage panther prey species as appropriate. Furthermore, the National Park Service has committed to developing a hunting management plan, in cooperation with USFWS and FFWCC staff. This hunting management plan would evaluate impacts on the Florida panther and its prey and establish game harvest limits. The Florida Fish and Wildlife Conservation Commission would then develop appropriate hunting regulations for hunting in the Addition before opening the area to public hunting. These measures would ensure that the panther and its prey are adequately protected.

**38. Comment:** *The Draft EIS lacks the necessary scientific data to make the decision to open the Addition to ORV use and has not demonstrated proper consultation with the U.S. Fish and Wildlife Service on endangered species.*

**Response:** The original Preserve has been open to ORV use since 1974. No specific adverse impacts on wildlife, including the panther, have been documented and attributed to ORV use. The National Park Service has evaluated all relevant scientific data on the relationship between ORV use and impacts to wildlife and has incorporated conservation planning measures to minimize adverse impacts into the general management plan. NPS staff has been working collaboratively with the USFWS staff on this planning effort since 2001.

Endangered Species Act consultation has been initiated, and USFWS staff will prepare a “Biological Opinion.” The National Park Service would complete all necessary actions to complete Endangered Species Act consultation.

**39. Comment:** *The National Park Service has not adequately used scientific data to analyze impacts to endangered species.*

**Response:** NPS staff have identified and used a number of scientific and scholarly studies, reports, and data in the development of the plan and its analysis of the potential effects to listed species. The National Park Service worked with the U.S. Fish and Wildlife Service to expand the analysis of federally listed species and incorporated several of the USFWS recommendations, especially for the preferred alternative, that would reduce impacts to listed species. At the request of the U.S. Fish and Wildlife Service, the National Park Service added additional citations, all of which can be found in the “References” section of the plan.

**40. Comment:** *The number of sustainable trails miles identified is not accurate and will not be sustainable over time.*

**Response:** NPS staff used a methodical process to evaluate existing ORV trails in the Addition and determine which of the trails were appropriate for inclusion in the primary ORV trail network (see page 100 in the draft plan). As defined on page 100 in the draft plan, a sustainable trail would still require some level of treatment over time to accommodate continued recreation use; however, its use should not substantially impact the soil resources and flora and fauna of the area. The National Park Service would monitor trail use and use adaptive management to ensure that the

trail system is functional and sustainable over time.

**41. Comment:** *Additional justification is needed for the standards established in the draft plan.*

**Response:** General management plans are required by law to address user capacity — the types and extent of visitor use that can be accommodated while sustaining the quality of resources and visitor opportunities consistent with an NPS unit’s legislative purpose. This general management plan looks at 16 of what are considered to be the most important user capacity indicators and standards. These indicators and standards are grounded in the desired conditions for the proposed management zones and acknowledge that the evaluating process is continuous and may be adjusted based on the monitoring results. The indicators and standards included in the plan were developed by evaluating the resources and determining the most important potential impacts to resource and social conditions. Standards were developed by considering the desired conditions, data on existing conditions, relevant research studies, staff management experience, and scoping on public preferences. Additional language was added to further explain and justify the indicators and standards included in the plan (see “User Capacity subsection of Chapter 2 (under “The Alternatives and User Capacity, Adaptive Management, ORV Administration and Management, and Wilderness”).

**42. Comment:** *Additional data and supporting information is needed regarding energy consumption and carbon footprint as a result of the proposed action.*

**Response:** Impacts on air quality due to greenhouse gas emissions resulting from

actions included in the plan would be minor, as stated in the rationale for dismissing air quality as an impact topic (see page 52 of the draft plan). Emissions resulting from facility development and operation would be minimized through sustainable design and development practices. Proposed facilities would be developed to minimize construction and operations costs. Emissions from ORV use would be minimized through the ORV inspection program, which would ensure that all vehicles have proper exhaust apparatus.

**43. Comment:** *The Florida panther does not inhabit the Addition anymore.*

**Response:** NPS panther telemetry data shows that panthers have been using and inhabiting the Addition each of the last 25 years, when systematic monitoring began. Historical data also confirms that panthers have been present in the Addition since before the Preserve’s creation.

**44. Comment:** *The “Hydrology of the Addition” map (Map 11) improperly depicts the flow of surface water.*

**Response:** The flows on this map, as labeled, correctly depict the general direction of surface water flow. Details specific to characterizing surface water flows are captured in the accompanying text of the “Water Resources” section of the plan’s “Chapter 3: Affected Environment.”

**45. Comment:** *The DGMP/EIS does not contain adequate guidance for near- and long-term management of the Addition because it does not meet the scientific needs of the Addition and does not contain an adequate analysis of the direct, indirect, and cumulative threats to Addition resources.*

**Response:** The DGMP/EIS is not intended to be a science plan for the Addition. The plan provides adequate guidance for management of the Addition because it addresses the planning issues identified in chapter 1 of the plan. Chapter 2 identifies certain science and planning needs; however, a future resource stewardship strategy would be the vehicle in which specific science, research, and resource management strategies would be identified. The plan discusses threats and stressors to Addition resources and includes an analysis of direct, indirect, and cumulative impacts as required by the National Environmental Policy Act (see chapter 4).

**46. Comment:** *The plan did not properly address, and include an analysis of the impacts to, the Gladesman culture.*

**Response:** Although the DGMP/EIS is not intended to be an ethnographic study of the Addition, the National Park Service analyzed the potential for impacts on cultural resources related to the Gladesmen. The National Park Service has determined that the actions in the DGMP/EIS pose no impacts on resources associated with the Gladesmen. NPS staff have consulted with the Florida state historic preservation officer on this plan under the framework of Section 106 of the National Historic Preservation Act and the state historic preservation officer concurred with the analysis and determinations of potential effects to cultural resources included in the plan (see appendix C).

**47. Comment:** *The plan does not contain adequate information on invertebrate species and their contribution to the values of the Preserve.*

**Response:** Although the plan does not specifically discuss invertebrates, they are

indeed an important component of the ecology of the Addition. The National Park Service is not aware of any quantitative sampling of invertebrates in south Florida that would provide information for a substantive analysis of these species. The actions and guidance included in the plan seek to conserve these species and protect the natural values of the Addition.

**48. Comment:** *The Florida panther should not be retained as an impact topic because no data exists to prove that ORV use (or other human use) adversely impacts the species.*

**Response:** Although the body of scientific literature and data on impacts to panther from ORV use is limited, the Endangered Species Act requires the National Park Service to evaluate potential impacts to listed species. Because some of the actions proposed in the plan could have a potential effect on the behavior of panthers in the Addition, the National Park Service must retain the panther as an impact topic and consult with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act.

#### **Compliance with Addition Act, the National Environmental Policy Act (NEPA), the Wilderness Act, or Other Legal Mandates**

**49. Comment:** *The Addition should not be proposed as wilderness because it does not meet wilderness eligibility criteria because of prior land uses and it does not meet the intent and spirit of the Wilderness Act.*

**Response:** A final “Wilderness Eligibility Determination” was completed as required by the Addition Act (Public Law 100-301) and NPS *Management Policies 2006* (see appendix B of the final plan). Prior land use practices and impacts do not affect an

area's eligibility as long as the criteria are met at the time of the assessment.

**50. Comment:** *The draft plan violates the National Environmental Policy Act and the National Historic Preservation Act because it does not assess potential impacts to the "Gladesmen culture" and provide for the continuation of "traditional use" of the Addition.*

**Response:** The National Environmental Policy Act and the National Historic Preservation Act require agencies to evaluate potential impacts to cultural resources, including ethnographic resources and traditional peoples. The plan evaluates impacts to known cultural resources. There would be no impacts anticipated to cultural resources associated with the Gladesmen. The plan calls for allowing traditional uses in the Addition, such as hunting, fishing, frogging, and ORV access, which would be available to the public under reasonable rules and regulations administered by the National Park Service.

**51. Comment:** *The draft GMP does not include a reasonable range of alternatives as required by the National Environmental Policy Act.*

**Response:** The general management planning process was initiated in 2001 and has included a number of potential management alternatives. The range of alternatives included in the draft and final plans is responsive to the issues that were identified in scoping and through the extensive public involvement process conducted for this project. The alternatives present a range of reasonable alternatives that respond to the project issues and objectives and meet the project's purpose and need.

**52. Comment:** *The Draft GMP does not provide enough detail regarding impacts associated with the development of visitor parking areas.*

**Response:** A general management plan is intended to provide a broad decision-making framework for NPS managers over the next 15 to 20 years. Actual construction of the visitor contact station, trailheads, and parking spaces would require additional planning and design to determine the specific facility features. Site planning and future environmental analysis would be needed to implement and construct some of the proposed facilities included in this plan.

**53. Comment:** *The Draft GMP mentions the affiliated American Indian tribes, but it does not address unaffiliated Indians or aboriginal peoples that also have certain rights to use the area.*

**Response:** The two federally recognized tribes named in the legislation establishing the Preserve who lawfully retain customary use and occupancy rights, subject to reasonable regulation, are the Miccosukee Tribe of Indians of Florida and the Seminole Tribe of Florida. The National Park Service consulted with these two tribes, as well as a third federally recognized tribe, the Seminole Tribe of Oklahoma, on a government-to-government basis in accordance with Executive Order 13175, *Consultation with Indian Tribal Governments* (2000); Executive Memorandum, *Government-to-Government Relationship with Tribal Governments* (2004); and the National Historic Preservation Act (16 USC § 470a(d)(6)(B) and 470h (1992)).

The views of the Independent Traditional Seminole Nation of Florida and other native peoples, who are not represented by a federally recognized tribe, were solicited

as members of the public. The Independent Traditional Seminole Nation of Florida were notified of the scoping process, received the planning newsletters and invitations to public meetings, and were provided a copy of the Draft GMP/EIS for review and comment. Throughout the planning process, the Independent Traditional Seminole Nation of Florida and others were provided a reasonable opportunity to identify their concerns about historic properties; advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance to them; and articulate their views on any potential effects to such properties. The planning team considered the views of the Independent Traditional Seminole Nation of Florida and other native peoples throughout the planning process and in the development of the changes to the alternatives that are included in this final plan.

**54. Comment:** *The Draft GMP does not adequately address climate change and the anticipated impacts to Preserve resources.*

**Response:** Climate change was included in the “Guiding Principles for Management” subsection of chapter 1 of the Draft GMP (see page 20 of the draft plan). A climate change action plan was also included as one of the “Future Studies and Implementation Plans Needed” section in chapter 2 (see page 124 of the draft plan). This future plan would provide a more detailed evaluation of climate science, predicted impacts to Preserve resources, and potential adaptation responses or strategies. Climate change was considered in the development of the alternatives by limiting new facility development, using sustainable design and development principles in the facility proposals, and developing a balance of actions that afford recreational access and protect the

conservation values of the Addition. The resource management activities that are a part of the alternatives would increase the resiliency and integrity of the resources in the Addition so that they would better adjust and respond to future impacts from climate change. The actions proposed in the plan also have the capacity to adapt for managing natural and cultural resources and infrastructure under a changing climate. The environmental impact analysis included in chapter 4 was developed with these assumptions in mind.

**55. Comment:** *The proposal to build facilities at the intersection of I-75 and SR 29 violates the terms of the settlement agreement entered into between the state of Florida and National Audubon Society, which prohibits development at this interchange.*

**Response:** The development would be located on SR 29 approximately 1 mile south of the interchange, putting it out of the scope of the settlement agreement.

**56. Comment:** *The National Park Service is violating Section 10 of the Addition Act by not providing ORV trails that connect to the existing trails in the original Preserve.*

**Response:** Section 10 of the Addition Act requires access for and continuation of traditional opportunities in the Addition. It does not specify the placement of ORV trails.

#### **Visitor Experience, Opportunities, and Safety**

**57. Comment:** *The plan should include designated camping areas, individual backcountry campsites, and primitive campsites along ORV trail routes.*

**Response:** The primitive backcountry and backcountry recreation management zones allow for dispersed camping and designated campsites where necessary for resource protection. Backcountry group campsites are proposed at the terminus of Jones and Nobles grades in the preferred alternative.

**58. Comment:** *Development of an access point and parking lot at MM51 on I-75 is not feasible because of the lack of law enforcement capacity, especially because a parking area already exists at MM63.*

**Response:** The Addition Act requires the establishment of three access points along I-75 in the Preserve. The *I-75 Recreational Access Plan* (1990) identified mile markers 53 and 61 (MM53 and MM61) as the preferred access point locations. This GMP proposes additional NPS staffing, including law enforcement personnel, who would enable the National Park Service to manage these sites and patrol and enforce regulations as necessary.

**59. Comment:** *Existing trails and roads should be used to the greatest extent possible to provide for a comprehensive system of trails for pedestrian access and other multiple uses.*

**Response:** The National Park Service has used as much of the existing road and trail system as possible to provide ORV trails and nonmotorized recreation opportunities while ensuring that the ecological values of the Addition are protected.

**60. Comment:** *The entire Addition should be zoned backcountry recreation to allow maximum opportunities for traditional uses (hunting, fishing, frogging, dispersed camping, and ORV use).*

**Response:** To zone the entire Addition as “backcountry recreation” would not achieve the range of visitor opportunities and experiences that the National Park Service is striving to provide. The National Park Service used a combination of management zones to provide reasonable access while ensuring that the ecological values of the Addition are protected. In the preferred alternative, traditional opportunities (including hunting, frogging, fishing, and ORV use) are all accommodated.

**61. Comment:** *Alternative B should be modified to remove all proposed wilderness, zone the entire Addition as backcountry recreation, and eliminate any restrictions on the amount of ORV trails allowed.*

**Response:** The National Park Service used a combination of management zones and levels of proposed wilderness and ORV trails to provide reasonable access while ensuring that the ecological values of the Addition are protected.

**62. Comment:** *The plan would adversely affect opportunities to establish and designate a permanent route for the Florida National Scenic Trail because it proposes motorized use along the trail route, which conflicts with the requirements of the National Trails System Act. An alternative would be to prohibit off-road vehicles from using the Florida National Scenic Trail except for designated crossings and establish a buffer of at least 1 mile along the scenic trail to protect the trail and the wilderness experiences of hikers.*

**Response:** The existing route of the Florida National Scenic Trail in the Addition is not certified in part because of the lack of a general management plan for the area. The stated objective of the scenic trail and National Park Service for the management of the trail is to “maximize the

primitive, undisturbed experience.” As a result, over time it was planned to reroute the trail as needed to meet primitive trail standards as defined by the U.S. Forest Service on Page 144, Appendix L, *Forest Service Recreation Opportunity Spectrum*, Table 1. These standards state (on page 147, Evidence of Humans Criteria (Primitive) — “Setting is essentially an unmodified natural environment. Evidence of humans would be unnoticed by an observer wandering through the area. Evidence of trails is acceptable, but should not exceed standard to carry expected use. Structures are extremely rare.” Thus, it has always been contemplated that the scenic trail would be moved off the obvious human-built raised grade. As stated in this general management plan, the National Park Service would work cooperatively with the Florida Trail Association to identify, designate, and obtain certification for a route for the Florida National Scenic Trail through the Addition. The National Park Service would work with the association to identify a route that minimizes trail conflicts and maximizes the solitude and experience of hikers.

**63. Comment:** *The National Park Service should include improvements to signs for the Florida National Scenic Trail in its plan, especially along the trail as it passes through the MM63 rest area and under I-75.*

**Response:** The National Park Service would work with the Florida Trail Association and U.S. Forest Service to develop a sign plan and implement recommended improvements for the portion of the scenic trail that is in the Addition. Specifically in the section passing through the rest area at MM63 the National Park Service would work with the trail association and Florida Department of Transportation to develop adequate signs and safe passage.

**64. Comment:** *If the National Park Service retains the backcountry recreation management zone, they should allow for dispersed camping in the zone.*

**Response:** The list of permitted activities for the backcountry recreation management zone was revised to allow dispersed camping.

### **Protected Species and Endangered Species Act (ESA) Compliance**

**65. Comment:** *The preferred alternative in the Draft EIS should not be allowed because it causes significant adverse impacts to federally protected species, including the Florida panther, red cockaded woodpecker, and the wood stork.*

**Response:** An analysis of the impacts and potential effects to federally listed species is included in the plan and determines no major adverse impacts to federally protected species. The U.S. Fish and Wildlife Service will issue a separate “Biological Opinion” in response to the information and conclusions included in this plan. Their “Biological Opinion” will likely include specific conservation measures that must be implemented to ensure protection of listed species and ensure compliance with the Endangered Species Act.

### **Management Objectives and Funding**

**66. Comment:** *The NPS analysis of impacts on Preserve operations from ORV use is inaccurate because they did not account for the significant time and financial resources that will be necessary to monitor resource impacts, restore areas, and provide proper management and enforcement of ORV use.*

**Response:** The analysis of impacts on NPS operations did include an evaluation of NPS staff time needed to manage and

enforce public use of the Addition. The cost estimates for each of the alternatives includes the cost of employees needed to properly manage recreation use in the Addition. The cost estimates also included the costs of capital construction projects. Costs for research and monitoring associated with the indicators included in table 7 and the activities included in table 8 are not included in the cost estimates presented in table 6.

### Surface Water Flow and Water Quality

**67. Comment:** *The National Park Service has not properly analyzed potential impacts on surface water flow from the introduction of ORV use in the Addition, including cumulative impacts on hydrologic restoration efforts already underway in the region.*

**Response:** Additional language was added to the plan that further describes the localized and temporary impact that actions could have on surface water flow. Additional information was also added to the cumulative impact analysis of each of the alternatives to indicate that the actions proposed in the alternatives would have only localized adverse effects on surface water flow and hydrology (i.e., limited to the Addition and to site-specific areas) and that the overall effects on ecosystem restoration projects in south Florida would be negligible.

**68. Comment:** *The National Park Service incorrectly states that ORV use may affect water quality because there is no evidence that ORVs cause water pollution.*

**Response:** There is evidence of water quality impacts (such as turbidity and contamination from oils and fuel) from ORV use. The analysis included in the plan discusses and discloses the potential for

impacts on water quality that might result from ORV use in the Addition.

### Monitoring, Restoration, and Research

**69. Comment:** *The National Park Service has not adequately explained how and when monitoring would occur to guide adaptive management and limit or eliminate impacts on flora and fauna in the Addition.*

**Response:** The indicators and standards included in table 7 would be the tools used to monitor important resource and social conditions and provide information on when management actions need to be adjusted. The management strategies and actions discussed in the “User Capacity” and “ORV Administration and Management” sections of the plan would be taken when needed to minimize impacts on flora and fauna. As noted on page 93 of the draft plan, the rigor of monitoring the indicators (e.g., frequency of monitoring cycles, amount of geographic area monitored) might vary depending on how close existing conditions are to the standards, how fast conditions are changing, whether specific and important values are threatened by visitation, and/or if the effects of management actions taken to address impacts are uncertain. Further, page 106 in the draft plan includes a general description of the methods for monitoring and a note that more detailed monitoring protocol and techniques would be developed as part of the phase I implementation of the ORV trail system. Monitoring protocol and techniques are detailed and often need to be adjusted as indicators are tested in the field, so this type of information is better suited to the implementation phases of the general management plan rather than being included in the plan itself.

## Vegetation

**70. Comment:** *The impact conclusion identified for “prairies and marshes” does not correlate with the individual impact analysis that is presented for each of the topical areas.*

**Response:** The overall impact determination for prairies and marshes is accurate. The analysis of direct and indirect impacts resulting from the actions included in the plan is made up of individual analyses of impacts that would accrue from certain activities proposed in the plan, each with a different magnitude and intensity. The same is true for cumulative impacts. When the effects of the actions included in the plan are combined with the effects of actions from other past, present, and reasonably foreseeable future projects, there would be a long-term, minor, adverse cumulative impact to prairies and marshes.

## Scope of the Plan

**71. Comment:** *The plan does not provide any guidance on “acquisition-deferred” or exempt properties in the Addition. If this issue is beyond the scope of this plan, then a reference to the proper document or plan should be added to the plan.*

**Response:** This issue is outside the scope of this plan. Exempt properties are referenced on page 8 of the draft plan. Additional language was added to further explain the relationship of this topic to this general management plan (see section on “Issues and Concerns Not Addressed in this General Management Plan” in chapter 1).

**AGENCIES, ORGANIZATIONS, AND INDIVIDUALS RECEIVING A COPY OF  
THIS DOCUMENT**

**FEDERAL AGENCIES**

Advisory Council on Historic Preservation  
Department of Agriculture  
    Forest Service  
    Natural Resources Conservation Service  
Department of Defense  
    Army Corps of Engineers  
Department of the Interior  
    Bureau of Indian Affairs  
    National Park Service  
        Everglades National Park  
        Biscayne National Park  
        Southeastern Archeological Center  
    Fish and Wildlife Service  
        South Florida Ecological Services  
        Office  
        Florida Panther National Wildlife  
        Refuge  
    Geological Survey  
    South Florida Ecosystem Restoration  
    Task Force  
Environmental Protection Agency

**STATE OF FLORIDA**

Department of Community Affairs  
Department of Environmental Protection  
    Office of the Secretary  
    South District Office  
    Fakahatchee Strand Preserve State Park  
Department of Transportation  
    District One Office  
Fish and Wildlife Conservation Commission  
Office of the Governor  
South Florida Water Management District  
    Executive Director  
    Lower West Coast Service Center  
    Big Cypress Basin  
State Historic Preservation Office

**COUNTY/LOCAL GOVERNMENT**

Collier County  
    Manager  
    Commission  
    Sheriff  
Everglades City  
    Mayor  
    Council  
Miami-Dade County Commissioner, José  
    “Pepe” Diaz  
Southwest Florida Regional Planning Council

**AMERICAN INDIAN TRIBES**

Seminole Tribe of Florida  
Seminole Nation of Oklahoma  
Miccosukee Tribe of Indians of Florida

**FLORIDA CONGRESSIONAL  
DELEGATION**

U.S. House of Representatives  
    Mario Diaz-Balart

U.S. Senate  
    Bill Nelson  
    George LeMieux

**FLORIDA STATE LEGISLATURE**

Florida House of Representatives  
    David Rivera  
    Matt Hudson  
    Ron Saunders

Florida Senate  
    Larcenia Bullard

**ORGANIZATIONS AND BUSINESSES**

Allied Sportsmen’s Associations of Florida  
Audubon of Florida and Collier County  
Big Cypress Sportsmen’s Alliance  
BreitBurn Energy Partners L.P.  
Collier Resources Company  
Collier Sportsmen & Conservation Club  
Conservancy of Southwest Florida  
Council of the Original Miccosukee  
    Simanolee Nation, Aboriginal People  
Defenders of Wildlife  
Everglades Coordinating Council  
Florida Biodiversity Project  
Florida Outdoor Alliance  
Florida Trail Association  
Florida Wildlife Federation  
Fort Myers News-Press  
Independent Traditional Seminole Nation of  
    Florida  
Jetport Conservation & Recreation Club  
Miami Herald  
Naples Daily News  
National Audubon Society  
National Parks Conservation Association

National Wild Turkey Federation –  
    Everglades Longbeards Chapter  
National Wild Turkey Federation - Florida  
    State Chapter  
North American Butterfly Association –  
    Miami Blue Chapter  
Pegasus Foundation  
Public Employees for Environmental  
    Responsibility  
Safari Club International  
Sierra Club  
South Florida Sun-Sentinel  
The Humane Society of the United States  
The Future of Hunting in Florida, Inc.  
The Wilderness Society  
Tropical Audubon Society  
Wildlands CPR

**INDIVIDUALS**

There is an extensive list of individuals; these individuals will be notified of the availability of the final plan.