

# Appendix A

## Lower Suwannee

### *National Wildlife Refuge*

#### ENVIRONMENTAL ASSESSMENT

U.S. Fish and Wildlife Service  
1875 Century Boulevard  
Atlanta, Georgia 30345

February 2001

### *Purpose and Need for Action*

The U.S. Fish and Wildlife Service proposes to implement a Comprehensive Conservation Plan to guide the management of the Lower Suwannee National Wildlife Refuge located in Levy and Dixie Counties, Florida, over the next 10 to 15 years.

The purpose of this environmental assessment is to analyze and evaluate the environmental effects of implementing a proposed management framework for the refuge. Formal consultation for this environmental assessment did not occur. However, the planning effort and the refuge staff's ongoing dialogue with various state and federal jurisdictions, interest groups, and private citizens have provided important elements in the synthesis of the proposed goals, objectives, and strategies found in the Draft Comprehensive Conservation Plan. Implementation of the plan will necessitate further coordination and cooperation with these entities.

The proposed action is to implement Alternative B, Enhance Habitat Management and Public Use, as described in the Proposed Management Direction of the draft plan.

### *Issues and Concerns*

Several key issues and concerns surfaced during two public meetings, two stakeholder workshops, and from written comments. The planning team reviewed the issues and concerns raised by the people who participated in the scoping process. The team considered these issues and concerns when developing the range of alternatives. To effectively address them, they were grouped into three categories: Wildlife Habitat Management, Public Use, and Partnerships.

#### Key Issues and Concerns Summary Statements

##### *Wildlife Habitat Management*

- WH1** Not enough is known about the wildlife or habitat of the refuge.
- WH2** Staff is needed to monitor and manage habitat for endangered species, migratory birds, and resident wildlife. People were concerned that the refuge had not collected adequate data on the wildlife present due to the lack of biological staff dedicated to developing a comprehensive biological program. Many people felt that staffing and funding should increase to address this need.
- WH3** Staff should initiate research partnerships with U.S. Geological Survey and Suwannee River Water Management District to assist and expand water flow and water quantity impact studies on refuge habitat.

People were concerned that the growth of the Tampa Bay area would put too much pressure on the Suwannee River and its natural resources. Some individuals mentioned that partnerships offer an increased opportunity to protect the Suwannee River ecosystem and the wildlife and habitats found therein, and would ensure that water quality and quantity are protected.

- WH4** Staff need to monitor and manage impacts of human use on wildlife and habitat.

People valued the opportunities to participate in wildlife-dependent recreation on the refuge, but there was an overwhelming concern that public use be monitored and managed. One suggestion centered around clustering public use areas within the refuge in order to limit degradation of resources in certain areas. Other areas would remain natural, without the development of public use facilities.

- WH5** Management activities should preserve and restore refuge ecosystems.

Many people wanted to see the refuge restored and managed in as natural a condition as possible. Much of the lands acquired to establish Lower Suwannee National Wildlife Refuge was severely degraded or was intensively altered by prior land use practices. Thousands of acres of longleaf, native slash, and scattered loblolly pines were cut and replanted with genetically improved slash pine in plantations. In addition, thousands of acres of mixed pine/hardwood stands were converted to slash pine plantations. Intensive site preparation, which altered the understory vegetation, was used to make these sites suitable for pine trees. Additionally, an extensive network of roads and ditches was developed to facilitate timber management.

#### *Public Use*

- PU1** The refuge should continue to provide the public with access and compatible consumptive and non-consumptive uses in a manner that minimizes conflicts between user groups and does not significantly impact habitat.

Some people believed the refuge was not open to the general public during hunting season, was unsafe, and that the entire refuge was open to hunting. Both hunters and non-hunters wanted a better understanding of game seasons and closed areas. The majority of people supported both consumptive and non-consumptive uses. A few people were opposed to hunting.

- PU2** Hunter groups requested better management and access for hunting activities on the refuge.

Hunters felt access to refuge habitats was inadequate and a few hunters requested access to the refuge via 3- or 4-wheelers. A majority of the public, however, opposed this type of access. Some hunting groups also suggested that we could improve the hunting experience as well as improve overall game species health by establishing food plots. Many hunters believed that game populations were low on the refuge due to inadequate forage.

**PU3** Other user groups requested more opportunities for passive recreational uses on the refuge.

The majority of people wanted additional opportunities to watch and photograph birds and other wildlife. One group and a few individuals disapproved of any consumptive public uses (hunting, fishing, trapping) on all national wildlife refuges. Another group specifically requested additional bike trails on the refuge.

**PU4** Staff is needed to expand environmental education and interpretation programs and increase involvement with public schools.

People expressed that the refuge's present environmental education and interpretation programs were not meeting the demands for these programs for area youth. People believed staffing is inadequate to conduct such programs.

**PU5** Environmental education and outreach should include adult groups, as well as school-aged groups.

It was also felt that refuge staff needed to reach adult groups and provide wildlife conservation and ecological preservation information to them.

**PU6** The public thought staff and facilities should be increased, particularly for the Dixie County portion of the refuge.

At Lower Suwannee Refuge, all staff are based out of the Levy County compound and administrative area. The Dixie County portion of the refuge is more than 50 miles from the administration area. Because of lack of staff presence on a daily basis, vandalism and littering are growing problems. People felt that if staff were stationed in this county, maintenance issues could be addressed on a daily basis, and relationships could be developed with local people so they might feel a sense of pride and ownership of the refuge.

People in Dixie County also requested improved facilities. Currently, there is only a small administrative area and maintenance compound including a 5-bay pole shed, fuel tanks, and an abandoned, dilapidated trailer.

**PU7** Staff should recruit student interns and more volunteers to assist with projects and research. There was a desire for the refuge to utilize volunteers to help with public outreach and to recruit students to assist with needed research projects.

#### *Partnerships to Manage and Protect the Refuge*

**P1** The refuge should maintain and enhance partnerships with state, county, and community agencies; universities and educational institutions; user groups; natural resource based organizations; and other entities.

**P2** Additional land acquisition and/or cooperative management agreements are needed to improve the Service's ability to protect existing and potential refuge resources. The people were concerned that there were still lands within

the acquisition boundary that were in private ownership. Many individuals believed that the refuge should actively seek to purchase these lands in order to ensure that they would remain natural and would not be developed.

In addition to the three alternatives seriously considered, two additional alternatives were discussed:

*Alternatives  
Discussed  
but*

*Alternative D* Custodial Management  
*Alternative E* Maximize Resource Management with Minimum Public Use

*Eliminated  
from Further Analysis*

These alternatives were eliminated from further consideration early in the planning process. Alternative D was not seriously considered because it would essentially end all refuge management. Custodial management would end any biological, habitat, and public use management occurring on the refuge. No new staff would be hired and existing partnerships would be dissolved. This alternative was eliminated because it was unreasonable. In Alternative E, all staffing and funding would support resource management. While this alternative would benefit wildlife and habitat management, the refuge would not be able to provide wildlife compatible recreational opportunities as required by the National Wildlife Refuge System Improvement Act of 1997. Staff would be unable to maintain existing public use facilities and minimum public use standards could not be met. The alternative was eliminated from further consideration because it is incompatible with the above referenced Act.

*Alternatives Including  
Proposed Action*

The following section analyzes the three management alternatives for Lower Suwannee Refuge, including how each alternative would affect the accomplishment of described refuge goals. Approved refuge goals would not change; only the objectives, strategies, and expected outcomes would be different under each alternative. The three alternatives can be compared by reviewing the objectives and strategies related to each issue.

#### **Alternative A. Maintain Current Management (No Action)**

This alternative would advocate that the refuge continue to be managed under its current management direction. The direction the refuge has taken for biology, management, environmental education, public use, protection of resources, and outreach would remain the same. Current biological monitoring would continue, but not be modified or expanded. Research would continue to be piecemeal with limited refuge involvement and with no projects initiated by professional staff. Environmental education would occur at current levels with no expansion and no systematic involvement by refuge staff. Public use facilities such as boardwalks, fishing piers, trails, and kiosks would be maintained, but not improved to include interpretation. Resources would be protected at current levels. Finally, contact with potential partners would continue, but those relationships would not grow or strengthen due to a lack of consistent nurturing. The present staffing and funding levels would remain unchanged.

#### *Goal 1*

##### **Wildlife**

Expand scientifically based monitoring and research to support management decisions on wildlife habitat and populations.

##### **Objective:**

- 1.1 Continue current monitoring programs for bald eagle, osprey and manatee; continue to support U.S. Geological Survey and

Service efforts to monitor threatened Gulf sturgeon that use the Suwannee River and coastal estuary by providing assistance in storing, transporting, and setting up equipment for field research, as needed; develop and implement a Breeding Bird Survey; participate in migratory shore bird surveys in the spring and fall seasons; conduct a baseline survey of gopher tortoises; and continue to participate in the Audubon's Christmas bird counts.

*Goal 2*

**Habitat** Restore, conserve, and enhance the natural diversity, abundance, and ecological function of refuge habitat, with an emphasis on managing habitat to benefit threatened and endangered species and species of special concern in the State of Florida.

**Objectives:**

- 2.1 Maintain habitat for migrating, wintering, nesting, and foraging birds, with special emphasis on threatened and endangered species, neotropical migratory birds, and colonial wading birds.
- 2.2 Refine and implement a prescribed fire program to restore and maintain healthy, fire-dependent communities. Implement the Fire Management Plan.
- 2.3 Refine and implement an active forest management program to restore and maintain healthy and diverse forest communities. Update the Forest Management Plan.

*Goal 3*

**Protection of Resources** Protect refuge natural and cultural resources to ensure their integrity and to fulfill the mission of the National Wildlife Refuge System.

**Objectives:**

- 3.1 Protect known archaeological and historical sites on the refuge through sporadic law enforcement patrol.
- 3.2 Evaluate a minimum of 15 miles of refuge boundary annually. Mark refuge boundaries with signs and paint as needed.
- 3.3 Protect refuge habitats from wildfire through the fire program, staffing, proper training, and equipment readiness. The station would monitor fire conditions and respond according to approved plans and procedures.
- 3.4 Protect bald eagle nests by monitoring for disturbance and, if necessary, close area around nests during the nesting season.
- 3.5 Provide visitor safety and resource protection, and ensure compliance with refuge regulations for 100,000 visitors annually through law enforcement patrol and public use contacts.
- 3.6 Work cooperatively with local, state, and other federal law enforcement agencies to enhance resource protection.
- 3.7 Maintain present road system containing 50 miles of primary refuge roads for public vehicle access and for habitat improvement, protection, and management through grading, mowing, repairs, and culvert replacement.
- 3.8 Maintain secondary road system for habitat protection, management, and improvement, as well as for foot or bike traffic by the public by mowing, boom axing, grading, and replacing culverts.
- 3.9 Maintain more than \$1,000,000 worth of capitalized equipment used in all aspects of refuge management including habitat, wildlife, and public use.

#### *Goal 4*

##### **Public Use**

Provide opportunities for environmental education, interpretation, and wildlife-dependent recreation in accordance with the National Wildlife Refuge System Improvement Act of 1997.

##### **Objectives:**

- 4.1 Develop a Visitor Services Management Plan.
- 4.2 Reprint interpretive materials including brochures, panels, and kiosks that highlight refuge resources when needed.
- 4.3 Provide opportunities for hunting and fishing on the refuge.
- 4.4 Maintain current volunteer levels on the refuge

#### *Goal 5*

##### **Landscape Management**

Promote interagency and private landowner cooperation and partnerships for the management and protection of natural and cultural resources within the Big Bend region of Florida, the Suwannee River Basin, and the North Florida Ecosystem to benefit wildlife, water quality and quantity, and the American people.

##### **Objectives:**

- 5.1 Continue participation in North Florida Ecosystem Team and support team priorities and projects.
- 5.2 Maintain partnerships with local community organizations and environmental agencies to promote and guide the development of nature-based tourism, while maintaining the “wildlife first” requirement of the National Wildlife Refuge System Improvement Act.

#### **Alternative B. Enhance Habitat Management and Public Use (Proposed Action)**

A complete description of this approach including estimated funding and staffing requirements is found in the draft plan. This management action was selected based on compatibility with the refuge’s mission, vision, and ecosystem function, and by needs expressed by the public during the scoping process. For comparison purposes to the other two alternatives, the goals and objectives are listed below.

#### *Goal 1*

##### **Wildlife**

Expand scientifically based monitoring and research to support management decisions regarding wildlife habitat and populations.

##### **Objectives:**

- 1.1 Conduct surveys of vertebrates, invertebrates, and plant species and habitat associations; develop monitoring programs for priority species; and establish targets for population levels. Expand current monitoring programs.
- 1.2 By 2004, revise the Wildlife Inventory Plan into a Wildlife Management Plan which would be based on data gathered during initial surveys. The Wildlife Management Plan would guide all aspects of refuge management and be based on reliable data and sound techniques.
- 1.3 By 2010, conduct a biological review of the refuge. Ideally, this review would have occurred prior to the initiation of this comprehensive conservation Plan. It will be necessary to conduct a biological review prior to its revision to determine if biological strategies outlined in the plan and in the Wildlife Management Plan are resulting in good science and sound management practices.

- 1.4 Develop a Geographic Information System database management and mapping system with plant and wildlife communities and management layers. (Resource Project 7).

### *Goal 2*

#### **Habitat**

Restore, conserve, and enhance the natural diversity, abundance, and ecological function of refuge habitats, with an emphasis on managing habitat to benefit threatened and endangered species and species of special concern in the State of Florida.

#### **Objectives:**

- 2.1 Maintain habitat for migrating, wintering, nesting, and foraging birds, with special emphasis on threatened and endangered species, neotropical migratory birds, and colonial wading birds.
- 2.2 Refine and implement a prescribed fire program to restore and maintain healthy, fire-dependent communities.
- 2.3 Refine and implement an active forest management program to restore and maintain healthy and diverse forest communities.
- 2.4 Protect wildlife habitat and water quality and quantity through land acquisition.

### *Goal 3*

#### **Protection of Resources**

Protect the natural and cultural resources of the refuge to ensure their integrity and to fulfill the mission of the National Wildlife Refuge System.

#### **Objectives:**

- 3.1 Protect known archaeological and historical sites on the refuge from illegal take or damage in compliance with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and the National Historic Preservation Act.
- 3.2 Annually evaluate a minimum of 15 miles of refuge boundary. Delineate refuge boundaries with signs and paint as needed.
- 3.3 Continue to protect refuge habitats from wildfire through the fire program, properly trained staff and equipment readiness. The station will monitor fire conditions and respond according to approved plans and procedures.
- 3.4 Continue to protect bald eagle nests by monitoring for disturbance and, if necessary, by closing areas around nests during the nesting season.
- 3.5 Continue to provide visitor safety, protect resources, and ensure compliance with refuge regulations for more than 100,000 annual visitors through law enforcement patrols and public use contacts.
- 3.6 Continue to work cooperatively with local, state, and other federal law enforcement agencies to enhance resource protection.
- 3.7 Maintain present road system containing 50 miles of primary refuge roads by grading, mowing, and replacing culverts as needed, for public vehicle access and for habitat improvement, protection, and management.
- 3.8 Maintain access to the secondary roads system by mowing, boom axing, grading, and replacing culverts as needed, for habitat protection, management, and improvement for refuge staff, public foot and bike traffic.
- 3.9 Identify additional lands and seek funding to acquire such lands that would improve resource protection and aid in fulfilling the mission and purpose of the refuge.

- 3.10 Maintain more than \$1,000,000 worth of capitalized equipment used in all aspects of refuge management including habitat, wildlife, and public use.
- 3.11 By 2005, conduct a wilderness review of the refuge. The purpose of a wilderness review is to determine whether any refuge lands or waters meet the characteristics of wilderness. Any lands determined to meet these criteria will then be nominated for inclusion as Wilderness Areas

#### *Goal 4*

##### **Public Use**

Provide opportunities for environmental education and interpretation and wildlife-dependent recreation in accordance with the National Wildlife Refuge System Improvement Act of 1997.

##### **Objectives:**

- 4.1 By 2002 develop and implement a Visitor Services Management Program.
- 4.2 By 2002, identify site for a visitor center or visitor contact station to serve both Lower Suwannee and Cedar Keys National Wildlife Refuges. Visitors will learn about the Service, the National Wildlife Refuge System, and both local refuges and the trust resources they protect. Seek funding support from Congressional representatives, local governments, organizations, and individuals.
- 4.3 Develop and implement an environmental education program that will result in a greater understanding and appreciation of refuge flora, fauna, and habitats.
- 4.4 Update existing materials and develop new interpretive materials, including brochures, interpretive panels, kiosks, and exhibits that highlight refuge resources.
- 4.5 Provide opportunities for hunting and fishing on the refuge in a manner that minimizes conflicts between consumptive and non-consumptive user groups.
- 4.6 Develop a volunteer program which offers resource, educational, and maintenance projects to accommodate a diverse volunteer community.
- 4.7 By 2001, develop a Friends Group for both Lower Suwannee and Cedar Keys National Wildlife Refuges.

#### *Goal 5*

##### **Landscape Management**

Promote interagency and private landowner cooperation and partnerships for the management and protection of natural and cultural resources within the Big Bend Region of Florida, the Suwannee River Basin, and the North Florida Ecosystem to benefit wildlife, water quality and quantity, and the American people.

##### **Objectives:**

- 5.1 Continue participation in North Florida Ecosystem Team and support team priorities and projects.
- 5.2 By 2005, develop partnerships with local school districts and state environmental agencies such as the Suwannee River Water Management District, Florida Department of Environmental Protection, and Florida Fish and Wildlife Conservation Commission to promote and provide environmental education opportunities on and off the refuge.
- 5.3 By 2006, develop partnerships to protect water quality and quantity and to promote research on trust resources of the refuge.
- 5.4 Maintain partnerships with local community organizations and environmental agencies to promote and guide the development

of nature-based tourism while maintaining the “wildlife first” requirement of the National Wildlife Refuge System Improvement Act.

- 5.5 Continue to develop partnerships with national and state organizations to acquire necessary lands for the protection of trust resources and the fulfillment of the purpose and mission of the refuge.
- 5.6 Seek mutual cooperation with recognized Native American tribes in Florida to protect Native American sites on the refuge.

### **Alternative C. Maximize Public Use**

This alternative emphasizes public use over biological monitoring and habitat enhancement. The biological program would be maintained at current levels. Habitat management would occur at current levels, but no evaluation and modification of management would occur. Any new staffing or funding would promote the six priority public uses. Protection efforts would concentrate on visitor safety. This alternative would support strengthening of partnerships with community organizations; however, partnerships with researched-based agencies and universities would not be enhanced or emphasized. Two new positions that are identified in the plan (biologist and biological technician), would not be added to current staffing levels. Project No’s. 3, 4, 5, 7, 11 and 14 would be omitted from the Resource Projects section of the Lower Suwannee National Wildlife Refuge Comprehensive Conservation Plan. Table 2, Special Resource Project Funding, would reflect the reduced cost resulting from eliminating these non-public use resource projects as they are not related to maximizing public use.

#### *Goal 1*

##### **Wildlife**

Expand scientifically based monitoring and research to support management decisions regarding wildlife habitat and populations.

##### **Objective:**

- 1.1 Continue current monitoring programs for bald eagle, osprey, and manatee; continue to support U.S. Geological Survey and Service efforts to monitor threatened Gulf sturgeon that use the Suwannee River and coastal estuary by providing assistance for storing, transporting, and setting up equipment and for field research, as needed; develop and implement a Breeding Bird Survey; participate in migratory shore bird surveys in spring and fall seasons; conduct a baseline survey of gopher tortoises; and continue to participate in the Audubon Christmas bird counts.

#### *Goal 2*

##### **Habitat**

Restore, conserve, and enhance the natural diversity, abundance, and ecological function of refuge habitat, with an emphasis on managing habitat to benefit threatened and endangered species and species of special concern in the State of Florida.

##### **Objectives:**

- 2.1 Maintain habitat for migrating, wintering, nesting, and foraging birds, with special emphasis on threatened and endangered species, neotropical migratory birds, and colonial wading birds.
- 2.2 Refine and implement a prescribed fire program to restore and maintain healthy, fire-dependent communities. Implement the Fire Management Plan.
- 2.3 Refine and implement an active forest management program to restore and maintain healthy and diverse forest communities. Update the Forest Management Plan.

### *Goal 3*

#### **Protection of Resources**

Protect refuge natural and cultural resources to ensure their integrity and to fulfill the mission of the National Wildlife Refuge System.

##### **Objectives:**

- 3.1 Protect known archaeological and historical sites on the refuge through sporadic law enforcement patrol.
- 3.2 Evaluate a minimum of 15 miles of refuge boundary annually. Mark refuge boundaries with signs and paint, as needed.
- 3.3 Protect refuge habitats from wildfire through the fire program, staffing, proper training, and equipment readiness. The station would monitor fire conditions and respond according to approved plans and procedures.
- 3.4 Protect bald eagle nests by monitoring for disturbance and, if necessary, close area around nests during the nesting season.
- 3.5 Provide visitor safety and resource protection, and ensure compliance with refuge regulations for 100,000 visitors annually through law enforcement patrol and public use contacts.
- 3.6 Work cooperatively with local, state, and other federal law enforcement agencies to enhance resource protection.
- 3.7 Maintain present road system containing 50 miles of primary refuge roads for public vehicle access and for habitat improvement, protection, and management through grading, mowing, repairs, and culvert replacement.
- 3.8 Maintain access to the secondary road system by mowing, boom axing, grading, and replacing culverts for habitat protection, management, and improvement and for public foot and bike traffic.
- 3.9 Maintain more than \$1,000,000 worth of capitalized equipment used in all aspects of refuge management including habitat, wildlife, and public use.

### *Goal 4*

#### **Public Use**

Provide opportunities for environmental education, interpretation, and wildlife-dependent recreation in accordance with the National Wildlife Refuge System Improvement Act of 1997.

##### **Objectives:**

- 4.1 Develop and implement a Visitor Services Management Program.
- 4.2 Identify a site for visitor center or visitor contact station to service both Lower Suwannee and Cedar Keys National Wildlife Refuges. Seek funding support from local governments, organizations, and individuals.
- 4.3 Develop and implement an environmental education program that results in a greater understanding and appreciation of refuge flora, fauna, and habitats.
- 4.4 Develop and produce interpretive materials including brochures, panels, and kiosks that highlight refuge resources.
- 4.5 Provide opportunities for hunting and fishing on the refuge in a manner that minimizes conflicts between consumptive and non-consumptive user groups.
- 4.6 Develop a volunteer program which offers resource, educational, and maintenance projects to accommodate a diverse volunteer community.
- 4.7 Develop a Friends Group for both Lower Suwannee and Cedar Keys National Wildlife Refuges.

*Goal 5*

**Landscape Management** Promote interagency and private landowner cooperation and partnerships for the management and protection of natural and cultural resources within the Big Bend Region of Florida, the Suwannee River Basin, and the North Florida Ecosystem to benefit wildlife, water quality and quantity, and the American people.

**Objectives:**

- 5.1 Continue participation in North Florida Ecosystem Team and support team priorities and projects.
- 5.2 Develop partnerships with local school districts and state environmental agencies such as the Suwannee River Water Management District, Florida Department of Environmental Protection, and Florida Fish and Wildlife Conservation Commission to promote and provide environmental education opportunities on and off the refuge.
- 5.3 Maintain partnerships with local community organizations and environmental agencies to promote and guide the development of nature-based tourism while maintaining the “wildlife first” requirement of the National Wildlife Refuge System Improvement Act.

## Issues and Concerns

### *Wildlife Habitat Management*

Below is a summarized list of the issues and concerns for Lower Suwannee National Wildlife Refuge. The abbreviations used in the list are also used in Table 4 which describes how each alternative addresses the needs and issues voiced by the public concerning future refuge management.

- WH1** Not enough is known about the wildlife or habitat of the refuge.
- WH2** Staff is needed to monitor and manage habitat for endangered species, migratory birds and resident wildlife.
- WH3** Staff should initiate research partnerships with U.S. Geological Survey and Suwannee River Water Management District to assist and expand water flow and water quantity impact studies on refuge habitat .
- WH4** Staff is needed to monitor and manage impacts of human use on wildlife and habitat.
- WH5** Management activities should preserve and restore refuge ecosystems.

### *Public Use*

- PU1** The refuge should continue to provide the public with access and compatible consumptive and non-consumptive uses in a manner that minimizes conflicts between user groups and does not significantly impact habitat.
- PU2** Hunter groups requested better management and access for hunting activities on refuge.
- PU3** Other user groups requested more opportunities for passive recreational uses on the refuge.
- PU4** Staff is needed to expand environmental education and interpretation programs and increase involvement with public schools.
- PU5** Environmental education and outreach should include adult groups, as well as school-aged groups.
- PU6** The public thought staff and facilities should be increased, particularly for the Dixie County Unit of the Lower Suwannee National Wildlife Refuge.
- PU7** Staff should recruit student interns and more volunteers to assist with projects and research.

### *Partnerships to Manage and Protect the Refuge*

- P1** The refuge should maintain and enhance partnerships with state, county, and community agencies; universities and educational institutions; user groups; natural resource-based organizations; and other entities.
- P2** Additional land acquisition and/or cooperative management agreements are needed to improve the Service's ability to protect existing and potential refuge resources.

**Table 4. Issues and Alternatives Matrix for Lower Suwannee National Wildlife Refuge (Cont'd.)**

| ISSUES  | ALTERNATIVE A   | ALTERNATIVE B  | ALTERNATIVE C   |
|---|---|--|---|
|   | No Action   | Enhance Habitat Management   | Maximize Public Use   |
| <p><b>Wildlife Issues</b></p> <ul style="list-style-type: none"> <li>■WH1</li> <li>■WH2</li> </ul>              | <p><b>Continue existing monitoring programs</b></p> <p><b>Does not expand monitoring programs</b></p>   | <p><b>Expands monitoring and research programs</b></p> <p><b>Evaluates population parameters and recommends management alternatives</b></p> <p><b>Initiates baseline surveys of plants, animals, and invertebrates</b></p> <p><b>Partners to conduct research</b></p> <p><b>Updates Wildlife Inventory Plan</b></p> <p><b>Develops GIS database, analysis, and mapping capabilities</b></p>  | <p><b>Continues existing monitoring programs</b></p> <p><b>Does not expand monitoring or research</b></p>                                     |
| <p><b>Habitat Issues</b></p> <ul style="list-style-type: none"> <li>■WH1</li> <li>■WH2</li> <li>■WH5</li> </ul> | <p><b>Maintains current habitat management regimes in forestry, fire, and restoration programs</b></p>  | <p><b>Expands and improves forestry, fire, and restoration programs by applying research findings and tailoring management based on wildlife population parameters</b></p> <p><b>Partners to conduct research</b></p>  | <p><b>Maintains current habitat management regimes in forestry, fire and restoration programs</b></p>   |
| <p><b>Protection of Resources</b></p> <ul style="list-style-type: none"> <li>■P2</li> </ul>                     | <p><b>Continues sporadic protection of known archaeological sites and maintains current levels of resource protection and maintenance</b></p> | <p><b>Improves protection of known archaeological sites through regular law enforcement patrol; inventories refuge archaeological sites; compiles a comprehensive literature review of archaeological, anthropological, and historical investigations within and near the refuge; and develops and implements an archaeological site protection plan</b></p> <p><b>Improves resource protection through an active land acquisition program</b></p> | <p><b>Continues sporadic protection of known archaeological sites and maintains current levels of resource protection and maintenance</b></p> |

**Table 4. Issues and Alternatives Matrix for Lower Suwannee National Wildlife Refuge (Cont'd.)**

|  | ALTERNATIVE A   | ALTERNATIVE B   | ALTERNATIVE C   |
|--|---|---|---|
|  | No Action   | Enhance Habitat Management  | Maximize Public Use   |
| <ul style="list-style-type: none"> <li>■ WH3</li> <li>■ P1</li> <li>■ P2</li> </ul>  | No Program  | <p>Provides an active land acquisition program to acquire significant habitats for threatened and endangered species and inholdings within the approved refuge boundary</p> <p>\$10,010,000 estimated acquisition costs</p>   | No Program  |
| <p>Public Use</p> <ul style="list-style-type: none"> <li>■ WH4</li> <li>■ PU1</li> <li>■ PU2</li> <li>■ PU3</li> <li>■ PU6</li> </ul>    | Maintains current public use and maintenance of structures  | Enhances public use program through the development of interpretive materials, improved facilities, and improved hunting and fishing opportunities  | Expands public use program by developing additional trails and facilities, developing interpretive materials, maximizing hunting opportunities within state seasons, and improving fishing access   |
| <p>Funding and Staffing Issues</p> <ul style="list-style-type: none"> <li>■ PU6</li> </ul>   | <p>Maintains current levels of staffing and funding</p> <p>\$537,000 (FY2000)<br/>(operations, maintenance, and staffing)</p> | <p>Maintains current levels and adds new positions to support biological, management, outreach and education programs and increases funding in all refuge programs</p> <p>\$1,997,000 (first year need, operations and staffing)</p> <p>\$1,297,000 (recurring operations and staffing)</p> <p>\$4,395,000 (special project monies)</p> | <p>Maintains current levels and adds new positions to support outreach and education. Increase funding to support public use and outreach programs only</p> <p>\$1,557,000 (first year need, operations and staffing)</p> <p>\$1,057,000 (recurring, operations and staffing)</p> <p>\$3,415,000 (special project monies)</p> |
| <p>Outreach and Environmental Education Issues</p> <ul style="list-style-type: none"> <li>■ PU4</li> <li>■ PU5</li> <li>■ PU7</li> </ul> | <p>Maintains current levels of outreach, environmental education, and partnerships</p> <p>No visitor center</p>               | <p>Expands outreach, environmental education, and partnerships</p> <p>Identifies site for a visitor center</p>  | <p>Maximizes outreach, environmental education, and partnerships</p> <p>Identifies site for a visitor center</p>  |

**Table 4. Issues and Alternatives Matrix for Lower Suwannee National Wildlife Refuge**

| ISSUES   | ALTERNATIVE A   | ALTERNATIVE B  | ALTERNATIVE C  |
|--|---|--|--|
|  | No Action   | Enhance Habitat Management   | Maximize Public Use  |
| <p>Partnership Issues</p> <ul style="list-style-type: none"> <li>■WH1</li> <li>■WH3</li> <li>■WH5</li> <li>■PU4</li> <li>■PU5</li> <li>■PU7</li> <li>■PU1</li> <li>■P1</li> <li>■P2</li> </ul> | <p><b>Supports the North Florida Ecosystem</b></p> <p><b>Maintains partnerships with local organizations for the development of ecologically sound nature-based tourism</b></p> <p><b>Continues sponsorship of Naturefest</b></p> | <p><b>Supports the North Florida Ecosystem</b></p> <p>Expands partnerships with schools</p> <p>Expands partnership with District to monitor water quality and quantity, inventory and study of aquatic species, and protect river corridor</p> <p>Expands partnership with University of Florida for increased research</p> <p>Expands partnerships with local organizations for the development of ecologically sound nature-based tourism</p> <p>Continues sponsorship of Naturefest</p> <p>Seeks community support for visitor/education center</p> <p>Coordinates with organizations to apply for grants on collaborative projects</p> <p>Seeks cooperation with Tribes to protect Native American sites on the refuge</p> | <p><b>Supports the North Florida Ecosystem</b></p> <p>Expands partnerships with schools</p> <p>Expands partnerships with local organizations for the development of ecologically sound nature-based tourism</p> <p>Continues sponsorship of Naturefest</p> <p>Seeks community support for visitor/education center</p> <p>Coordinates with organizations to apply for grants on collaborative projects which support public use, outreach, and environmental education</p> |

*Affected  
Environment*

*The following section describes the natural environment of the areas which could be affected by the proposed management direction. It also addresses the human environment and the socioeconomic factors that could be affected.*

### **General**

Lower Suwannee National Wildlife Refuge is located on the Gulf Coast of Florida in Dixie and Levy Counties, about 50 miles southwest of Gainesville. The refuge protects the lower reaches of the Suwannee River, which has been designated as an “Outstanding Florida Water” by the state. The Suwannee River originates in the Okefenokee Swamp in Georgia and flows through the Florida peninsula for 245 miles before emptying into the Gulf of Mexico. The refuge lies within the Florida Panhandle Watersheds Unit, as classified by the U.S. Geological Survey and within a subtropical coastal zone characterized by flat lowlands and gently rolling sandhills.

### **Economic and Social Conditions**

Although Levy and Dixie Counties are located on the Gulf Coast, they have not yet had the extensive growth experienced by many other Florida areas. Both counties are rural and rank among the lowest 20 percent in the state for population density. Levy County is about 75 percent forest, and Dixie County is about 90 percent forest. Farming activities are oriented more to cattle raising and horse breeding, followed by crop farming with corn, peanuts, and watermelons accounting for the primary crops. Industrial activities in the counties are associated with forestry, farming, and road construction. Commercial fishing and shell fishing are significant industries, although catches have declined appreciably in recent years. Personal and family incomes in these counties are among the lowest in the state. Approximately one out of five families was living at or below the poverty level in 1989. Although tourism and the number of retired residents have not been major factors thus far in the economic and social growth of this area, they are becoming more significant and can be expected to grow at an increasing rate.

### **Geology and Water Quality**

The Suwannee River and its tributaries drain more than a 10,000-square-mile-area. Starting from boggy channels of coffee-colored waters in the Okefenokee National Wildlife Refuge near Waycross, Georgia, the river begins its 265-mile course to the Gulf of Mexico. During its course from the Okefenokee to the Gulf, the water character changes substantially. The upper portion of the river flows through the yellow clay of Georgia’s Tifton Upland and then through the white sand country of Florida’s Trail Ridge. Below Branford, the Suwannee River assumes the water qualities of a giant spring while above Ellaville, the flows characterize the typical cypress-stained waters of the Okefenokee. These characteristics are occasionally overridden by the muddy flood waters of Georgia’s Withlacoochee and Alapaha Rivers.

The coastline of the refuge is marshy and quite irregular with many islets lying just offshore. Many creeks of various lengths originate at the inner boundary of the marshland and flow in meandering channels toward the Gulf. The coastal waters are quite shallow. Nautical charts show the 1-fathom contour being 1 to 5 miles offshore and the 5-fathom contour about 25 miles offshore, indicating a slope slightly in excess of 1-foot per mile. The coastal marshes are from 1 to 3 miles wide and consist of mud and silt which support the marsh plant communities. Occasionally, there are barren stretches where rock is exposed. The coastal marshes extend up the mouths of streams and merge with the alluvial flats that border the stream channels.

Of particular importance to this area is the geologic feature named the Silver Bluff Terrace and Shoreline. The 10-foot contour line may be used to mark the strand line of the Silver Bluff Sea. This is the youngest of

three Pleistocene surfaces and shorelines. The two preceding were the Pamlica and Wicomica.

Total stream flow of the Suwannee varies greatly from year-to-year and during a given year. The river flow in the 30-year period of record has been as great as 84,000 cubic feet per second (cfs) (gauge height of 22.32 feet at U.S. Highway 19) in April 1948, and as low as 3,270 cfs (gauge height of .57 feet) in February 1957, resulting in an average stream flow of 10,942 cfs, as measured at the gauging station near the town of Suwannee. Up river at Fargo, Georgia, the maximum gauge height was 19.6 feet and there was no flow in the river for certain periods in 1931, 1943, and 1954. Zero flows probably occur more often below the sill in the Okefenokee Swamp than at Fargo. In its most menacing flood conditions, as in 1928 and 1948, the Suwannee fills its basin with relatively quiet water. Flood damage is seldom due to strong current, but rather to the slow rate of the water's departure. The slow advance and retreat of flood waters are attributed to absorbing capacities of the Okefenokee Swamp and the Florida Aquifer, combined with the 6-inch gradient per mile of the river.

The Suwannee River is relatively free of biological and chemical pollutants. Some bacteriological pollution exists in localized areas near towns and in the Okefenokee Swamp. The river enters Florida low in dissolved inorganic matter, but with a high concentration of dissolved organic material resulting in a pH of about 4.5. Hardness and pH increase progressively downstream due to the flow over limestone. The murkiness decreases, the color becomes lighter, and the clarity increases with the dilution by springs. Potential sources of pollutants which require continuous monitoring include: (1) effluent from paper mills on the Withlacoochee River in Georgia; (2) chemically polluted waters from the Santa Fe River; (3) runoff from strip mines draining into the Swift Creek tributary; and (4) nitrates from dairies and poultry farms, which are increasing along the middle reaches of the Suwannee River.

At present, the quality of Suwannee River water is being determined by a detailed cooperative monitoring program conducted bimonthly by the Suwannee River Water Management District and the U.S. Geological Survey. Under this program, river water samples are taken at nine sites in Florida and one site in Georgia. The Suwannee River is an interstate stream, and water quality standards have been established by Florida and Georgia. The water quality criteria established by the two states are subject to further revision in the future.

The Suwannee River Water Management District is presently in the process of determining minimum flow requirements for the river as required by Florida law. There has also been some discussion within the past few years to pipe water from the Suwannee River watershed to the heavily populated Tampa Bay area.

### **Topography**

Lands within the refuge are relatively flat and are primarily of elevations below and slightly above mean high tides. Much of the surface soil is inundated by tidal action or by surface runoff and an impeded drainage system.

This portion of the west coast of Florida is an area of low energy exchange with a mean tidal amplitude of about 2.5 feet. The winds play an extremely important part in controlling the movements of water and resulting depths. The influence of the Suwannee River on this estuary is very significant.

Refuge elevations rarely exceed 20 feet above mean sea level. These elevations are generally found as islands within the tidal marsh zone or small remnant dunes. The 10-foot contour is the general line prescribing the refuge boundary. The vegetative patterns along the coast and the Suwannee River delineate the approximate 5- and 10-foot contour lines.

## Minerals and Soils

The soils of the coastal plains are derived primarily from unconsolidated, stratified, marine sediments. The underlining bedrock is generally limestone with sediments of thin-bedded, fine-grained dolostone that alternates with phosphorite and quartz. Limestone is mined in both Dixie and Levy Counties. Phosphate is mined to the north of the area in Hamilton County. Other counties in the Suwannee Basin are also considered to hold reserves of both limestone and phosphate.

The Levy County portion of the refuge has been mapped for soils. Along the coast the primary soil is tidewater mucky clay, along the river, it is primarily terra ceia soils. Moving inland, Placid and Samsula soils and Myakka mucky sand dominate. The higher elevations are fine sands with Placid and Popash soils in the depressions.

No known gas or oil deposits exist within the refuge. Exploration for petroleum and natural gas within the Suwannee Basin apparently revealed no producing wells.

## Climate

Levy and Dixie Counties are low-lying, subtropical, coastal areas. Because they lie within the frost belt, tropical fruits and vegetables do not flourish. The annual temperatures average about 77° Fahrenheit, ranging from a mean 81° August temperature to a 57° January average. No predictable dry or rainy season exists for the region, although December, January, and February are generally the driest months, with June, July, and August being the wettest. During the summer months, rain clouds form offshore and move inland to precipitate showers 15 to 20 miles from the coast. These showers account for a significant portion of the average annual rainfall of 54 inches. The area is in the hurricane belt and these tropical disturbances produce winds of very high velocity and destructiveness.

## Land Uses

Forestry constitutes the primary land use within the area. The most intensive forestry is practiced on the higher upland areas where hardwood hammocks and longleaf pine sand ridges have been converted primarily to monoculture slash pine plantations. A large market has developed within the past decade for cypress garden mulch. For this reason, cypress logs are bringing better prices in the market than pine and most hardwoods. As a result, when the pine plantations and upland sites are harvested for timber, many of the cypress bogs are routinely clear cut. There is also an active forestry industry in the area for bottomland hardwood species. Within the refuge, forestry has been limited to improving the pine plantations through thinning operations and prescribed fire as addressed in present Forestry and Fire Management Plans.

Cattle raising is being practiced on a limited basis, but dairy farming has become a major industry in the tri-county area.

Until recently, this area of Florida had not felt the pressure of waterfront developments for either tourist accommodations or homes. However, this situation is changing rapidly. Outdoor recreation is probably the greatest single and best use of the area. There are limited developments and facilities, but communities and chambers of commerce are embracing nature-based tourism. Fishing, hunting, and boating are prime attractions.

## Refuge Management Programs

Prescribed burning is the primary refuge management tool used to maintain and enhance refuge habitat. Historically, wildfires were ignited by lightning or infrequent prescribed burns set by Native Americans, and later by settlers who sought to improve habitat conditions for hunting and for cattle grazing. Prescribed fire is a well established and effective habitat management tool. Properly used, fire reduces the risk of

catastrophic wildfires, and improves food and cover conditions for wildlife. The specifics of the station's prescribed fire management program are addressed in the Fire Management Plan and the Annual Fire Prescriptions Plan.

Forest management on the refuge involves both select harvesting of trees and planting of seedlings. The specifics are addressed in the Forest Management Plan.

Public use on the refuge includes both consumptive and non-consumptive wildlife-dependent activities. The refuge is open to hunting of big game, small game, and migratory waterfowl. Sport fishing by the use of pole or rod and reel is permitted on the refuge in accordance with state regulations. There are approximately 50 miles of primary roads maintained for public vehicle travel. There are additional secondary roads that are maintained for official vehicles only, but the public can access them by bicycle or foot.

The Shell Mound area has two designated walking trails, interpretive displays, a fishing pier and wildlife observation boardwalk, and a boat ramp for small boats. There is an interpretive trail and boardwalk to the Suwannee River near the refuge headquarters. The Salt Creek area has a wildlife observation point and fishing pier. At Shired Island there are two boat launching ramps and an observation deck. Wildlife observation, wildlife photography, and environmental education and photography are permitted public activities throughout the refuge.

### Vegetation

**Water and marsh areas.** The normal seagrasses of the area do not become particularly well established until reaching considerable distance offshore, away from the Suwannee River mouth and some of the larger tidal creeks. Manatee grass (*Cymodocea manatorum*), turtle grass (*Thalassia testudinum*), and shoal grass (*Halodule wrightii*) are the most common.

The tidal saltwater marsh of the refuge is dominated by needlerush (*Juncus roemerianus*) at the higher elevations and saltmarsh cordgrass (*Spartina alterniflora*) along the tidal creeks, sunken bars, and other lower elevations. The coastal marsh at the mouth of the Suwannee River presents a fairly unique environment inhabited by many freshwater plants. Generally, the marsh does not reflect a typical coastal marsh profile, but rather represents apparent competition between freshwater and saltwater marsh plants for dominance. Even at the Gulfward extremities of the marsh, there exists a number of more typically freshwater marsh plants such as arrowhead (*Sagittaria latifolia*), cattail (*Typha domingensis*), bulrush (*Scirpus sp.*), and sawgrass (*Cladium jamaicense*). These freshwater marsh plants exist among the more typical saltwater marsh species such as needlerush, saltmarsh cordgrass, and saltgrass (*Distichlis spicata*). Along the many tidal creeks away from the mouth of the Suwannee River, a considerable amount of freshwater influence results in the growth of such plants as pickerelweed (*Pontederia cordata*), smartweed (*Polygonum sp.*), morning glory (*Ipomoea sagittaria*), phragmites (*Phragmites communis*) and even swamp-lily (*Crinum americanum*).

Small scattered areas of freshwater marsh, wet prairie and open water are found throughout the refuge. These are the typical "sawgrass ponds" found in the pine flatwoods (slash pine overstory with palmetto-gallberry understory) of the lower coastal plain. Northeast of Cedar Key, these ponds take on the character of the "flag" ponds of central and southern Florida where the edges are ringed with sawgrass; covered with white waterlily (*Nymphaea odorata*); and interspersed with clumps of pickerelweed, arrowhead, and occasionally maidencane (*Panicum hemitomon*). A small amount of emergent marsh occurs along the banks of the Suwannee River. These are dominated by spatterdock (*Nuphar lutum*) with some cattail and a little wild rice (*Zizania aquatica*).

**Timbered swamp.** The dark colored waters feeding the numerous small tidal creeks have their origin in the timbered swamps. The timbered swamp is a most conspicuous feature of the area. Timbered swamps, while composed of many of the same tree species, occur primarily as two separate types: flood plain hardwoods and hardwood swamps. The flood plain forest occurs primarily along the Suwannee River with smaller acreages along the larger creeks. Water tupelo, pumpkin ash, water locust, water elm, bald cypress, red maple, and river birch are characteristic species of this type. In addition to being in standing water most of the year, these trees are subject to periodic high water floods. The hardwood swamp forest is subject to lesser periods of inundation and therefore consists of such species as sweetgum, swamp chestnut oak, water oak, sweetbay, and several species of hickories. These swamps occur as low, ill-defined drainages and depressions throughout the area.

Away from the river where the bedrock is limestone, shallow sinks are filled with dome-like groves of pond cypress. When surrounded by pines, these domes which are called cypress heads, are quite conspicuous. Accompanying trees are water tupelo, slash pine, red maple, and sweetbay (magnolia). Water is usually present in these sinks.

Along the river, the forest is broken by dense thickets of small broad-leaved evergreen trees, mainly sweet, loblolly, and red bays. This plant community is called a bayhead. It occurs most often where the floodplain widens. A bayhead consists of highly acidic soils containing sphagnum. Near the mouth of the river, cabbage palm appears more common than elsewhere. Southern red cedar reacts favorably either to the brackish condition or to some other environmental factor which causes it to grow commonly near the water.

**Upland Areas.** Upland areas are represented by four basic habitat types: climax hardwood hammocks, pine "flatwoods," pine-cedar-palm islands, and scrub oak dunes. The hardwood hammock and oak knolls are climax communities for this region. This habitat type occurs above the timbered swamp and distribution and composition are dependent upon the width, elevation, and drainage pattern of the flood plain. The dominant species within the climax condition are live oak, laurel oak, and sweetgum with lesser numbers of southern magnolia, swamp chestnut oak, and several hickories. About fifty kinds of trees are to be expected in old mixed hardwood stands and, were it not for high-grading by early lumbermen, the Florida maple, basswood, holly, and white oak would probably also be dominant species. Of the hammocks, the laurel and live oaks are best represented by the large individual trees left standing because of their low commercial value. These large oaks line the upper reaches of the river with their thick draperies of Spanish moss, a distinctive trademark of the coastal plain.

The pine flatwoods are characterized by a monotypic slash pine overstory with a saw palmetto, wax myrtle, gallberry and fetterbush understory. This habitat type is generally found on moderately to poorly drained soils above the timbered swamps.

The pine-cedar-palm islands are found scattered throughout the vast expanse of needlerush marsh on elevations slightly higher than the surrounding saltwater marsh. Typically, this habitat consists of a dominant stand of mature slash pine and/or cabbage palm with an understory of southern red cedar. Some of these islands appear to be influenced by increased saltwater intrusion which is negatively affecting tree survival and regeneration.

The scrub oak dune type is very limited and is found primarily along the southeastern boundary. This habitat is dominated by the low-growing Chapman, myrtle and sand live oaks.

**Open Land.** There is essentially no open land within the refuge boundary, except that which has been clear cut prior to regeneration and semi-improved pasture lands with tree stocking reduced, but not eliminated.

A summary of the major habitat types is illustrated in Figure 7, and the approximate acreage and percentages within the refuge are shown in Table 5.

**Table 5. Summary of Major Habitat Types within Lower Suwannee National Wildlife Refuge**

| HABITAT TYPES                               | PERCENTAGE OF TOTAL | APPROXIMATE ACREAGE |
|---|---------------------|---------------------|
| Tidal salt marsh                            | 28                  | 15,036              |
| Freshwater marsh and open water             | 5                   | 2,828               |
| Tidal forest                                | 6                   | 3,074               |
| Hydric hardwood hammock                     | 34                  | 18,410              |
| Pine  | 12                  | 6,330               |
| Bottomland forest                           | 5                   | 2,881               |
| Wet flatwoods (cypress, pine, cabbage palm) | 6                   | 3,343               |
| Mixed pine/hardwoods                        | 2                   | 837                 |
| Shrub and brush                             | 1                   | 154                 |
| Open administrative areas                   | 1                   | 42                  |
| <b>TOTALS</b>                               | <b>100</b>          | <b>52,935</b>       |

### Wildlife Resources

**Threatened and Endangered Species.** Several species federally listed as “threatened” or “endangered” are known to exist on the refuge, either seasonally or year-round. In addition to the federally listed species discussed below, habitat on the refuge has the potential to support other rare flora and fauna. Appendix H contains both federally and state listed species known to occur, or that have the potential to occur on the refuge. Surveys for both occurrences and habitat for listed and rare species on the refuge are incomplete.

- The Florida manatee uses the tidal creeks, the Suwannee River estuary and the Suwannee River from spring through fall. The dark water associated with tannins make manatee difficult to see in the river; however, they are often observed at the mouth of the river and tidal creeks, as well as at Manatee Springs State Park and Fanning Springs, where the water is clearer.
- Green, loggerhead, and Kemp’s ridley sea turtles are commonly found in the offshore coastal waters. No known nesting occurs in the immediate area of the refuge.
- The American alligator population has made a comeback, but is protected and listed due to similarity of appearance to the crocodile.
- The Eastern indigo snake is found on the higher, better-drained sites, especially on the scrub oak dunes and upland pine areas.
- Bald eagles, which have been delisted from endangered to threatened, are common on the refuge during the winter months. There are four active nests on the refuge with additional eagle nests on lands adjacent to the refuge.
- The Suwannee River supports the only healthy, viable population of Gulf

sturgeon still remaining in coastal rivers of the Gulf of Mexico.

- Wood storks are observed periodically through the year but no nesting occurs on the refuge.
- There is a plan to establish a migratory flock of whooping cranes that will winter at Chassahowitzka National Wildlife Refuge, south of Lower Suwannee refuge. If this becomes successful, the cranes will probably utilize the large expanse of salt marsh on Lower Suwannee refuge.

None of the refuge area has actually been classified as “critical habitat” for any endangered species. However, the lower Suwannee River is a candidate area as critical habitat for the manatee due to the numerous springs along the river banks and the traditional use of the area by manatee.

**Waterfowl.** The large raft of redhead ducks which winter off the Gulf Coast drift into this area near the end of the winter periods, but generally stay north and well offshore from the refuge. Other species represented are lesser scaup, red-breasted merganser, hooded merganser, bufflehead, green-winged teal, blue-winged teal, and the occasional widgeon and gadwall. Wood ducks are common on the refuge during the winter. However, nesting cavities and suitable brood-rearing habitat may be the limiting factors to hosting a summer population.

**Marsh and Water Birds.** The tidal marshes support a substantial population of clapper rails. King rails inhabit the numerous sawgrass ponds and swamp edges throughout the area and Virginia rails are seasonal visitors. Black rails, a species of concern, are thought to be present on the refuge. Common snipe and woodcock are found in limited numbers where the habitat is suitable.

Both the coastal marshes and the freshwater swamps and wetlands ponds serve as key feeding areas for many long-legged wading birds that nest on Cedar Keys Refuge, including white ibis, snowy egret, great egret, tri-colored heron, great blue heron, little blue heron, night herons and green heron. Limpkin are less common, but are regularly observed in the wooded swamps. The numerous oyster bars, sand flats, and extensive shoreline provide excellent feeding, loafing, and nesting for a wide variety of shorebirds such as oyster catchers, willets, greater and lesser yellowlegs, dunlin, and a number of sandpipers. A variety of gulls and terns can be found in the area, although suitable nesting areas for these species are limited.

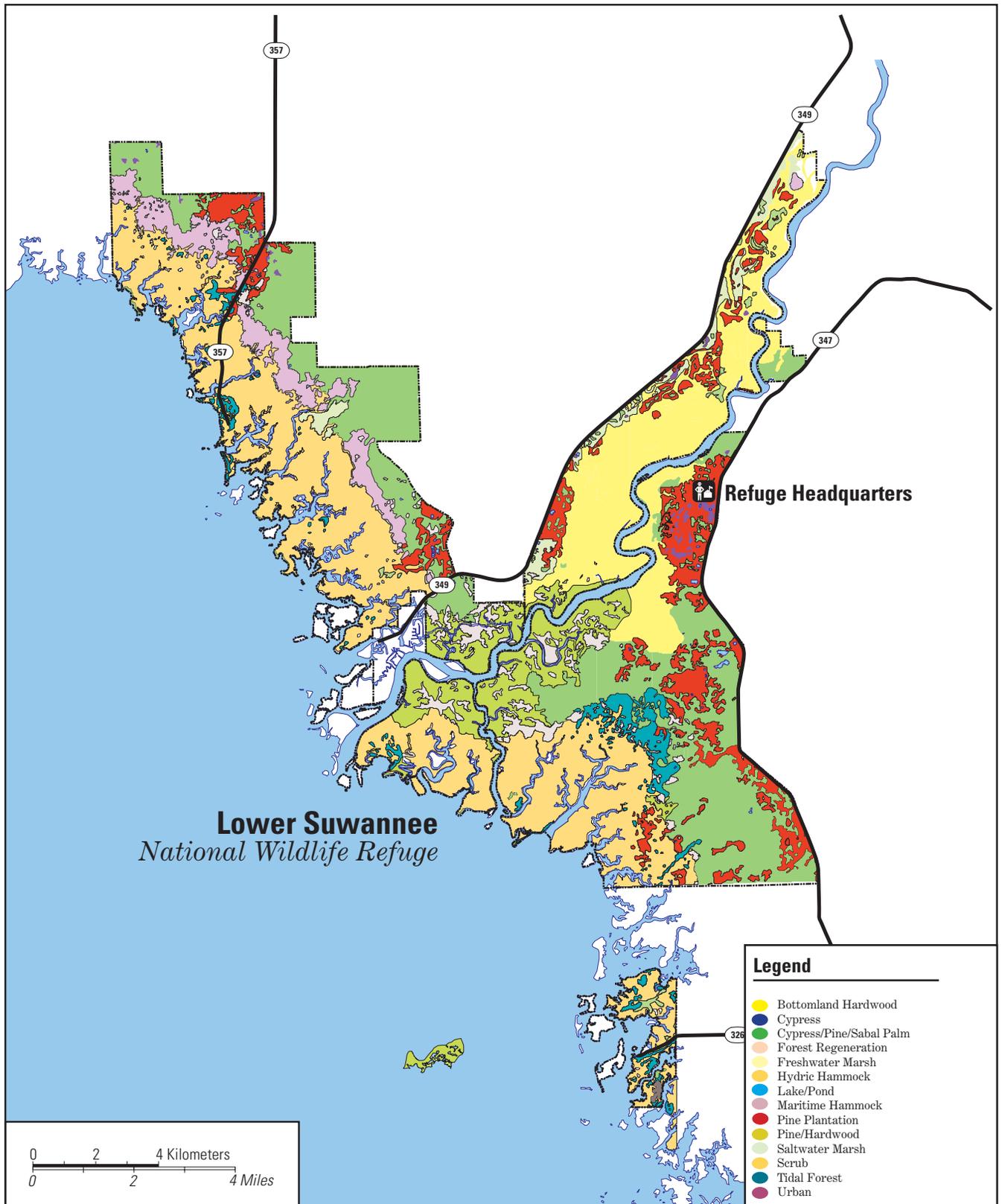
**Song Birds.** The bottomland hardwoods and coastal hammocks provide important habitat for song birds. One species of special concern that is common on the refuge is the swallow-tailed kite. The refuge checklist includes a total of 254 different species of birds and an additional 25 species which are listed as accidental occurrences to the refuge.

**Upland Game Birds.** The bobwhite quail is present on the refuge; however, suitable upland habitat is somewhat limited and the total population is not large. Mourning doves are present both as resident nesters and as migrant flocks. Turkey are commonly observed along the timber access roads, which indicates that a fair population of these birds exists throughout the timbered swamp and upland portions of the refuge.

**Big Game.** White-tailed deer are the principal big game species present. Most all of the refuge lands were previously owned by timber companies that leased the property for deer hunting. Refuge forest management practices have improved habitat for resident wildlife including deer. Within the refuge, forestry has been limited to improving the pine plantations through thinning operations and prescribed fire, as addressed in present Forestry and Fire Management Plans.

**Other Wildlife.** Gray squirrel, raccoon, opossum, otter, gray fox, bobcat, and striped skunk are among the other furbearers and game animals which

**Figure 7. Major Habitat Types, Lower Suwannee National Wildlife Refuge**



are relatively abundant on the refuge. Although bears were historically present in this part of Florida, most were shot by early settlers. Reptiles and amphibians are numerous in the bottomland hardwoods along the river. Two species listed by the State of Florida as species of special concern are the Suwannee cooter and the alligator snapping turtle. The gopher tortoise, also a species of special concern, is common on upland sites.

**Problem Species.** Feral hogs are present in the timbered swamps and adjacent upland areas. Sport hunters are permitted to take hogs during the refuge deer hunting season. This pressure has appeared to keep the population from becoming overabundant. Brown-headed cowbirds are present on the refuge, but their effects on nesting song birds are not known. The species and extent of exotic plants on the refuge and their impacts on native species are unknown.

### **Fishery Resources**

At least 62 species of freshwater fish are found in the Suwannee River and its tributaries. Many are small fish but are important to the food chain and maintenance of sport and commercial fish. These can be grouped conveniently into two categories: game fish or nongame fish. Most sport fish are members of the sunfish family. Of the 17 found in the Suwannee River, the redbreast sunfish (redbelly), spotted sunfish (stumpknocker), bluegill (bream), and redear sunfish (shell cracker) are the species most commonly caught. Largemouth bass and Suwannee bass are highly desired in the creel. Channel catfish and white catfish are the most desired catfish. Nongame fish include chubsucker, spotted sucker, American eel, yellow bullhead, brown bullhead, bowfin, Florida gar, mosquito fish, pirate perch, topminnow, dollar sunfish, blue spotted sunfish, and banded sunfish.

Fresh water flowing from the Suwannee River to the Gulf of Mexico creates an estuary that is home to more than 140 species of fish. Such prize fish as spotted seatrout, red drum, mullet, pompano, permit, sheepshead, and others depend on the estuary during some period of their life cycle. "Anadromous species, those that spend part of their life in salt water and enter fresh water to spawn, are limited to Alabama shad, skipjack herring, striped bass, and Gulf sturgeon. All are rare; and the Gulf sturgeon, the Suwannee's prize, is classified as a 'threatened species' under the Endangered Species Act" (Clugston 1999).

### **Cultural Resources**

There is evidence to show that Indians were living in the region at least 10,000 years ago, and that they continued to live in the region until the first half of the 19th century. Early in the 16th century, the Spanish conquistadores, Panfilo de Narvarex and Hernando DeSoto crossed the Suwannee River in northwestern Florida and later described the habitat and wildlife to the European world.

The Suwannee River has played a major role in the human habitation of these coastal and inland areas. Numerous prehistoric camps, towns, and mound sites have been reported along the river. It appears likely that the river provided a corridor for the invasion of the Weeden Island culture into southeastern Georgia.

Although very little systematic archaeological research has taken place in the Suwannee River area, it is known that the cultural resources are extensive. Because of the known archaeological potential, the Service will exercise special care to protect any cultural resources that may be on the refuge. Before undertaking any construction or management actions that might impact such resources, comprehensive surveys will be undertaken to identify and evaluate any historic remains that might be present.

Section 106 of the National Historic Preservation Act of 1966, as amended, and Section 14 of the Archaeological Resources Protection Act require the

## *Environmental Consequences*

Service to evaluate the effects of any of its actions on cultural resources (historic, architectural, and archaeological) that are listed or eligible for listing in the National Register of Historic Places. If the Service plans or permits any actions that might affect eligible cultural resources, it will carry out appropriate site identifications, evaluations, and protection measures as specified in the regulations and Service directives and manuals.

The following discussion assesses the impacts to the physical, biological, cultural, and socioeconomic environments by the implementation of the three alternatives proposed in the Draft Comprehensive Conservation Plan for Lower Suwannee National Wildlife Refuge. The issues identified in the Affected Environment section of this Environmental Assessment, as well as some of the issues identified in the scoping process, are considered.

### **Physical Environment (Soils, Air, Climate, and Water)**

*Alternative A (No Action)* The alternative to maintain current management would not have negative environmental consequences on the soils, air, water resources, or climate. However, under this alternative, no research would be conducted to identify external pollution potentials.

*Alternative B (Proposed Action)* The alternative to Enhance Habitat Management and Public Use would not have negative environmental consequences on the physical environment. It would provide better coordination with other environmental agencies such as the Florida Fish and Wildlife Conservation Commission, the Suwannee River Water Management District, and the University of Florida for researching, monitoring, and protecting the soil, water and air quality.

*Alternative C (Maximize Public Use)* The alternative to Maximize Public Use could potentially have negative environmental consequences on the soils, air and water resources. Under this alternative, no research to identify external pollution potentials would be conducted and no monitoring of impacts on refuge programs that could negatively impact the physical environment would occur.

### **Biological Environment (Wildlife and Habitat)**

*Alternative A (No Action)* The alternative to maintain current management would not adversely affect the biological environment of wildlife and habitat on Lower Suwannee National Wildlife Refuge. This alternative would continue to provide important habitat for threatened and endangered species, neotropical migratory birds, and resident wildlife. However, the current biological monitoring program provides only minimal information on the highest priority species. Staff and funds are insufficient to conduct wildlife and habitat surveys and research to address critical management issues. The No Action alternative would continue the “status quo” and would not adequately monitor or evaluate wildlife and habitat present to identify population trends or suggest remedial actions to improve wildlife populations or habitat.

*Alternative B (Proposed Action)* The alternative to Enhance Habitat Management and Public Use would not adversely impact the biological environment. Important habitat for threatened and endangered species, neotropical migratory birds, and resident wildlife would still be provided and protected. The wildlife goal under this alternative would expand scientifically based monitoring and research. Strategies to help reach the refuge’s wildlife goal under this alternative include the following: amphibian and reptile surveys and long-term monitoring programs would be initiated; gopher tortoise populations would be monitored and tested for respiratory disease; and breeding bird and shore bird surveys would be added to the present osprey and eagle surveys to help determine trends and important habitat. The refuge would be evaluated to determine if any rare or endangered plant populations are present. Identification of these plants would be the first step in their protection and management.

Manatee, Gulf sturgeon, and sea turtles that use adjacent state waters would be afforded better research, protection, and monitoring. With proper funding and staff, databases would be developed through GIS to map and monitor threatened and endangered species and species of special concern. Partnerships would be actively sought to expand awareness of Service ideals and goals.

This alternative would customize habitat management to maximize healthy populations of wildlife. Procedures would be incorporated to evaluate the refuge's prescribed fire and forest management activities to determine impacts on important plant and animal species.

Public use of our natural resources is anticipated to increase both on and off the refuge; the proposed alternative identifies increased public use. However, it also provides safeguards to protect the refuge environment by grouping public use facilities in central locations rather than allowing them to expand uncontrolled on their own. It calls for a Visitor Services Plan and proper staffing to implement and monitor public use and its effects on wildlife and habitat. With this alternative, the Service would be able to control expansion and better protect trust resources. Programs would be developed to reach out to students and the general public to educate and inform them about the importance of national wildlife refuges.

*Alternative C (Maximize Public Use)* The alternative to Maximize Public Use may adversely affect the biological environment of wildlife and habitat on Lower Suwannee National Wildlife Refuge. This alternative would continue to provide important habitat for threatened and endangered species, neotropical migratory birds, and resident wildlife. However, the current biological monitoring program provides only minimal information on the highest priority species. Staff and funds are insufficient to conduct baseline wildlife and habitat surveys and research to address critical management issues. The Maximize Public Use alternative would continue the "status quo" and would not adequately monitor or evaluate wildlife and habitat present to identify population trends or suggest remedial actions to improve wildlife populations or habitat. Additionally, no monitoring or evaluation of public use impacts on wildlife populations or habitat quality would be conducted.

### **Cultural and Historical Environment**

Under all three alternatives, historic and archaeological sites would be protected under federal ownership and jurisdiction as defined in the National Historic Preservation Act, the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act and implementing regulations authored by the Advisory Council on Historic Preservation, the Department of the Interior, and the National Park Service. However, the degree of protection as well as the opportunities to conduct scientific research and to interpret past cultures varies between each alternative.

Archaeological and related scientific investigations on the refuge have been limited to C.B. Moore's 1902 investigation of several mounds and shell middens on islands or keys and along the Suwannee River; Goggin's 1948 investigations on Hog Island and Shired Island West; and Bullen and Dolan's 1959 investigations on Shell Mound. These investigations were preliminary in nature and have been summarized by Willey (1949), and Dorian and Stoutmire (1980).

*Alternative A (No Action)* Cultural Resource Management would be limited to those investigations required for compliance with Section 106 of the National Historic Preservation Act and Archaeological Resources Protection Act-related investigations of illicit looting and collecting. Data relating to the refuge's hydrological regime, geomorphology, changing vegetation patterns, and past cultural land use patterns would be garnered only through reviews of existing technical literature and through focused scientific investigations. Other efforts, such as erosion control, and

interpretive and educational opportunities would be virtually non-existent due to the lack of personnel, facilities, and funds. Rather than pro-active partnerships with universities and Native American groups, Alternative A lays the groundwork for abrasive and non-constructive relationships.

*Alternative B (Proposed Action)* Alternative B seeks to enhance habitat management and public use. Several specific objectives and strategies are proposed to aid the Service in the responsible management of the refuge's historic properties. Included are the performance of a refuge-wide comprehensive archaeological survey and site assessment, the development of a comprehensive archaeological plan, the development of an annotated bibliography, and the development of a site predictive or sensitivity model. To accomplish the goals of this alternative, scientific investigations such as plant and animal inventories, GIS mapping, archaeological investigations, and geomorphic studies are necessary tools. The databases generated from these investigations would enhance the refuge's ability to monitor and protect cultural resources under Service ownership and jurisdiction. The emphasis on environmental education can provide increased public awareness of the region's past cultural histories, the fragility of archaeological sites, and the nature of human-habitat interactions. Ties with the Creek, Seminole, and Miccosukee Tribes are encouraged, particularly for input into the management of sites important to these groups as well as providing opportunities to educate others about their history and use of resources present within the refuge. Partnerships with universities and other pertinent entities to conduct scientific archaeological research would be actively pursued and fostered under this alternative.

*Alternative C (Maximize Public Use)* This alternative is the most destructive to cultural resources due to the proposed construction of facilities, such as boardwalks and restrooms. Although increased visitation leads to opportunities for education about past cultures and habitats, it also leads to an increased potential for site loss due to public use related activities, illicit looting, and unpermitted collecting. Education opportunities should focus on responsible site stewardship, introduce the public to the region's rich cultural history via interpretive programs, and provide for a comprehensive archaeological survey of the refuge. This alternative neither identifies nor seeks funding for these purposes. Similar to other alternatives, project-specific investigations and/or site assessments would still be required for proposed construction of facilities and for other management activities. The increased funding and staff levels proposed for this alternative would enhance the Service's ability to protect known sites from vandalism, looting, and ongoing natural processes. In spite of the increased funding and staff, this alternative's overall impact on historic properties is similar to that of Alternative A.

### **Socioeconomic Environment**

*Alternative A (No Action)* The No Action alternative may have negative environmental consequences on the socioeconomic environment because public use of the refuge continues to grow; however, staff and management of these uses would remain at current levels. Refuge staff would not be actively involved in implementing ecologically sound nature-based tourism efforts. Outreach and environmental education would remain at current levels.

*Alternative B (Proposed Action)* The alternative to Enhance Habitat Management and Public Use would not adversely affect the socioeconomics of the area. The Service expects that the implementation of this alternative would support the economy by providing a destination for nature-based tourists. Improved wildlife and habitat management would mean increased opportunities for wildlife viewing and photography. Enhanced public use facilities would provide additional opportunities for visitors to extend their stay, thus supporting the local economy through hotels, food vendors, and merchants. The Service plans to implement monitoring and evaluation procedures to ensure the integrity of wildlife and habitat. Additionally, the refuge has clustered public use areas in an effort to minimize overall impacts across the refuge landscape. Finally, the refuge would have dynamic and progressive partnerships with community organizations and chambers of commerce and will guide the development of ecologically sound, nature-based tourism efforts.

*Effects Common  
to Alternatives*

*Alternative C. (Maximize Public Use)* This alternative would have significant impacts on the socioeconomics of the area. Increased visitation and public use opportunities on the refuge would bring increased revenues to the local economy not only in tourism, but in construction as well, as there is currently insufficient infrastructure to meet increased tourism demands. The expanded environmental education and volunteer programs would also positively impact the community and build a refuge constituency.

### **Health and Safety Effects**

The alternatives would not have a significant effect on health and safety of the environment. Under all alternatives, water resources, quality, and quantity are protected. The only potential safety problems are accidents that deal with human error affecting other humans. Operation of equipment and vehicles by staff, for management purposes, can lead to accidents affecting the health of both staff and the visiting public. Proper training and awareness of climatic and physical surroundings during operations would help to minimize accidents. Proper road and trail signs would inform visitors of potential hazards. Time and space zoning has been and would continue to be utilized to minimize potential conflicts between hunters and other user groups. Air quality effects from prescribed fire would be of short duration and minimized by following procedures outlined in the refuge's fire plan, which considers weather and atmospheric conditions prior to burning.

### **Regulatory Effects**

As indicated in the Introduction section of the Draft Comprehensive Conservation Plan and Appendix C, Legal Mandates, the Service must comply with a number of federal laws, executive and administrative orders, and policies in the development and implementation of management actions. The alternatives would not lead to a violation of these laws and orders.

### **Effects on the Surrounding Lands**

The refuge provides recreational opportunities and supports nature-based tourism in surrounding areas. Through its active forest management practices, it contributes to timber production in both counties. Presently, most of the lands surrounding the refuge are being used for commercial timber production and private hunting clubs. Wildlife move freely across public and private ownership boundaries. At times, the refuge may supply sanctuary for wildlife from the hunting that occurs on private property. While at other times, the surrounding lands supply food and cover to refuge wildlife species. The alternatives would not adversely affect surrounding lands and may benefit neighboring hunt clubs by serving as a breeding ground for game species.

### **Uncertainty of and Future Action Effects**

The commercial timber company lands adjacent to the refuge provide important habitat for wildlife species that utilize the refuge. As more people move to this portion of rural Florida, urban expansion would continue to convert agricultural lands into housing and commercial developments. This loss of wildlife habitat would adversely affect wildlife populations and would make active management of refuge lands even more important.

### **Cumulative Impacts**

All three alternatives were evaluated as to their cumulative impacts. Cumulative impacts include impacts on the environment which result from incremental effects of the proposed action when added to other past, present, and foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Implementing Alternative B, Enhance Habitat Management and Public Use, would reduce any potential for cumulative impacts due to improved biological research and monitoring of all refuge programs and consideration of resource conflicts within the broad management framework of the comprehensive conservation plan. The greatest internal threat to the resources of Lower Suwannee National Wildlife Refuge is the long-range use of the refuge by increasing numbers of visitors. The comprehensive conservation plan allows for the monitoring of wildlife and habitat, as well as impacts by increased public use. The public use program can be restructured, restricted, or eliminated if the cumulative impacts of increased visitation are detrimental to the purpose, mission, and vision of the refuge.

If Alternative A (No Action) is implemented, cumulative impacts may not be identified due to the issue-by-issue, problem-by-problem, fragmented approach currently in place. If Alternative C (Maximize Public Use) is implemented, cumulative impacts would not be identified because all funding and staffing would emphasize public use and not address monitoring and evaluating wildlife and habitat resources. Additionally, due to the expansion of public use facilities beyond clustered areas, it would be difficult to restructure, restrict, or eliminate public use programs to mitigate negative impacts on biological resources.

### *Mitigation and Residual Impacts of the Proposed Action*

No mitigation would be necessary in the adoption and implementation of the proposed/preferred action. Where site development activities are proposed, each activity would be given appropriate National Environmental Policy Act consideration prior to development. At that time, any identified mitigation activities would be designed into the specific project to reduce any significant adverse impacts to the environment.

The refuge would closely monitor and regulate any proposed activities to reduce potential impacts. Consideration would be given to zoning activities by space or time to reduce potential impacts. Public use activities would be monitored and visitation numbers recorded. If wildlife or habitat become negatively impacted, the use would be modified or adjusted accordingly to mitigate such impacts.

