



Local wildlife

Chapter 4 - Environmental Consequences

INTRODUCTION AND METHODOLOGY

The National Environmental Policy Act requires that environmental assessments disclose the environmental impacts of a proposed federal action (e.g., the impact from the implementation of the approved alternative). This chapter provides a discussion of the potential impacts that the two alternatives could have on the outstanding resource values of the Wekiva Wild and Scenic River System: scenic, recreation, wildlife and habitat, cultural resource, and water quality and quantity. The consideration of these effects provides a measurable basis for comparing the advantages and disadvantages of each alternative.

The alternatives presented in this document should provide broad direction on how the river system could be managed. Because the potential consequences of the alternatives are sometimes broad and conceptual, they can be analyzed only in general terms. More detailed environmental documents may need to be prepared before undertaking some specific actions in this environmental assessment.

For each impact topic, a description of the potential positive and adverse effects that could result from the actions proposed in each alternative is presented. This is followed by an explanation of the cumulative effects of any other past, present, and/or anticipated projects. A conclusion statement that briefly summarizes the potential impacts of the respective alternatives follows those discussions.

METHODS OF ASSESSING EFFECTS

When assessing the potential impacts on the outstanding resource values of the Wekiva Wild and Scenic River System, several impact parameters must be analyzed for each alternative. The potential impacts of the two alternatives are described in terms of four

impact measurement criteria. First, the *type* of impact must be determined (i.e., whether the impact is beneficial or adverse). The beneficial and adverse impacts on the river system's values are determined by comparing the anticipated changes resulting from implementing alternative B to the results of continuing current management direction (alternative A). Once it is determined if an impact is beneficial or adverse, the other impact measurement criteria can be assessed, such as *context*, *duration*, and *intensity*. They are defined as follows:

Context: The scope of impacts considered are limited to those that could potentially affect values of the Wild and Scenic River System. The context refers to the setting or geographic scope of the impact to the river resource or value. In this analysis, impacts will be measured relative to the following two context levels:

- **Localized:** Impacts would be limited to a specific site or specific segment of river within 0.25-mile distance from the river.
- **Widespread:** Impacts would occur over a larger area or in multiple areas within the Wekiva River System basin, spring-shed, or ecological corridor.

Duration: The duration refers to the length of time the impact affects the resource or value. In this analysis, impact durations will be defined as follows:

- **Short-term:** Impacts would be one year or less in duration.
- **Long-term:** Impacts would extend beyond one year. Impacts may last for many years, or may be permanent.

Intensity: The intensity refers to the degree of the impact to the river resource or value. The impact intensities will only be measured for adverse effects, and quantified as negligible, minor, moderate, and major.

Because the definitions of *intensity* will vary by type of resource value, the various intensities are defined separately for each impact topic analyzed in this document. However, the definitions for *duration*, *type*, and *context* apply to all impact topics. The impact analyses were derived through professional judgment, from research, and from the study of previous projects that had similar effects.

CUMULATIVE EFFECTS

The regulations of the CEQ, which administers NEPA, require that cumulative effects be assessed in the decision-making process for federal projects. Cumulative effects are defined in 40 CFR 1508.7 as follows:

... the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions.

In this document, the cumulative impacts have been considered for all impact topics and both alternatives.

To determine potential cumulative impacts, other projects and actions in the Wekiva River watershed, springshed, and ecological corridor that contribute impacts to the Wekiva Wild and Scenic River System were identified. Staff from various agencies were consulted and research was conducted to develop the list below.

Current and Reasonably Foreseeable Actions

Other planning or development activity now being implemented or that would be implemented in the reasonably foreseeable future was considered in identifying cumulative actions. Such actions are considered in conjunction with the effects of

each alternative to determine if they would have any additive effects on a particular natural resource, cultural resource, or visitor use. Some of these actions are in the early planning stages, so the evaluation of cumulative effects was based on a general description of the project. Because the specific effects of some actions cannot be determined at this time, the cumulative impact analysis is qualitative and general.

Land Use and Development. Urban and suburban land development in unincorporated lands of Lake, Orange, and Seminole counties, as well as in several municipal jurisdictions, has had and will continue to have effects. Nearby communities such as Apopka to the southwest, Altamonte Springs to the south, Lake Mary to the east, and the unincorporated area of Sorrento to the west have had considerable expansion over the last decades. Residential subdivisions, such as in the Markham Woods area, have been constructed on previously undeveloped lands east of the Wekiva River. County and other building codes require a setback from the river's edge for houses, but there are direct impacts to the river when access (docks, boat ramps, etc.) is created.

Continued urban and suburban growth and development could lead to the following:

- increased light pollution and adverse effect on dark night skies
- more recreation pressure
- impacts on water as increased demands draw down the aquifer or tap surface waters
- the introduction of chemicals (fertilizers, pesticides, etc.) to the watershed and springshed from development and agriculture.
- more traffic on roads that cross the rivers (i.e., more noise and potential pollution)
- more development that could fragment habitat or sever wildlife corridors

- an increase in impervious surfaces from development may affect groundwater recharge as percolation patterns are affected

Wekiva Parkway. The Orlando-Orange County Expressway Authority and the Florida Department of Transportation are in the planning process for the Wekiva Parkway, a four-lane parkway that would traverse the planning area and cross the Wekiva River at the current SR 46 bridge crossing. The 2004 Wekiva Parkway and Protection Act authorizing this major road construction project requires that the parkway help to protect area resources in several ways:

- Extensive wildlife crossings: Currently, two wildlife tunnels under SR 46 in east Lake County provide a total of 78 feet of safe crossing for animals including deer, bobcat, coyote and bear. As presently planned, construction of the Wekiva Parkway/SR46 redesign would replace the tunnels with two wildlife bridges totaling nearly 6,000 feet — more than 76 times the current crossing space. Also, the parkway would replace the 561-foot Wekiva River bridge with one about 2,150 feet long.
- Another 800-foot-long bridge is also planned for part of the Wekiva Parkway that bisects one of the properties acquired for conservation as part of the parkway project.
- Longer bridges: Longer bridges will enhance habitat connectivity by providing animals with greater opportunities to safely move between Rock Springs Run State Reserve and Seminole State Forest.
- Realigning County Road 46A: Closing the portion of CR 46A through Seminole State Forest will reduce the number of animals harmed by vehicles and provide greater habitat connectivity in the forest.

Recreation Development. Facilities at three state parks, Seminole State Forest,

county parks, and private enterprises created outlets for outdoor recreation in the region. Various improvements can be anticipated. Possible expansions in facility development and commercial uses on various private properties (e.g., amenities and facilities for recreation and other active commercial uses at sites such as Wekiva Falls Resort, Wekiva Island, and other similar commercial operations.)

- Improvements at the Wekiva River Basin State Parks (e.g., Katie's Landing access and picnic area development) allow for safer and more convenient access to the river for recreationists and may increase the level of use. Planned development of a new interpretive center convenient to the three state parks would increase the level of information and education visitors receive about the area and the river. This could lead to an increased stewardship ethic among river users.
- The Florida Division of Recreation and Parks is working with partners to maintain the Florida National Scenic Trail in Lower Wekiva River Preserve State Park and is planning to develop an extension of the West Orange Trail along the western perimeter of Wekiva Springs State Park.
- Lake County, Seminole County, and private interests are planning development of public recreational trails through the basin and crossing the Wekiva River either at the Wekiva Parkway bridge or a new bridge constructed along the old railway crossing south of SR 46. The Florida Department of Transportation is assessing the feasibility of incorporating the trail crossing with the Parkway bridge.

Agency Regulatory Actions. Numerous federal, state, and local agencies have and will continue to have a regulatory role in the protection of natural resources affecting the Wekiva River system including the quality and quantity of surface and ground water, wildlife, habitat, and land use. (See the description of agency regulatory roles in

chapter 2 under alternative A.) These agencies include:

- Florida Department of Environmental Protection
- Florida Fish and Wildlife Conservation Commission
- Florida Department of Agriculture and Consumer Services
- Florida Department of Health
- Florida Department of Community Affairs
- St Johns River Water Management District
- Seminole, Lake, and Orange counties and various municipalities
- Lake County Water Authority
- National Park Service (pursuant to the Wild and Scenic River Act)
- U.S. Fish and Wildlife Service
- U.S. Army Corp of Engineers

Past Actions

The following past actions have contributed to cumulative effects on the Wekiva Wild and Scenic River System:

Agriculture. In the past, lands throughout the Wekiva River watershed and springshed were directly and indirectly affected by agricultural land uses that ranged from intensive citrus farming to cattle and sheep grazing. As a result, large acreages of native vegetation communities have been displaced to accommodate these uses. These land use activities have led to the loss and fragmentation of habitat and wildlife populations, caused an alteration of soil strata, and introduced several nonnative plant species to the area. One of the most significant and long-lasting impacts from agricultural land uses in the Wekiva River basin and springshed stems from the use of fertilizers. Because the Wekiva River System is very dependent on groundwater discharge (i.e., spring flow), the river's water quality is

directly correlated to the water quality of the groundwater throughout the river's springshed. Nitrogen from agricultural fertilizers that migrates into the groundwater of the springshed continues to discharge into the surface water via the many springs in the area. This nitrogen feeds algal blooms and other invasive vegetation that can displace native aquatic vegetation and reduce dissolved oxygen in the river system and springs.

Because groundwater may take several years or even decades to move horizontally and vertically through the deep and shallow aquifers in the springshed, fertilizer use from past years continues to have adverse effects on surface water quality in the basin. Although most large agricultural operations have been replaced, there are plant nurseries and tree farms in the area using fertilizers and pesticides.

Urban and Suburban Development. A variety of widespread development actions have occurred in the region.

Over time, privately owned land that was previously undeveloped or in some form of agriculture (such as citrus groves, orchards and livestock operations, or silviculture) have been gradually replaced by residential, commercial, and industrial development. Much of this development has occurred in an inefficient pattern of urban and suburban sprawl that has negatively affected natural resources, including species, habitat, and water resources. This pattern of development has been coupled with an extensive network of roads and infrastructure that has contributed to habitat fragmentation. Furthermore, the widespread use of septic tanks, wastewater treatment plants, fertilizers, and pollution have contributed to degradation of surface and ground water quality.

The creation of Walt Disney World and other major tourist attractions in the Orlando area in the 1970s greatly accelerated the spread and level of development.

Construction of the SR 46 bridge over the Wekiva River created a narrowing of the river channel. This narrowing has resulted in unnatural downcutting (or deepening) of the river bed.

The greatest offset to the negative impacts of development in the region has been the public acquisition of land for preservation surrounding the Wekiva River System; however, critical gaps remain in this conservation landscape.

Assumptions

Several assumptions have been made about past, present, and future conditions in the region so that the cumulative effects could be analyzed, particularly in regard to future actions. The following assumptions apply to this assessment:

- The types of river uses that are occurring now will continue, and in addition there may be new, different future uses.
- Additional land development for commercial and residential land uses, recreation, tourism, agriculture, and road construction have occurred, are occurring, and will continue to occur, which could put greater stress upon values of the Wekiva River System because of habitat loss, fragmentation, degradation of water resources, and recreational impacts.
- Local and state stormwater management regulations will continue to control how stormwater is released from developed lands in the watershed.
- The growing population in the region will generate increased recreation and public access pressure on the river system. This growing pressure will result from the decline in other available natural areas and local residents' preference to use the Wekiva River System as community and/or neighborhood recreation area.
- Although efforts to minimize impacts are occurring, land uses in rural areas of the watershed and the springshed, such as agriculture, wastewater disposal, and the application of landscape fertilizers, will continue to be a source of nutrient loading and pollutants into the surface and ground water that feeds the Wekiva River System.
- The flows of surface and ground water in the Wekiva River System will continue to be directly affected by weather patterns and trends that will increase or decrease flows (floods, hurricanes, droughts, etc.).
- Public land managers will continue to implement and revise management plans that describe intended management activities, including the use of prescribed fire.

SCENIC VALUES

METHODS OF ASSESSING EFFECTS

To provide a measurement for quantifying the intensity of the impacts on scenic values, the definitions for the impact intensity and thresholds are included below.

Negligible: The action would not have any noticeable or measureable changes to natural scenery, natural sounds, or other natural aesthetics on the river system, as seen or heard from the river system or from adjacent vantage points along the shorelines.

Minor: The effects on scenic or aesthetic value would be detectable and measurable, but very limited in scale and degree. The action would change natural scenery, natural sounds, or other natural aesthetics on the river system, but the effects would be of little consequence and would not disturb or improve the visitors' experience on the river system or its shorelines.

Moderate: The effects on scenic or aesthetic value would be apparent and would have some influence on the visitor experience. The action would change natural scenery, natural sounds, or natural aesthetics that would have notable consequences that are either intrusive or beneficial to the visitors' experience on the river system or along shorelines. However, the consequences are not widespread, severe, or exceptionally favorable.

Major: The effects on scenic or aesthetic value would be very apparent and would have direct and substantial influence on visitor experience. The action would result in considerable changes to natural scenery, natural sounds, or natural aesthetics that would have widespread, severe, or exceptionally favorable consequences that are either very intrusive or very beneficial to the visitors' experience on the river system or along shorelines.

EFFECTS OF ALTERNATIVE A

Analysis

The scenic values and aesthetic resources of the Wekiva Wild and Scenic River System could be affected by the following.

Invasive and Exotic Vegetation. Despite active, multiagency control efforts, the proliferation of invasive and/or exotic vegetation is a continuing challenge throughout the basin in all waters of the Wekiva River System. This threat would likely continue in the future and might worsen over time if the native natural communities get further stressed by encroaching development, public use, and nutrient loading of the river system. If the invasive vegetation became dominant, it would crowd out more diverse native plants and take over entire reaches of the river system, diminishing its scenic values. Also, although the cattail (*Typha latifolia*) is considered a native plant, it has posed recurrent problems to the river system by choking off various segments of the rivers from time to time.

A significant threat to scenic value is the proliferation of algae often seen coating native eel grass beds and rocks within the river system and spring runs. Excessive growth of algae, hydrilla, and other invasive aquatic species could be caused by elevated nitrate levels within the springshed and surface water drainage basin.

Alternative A would continue the current multiagency control efforts and expand these efforts if and when additional funding becomes available.

Contractors for the Bureau of Invasive Plant Management do much of the exotic vegetation control, with assistance from the Florida Park Service and the Wekiva River Aquatic Preserve. These existing efforts are aggressive,

intensive, and often temporarily successful in controlling various invasive species. Occasionally, the efforts are not enough in some river segments (e.g., in years when invasive plant proliferation is substantial). Generally, for controlling invasive plant effects on scenic and aesthetic values, the continued treatment actions under alternative A would have a minor to moderate beneficial effect.

Litter. Litter on the surface, bottom, and shoreline of the river channels is a recurring problem in several areas of the Wekiva River System. This litter diminishes the scenic and aesthetic value for people accessing the river system for its scenery and wild surroundings. Alternative A would continue the current litter cleanup efforts, which are effective and successful when conducted. However, these efforts are not enough to control litter to a point where it doesn't affect scenic value. The aquatic preserve conducts about 12 cleanups per year with assistance from volunteers. The aquatic preserve staff also assists in cleaning litter on the water surface and shoreline during other management activities on the rivers. Divers and snorkelers are periodically used to clean up litter off the bottom of the river. Independent volunteer groups also perform occasional cleanups.

For controlling the effects of litter on scenic values, the continued cleanup actions under alternative A would have a continuing beneficial effect.

Shoreline Vegetation. The loss of natural shoreline and riparian vegetation caused by residential development is quite evident along the Wekiva River in the recreational segment north and south of the SR 46 bridge. Houses, associated residential structures, docks, shoreline decks, and the cleared vegetation around such structures have considerable adverse effects on the scenic and aesthetic values of the river system. Because alternative A maintains the status quo of agency involvement and action on this issue, this alternative would have no new effect on the preservation of natural shorelines. The shoreline impact is

particularly noticeable on the residential developments that were constructed before the implementation of local government land use regulations that require setbacks and riparian habitat protection. The wild and scenic segments of the river system are generally free of these visual disturbances.

In addition to residential development, public access and recreational uses also contribute to the loss of natural shorelines and riparian vegetation in some areas. Impacts are seen at public access points or commercial locations, and also in undeveloped areas. This site-specific shoreline impact often results from vegetation trampling by boaters taking breaks off the river. These impacts occur at unofficial canoe takeouts, at social trails along the shoreline, and at active, unofficial shoreline recreation sites (e.g., rope swings, wading areas, etc.). Alternative A would not change current protection of the scenic quality of natural shorelines from these recreation and land development activities. Thus, with the anticipated future increase in recreation demands on the river, alternative A would continue impacts on scenic values that are long term, minor, adverse, and localized.

Middens. Similar to the previous issue of shoreline development and vegetation trampling, the many shell middens along these waterways also contribute to the scenic and aesthetic value of the Wekiva River System. However, vandalism, disturbances, vegetation trampling, and the use of the middens as on-river restrooms all result in a notable visual disturbance to the resource. These activities and their impacts are currently monitored by various state agency staff. However, enforcement is limited, resulting in a continued adverse effect on scenic and aesthetic values. With the anticipated future increase in recreation demands on the river, alternative A would have an impact on the scenic values of the middens that is long term, minor, adverse, and localized.

Recreation Demand and Crowding. The scenic and aesthetic value of the river system is diminished on busy recreation days when

many motorboaters, canoeists, kayakers, and/or tubers populate the Wekiva River, Wekiwa Springs Run, and/or Rock Springs Run. Adverse visual impacts of many boats in the viewshed and noise disturbances from loud boats and individuals are common on heavily used river segments on such days. This visual and aesthetic impact would continue to be an issue because the river system has several access points (both public and private), and because a systemwide user capacity limit has not been established. Alternative A would maintain the status quo in terms of managing this impact. Thus, alternative A would have a negligible effect on controlling visual and noise disturbances from recreational use and crowding on the river system. With the expected increase in population and recreation demand on the river system in the future, alternative A would continue to have an impact from recreation use on scenic values that is long term, minor to moderate, adverse, and localized.

Motorized Watercraft. The noise, gasoline fumes, and water disturbances caused by motorized watercraft on the Wekiva River could generate adverse impacts on the river's scenic and aesthetic value. In particular, loud motors, gasoline fumes, and wakes from fast-moving watercraft (boats or personal watercraft) disrupt the otherwise serene air and water conditions that are common to the Wekiva River. Alternative A would not result in a reduction of these impacts. These impacts from motorized watercraft on the scenic values of the Wekiva River System would likely not change under alternative A. With the anticipated future increase in the use of motorized watercraft on the river, alternative A would continue to have long-term, minor to moderate, adverse, and localized impacts.

Cumulative Effects

Roads, Bridges, and Trails in the River Viewshed. The proposed Wekiva Parkway and its proposed bridge to replace the existing SR 46 bridge might add to the intrusiveness of human impact on the river system, both

visually and audibly. The Wekiva Parkway and the new bridge will be larger than the existing two-lane road and bridge. This could create a notable increase in visual disturbance to the river corridor's viewshed. In addition, the anticipated higher speeds and volume of vehicles on the new bridge, particularly trucks, could create additional noise disturbances in this segment of the river. The Wekiva Parkway bridge is currently in the design and review stage. To date, various agencies and organizations with interests in the Wekiva River System have raised concerns regarding the bridge design in an attempt to minimize and mitigate impacts. The SR 44, CR 44A, and Lake Norris Road bridges over Black Water Creek also disturb the scenic values of the river system on Black Water Creek. Members of the advisory management committee would continue to work with state and local agencies concerning road, trail, and bridge construction to mitigate adverse impacts on scenic and aesthetic values of the river system. If successful, these continuing actions would have long-term, beneficial impacts.

Also, a regional trail connection across the Wekiva River is being planned. Lake County and Seminole County support an intercounty trail connection. Trail alignment and crossing alternatives include the use of the proposed Wekiva Parkway bridge, as well as a possible new bridge across the Wekiva at the old railroad crossing south of SR 46 (using existing railroad bridge abutments). To date, members of the advisory management committee have been involved in the trail planning discussions and have expressed concerns about the impacts of either trail alternative on the Wekiva Wild and Scenic River System. Alternative A would maintain the existing level of involvement in the planning, design, and review of the Wekiva Parkway bridge and the possible regional trail bridge.

Although a certain amount of coordination between transportation and conservation agencies and nonprofit organizations has occurred, piecemeal decisions regarding transportation infrastructure could have adverse impacts on scenic values over time

that could be long term, minor to moderate, adverse, and localized.

Light Pollution. Artificial light pollution associated with residential and commercial land development near the Wekiva Wild and Scenic River System has adverse effects on the dark skies over the river corridor and surrounding lands. The effects could be localized or widespread (e.g., lights from developments shining along shorelines or a brightened night sky from nearby urbanized areas, respectively). The current actions under alternative A would have a negligible effect on this threat to the scenic values of the Wekiva River System. The impact of light pollution would likely increase in the future because population growth and continued urban expansion is expected throughout many areas of the Wekiva River basin. Therefore, alternative A would continue to have an impact that is long term, minor to moderate, adverse, and widespread.

Overall. As discussed above, scenic and other natural aesthetic values in the river system corridor could be adversely affected by continued private land development along the shorelines (e.g., docks), road and bridge development, and light pollution along shorelines and overhead from nearby urbanized areas. In addition, the scenic and aesthetic value of the Wekiva River System would also continue to be adversely affected by noise from commercial jets flying overhead to and from the nearby Orlando Sanford International Airport. The continued and possibly increasing uncontrolled public access to the river system would also continue to have adverse effects on the scenic and aesthetic values of the river system. For example, future expansions of the private commercial boating operations along the river system could have adverse effects (e.g., Wekiva Island, Wekiva Falls Resort). Many of these threats and impacts would likely increase or worsen in the future because of the projected increases in population growth and recreational demand in the future. Collectively, these actions would continue to have an impact that is long term,

minor to moderate, adverse, and localized to widespread.

Alternative A would continue to maintain the existing level of action on these issues. A continuation and increase of existing impacts to scenic values would be expected under alternative A. As a result, the effects of these other actions and trends, combined with the effects of alternative A actions, could result in long term, minor to moderate, adverse, and widespread cumulative impacts. The impacts of alternative A on the scenic values would comprise a small portion of this overall adverse cumulative effect.

Conclusion

Implementing alternative A would result in a continuation of status quo policies and management actions that relate to scenic and aesthetic values of the Wekiva River System. Thus, this alternative would have a long-term, adverse impact that ranges from minor to moderate and localized to widespread. The continuation of adverse impacts would primarily be caused by: invasive and exotic vegetation, litter, loss of shoreline vegetation, degraded midden appearance, recreation overcrowding, motorized watercraft, highway and bridges in the river viewshed, and light pollution.

The effects of various other actions combined with the effects of alternative A could result in long term, minor to moderate, adverse, and widespread cumulative impacts. The impacts of alternative A on the scenic values would comprise a small portion of this overall adverse cumulative effect.

EFFECTS OF ALTERNATIVE B

Analysis

Implementing alternative B, the preferred alternative, would increase management emphasis and interagency coordination on preserving the scenic and aesthetic values on

the Wekiva Wild and Scenic River System. This holistic and collaborative approach could strengthen the protection and enhance these values when compared to the current conditions and management efforts. The scenic and aesthetic value of the Wekiva River System could be affected by the following.

Invasive and Exotic Vegetation. As described in alternative A, despite active, multiagency control efforts, the proliferation of invasive and exotic vegetation is a continuing challenge throughout the Wekiva River System. If the invasive vegetation becomes dominant, it would crowd out more diverse native plants and take over entire reaches of the river system, thus diminishing scenic values.

Alternative B would continue the existing multiagency invasive and exotic vegetation monitoring and control efforts for species such as hydrilla, water hyacinth, wild taro, elephant ear, para grass, Chinese tallow, East Indian hygrophylla, and cattail. These efforts would increase if and when additional funding becomes available. Contractors for the Bureau of Invasive Plant Management would continue to work with the assistance from the Florida Park Service and the Wekiva River Aquatic Preserve on this matter. Alternative B also calls for a coordinated effort by the advisory committee, agencies, and local governments to advance strategies for reducing nutrient loading from surface and ground water sources, which in turn would limit the excessive growth of algae and other invasive aquatic species. Generally, for controlling invasive plant effects on scenic values, alternative B would result in an impact that is long term, beneficial, and localized to widespread.

Litter. Litter on the surface, bottom, and shoreline of the river channels is a recurring problem in some areas of the Wekiva River System. This litter diminishes the scenic and aesthetic value for people accessing the river system for its scenery and wild surroundings. Alternative B would continue the current litter cleanup efforts, which are effective and suc-

cessful when conducted (as described in the alternative A analysis above). However, alternative B would also make a distinct effort at reestablishing and strengthening the Adopt-A-River program such as has been established by Seminole County, which would provide direct assistance in monitoring and removing litter in the Wekiva River System. As for public education efforts, alternative B would promote events and media announcements that encourage the public to directly experience and learn about the Wekiva Wild and Scenic River System and understand its status and health. An informational “branding initiative” for the Wekiva Wild and Scenic River System would complement these outreach efforts, with unified signs at all river crossings and access points.

Furthermore, this alternative would expand current partnerships with private businesses and concessioners who operate on the Wekiva River System to ensure that their activities protect wild and scenic river values and provide unified, supportive messages to their clients about the Wekiva River System and guidelines for its use. This active public awareness and outreach effort could help with litter control by making boaters and other river users more aware of the effects of their actions on the river system. In terms of litter control, alternative B would result in an impact that is long term, beneficial, and localized.

Shoreline Vegetation. The loss of natural shoreline and riparian vegetation caused by residential development is quite evident along the Wekiva River in the recreational segment north and south of the SR 46 bridge. Houses, associated residential structures, docks, shoreline decks, and vegetation clearing around such structures have substantial adverse effects on the scenic values of the river system. Alternative B includes actions aimed at improving the regulatory control and code enforcement of development near the Wekiva River System. To minimize visual disturbance, alternative B would clearly state the objective of making sure waterfront development regulations are enforced and effective by working with local governments.

These efforts would emphasize the protection of native vegetation along the riparian corridors and limitation and minimization of visual impacts from signs and river-based structures (e.g., docks, launch areas, and overlooks within the Wekiva River System).

If necessary, alternative B would also promote the improvement or expansion of local government regulations on these riverfront activities and structures (beyond what is currently regulated). These efforts would be complemented by an educational program aimed at local government planners and decision makers to provide information about the river system and strategies for protection. In addition to effects on private land development in the river corridors, alternative B also has an objective to implement and strengthen development guidelines, regulations, and practices related to public recreational areas on the Wekiva River System. These guidelines and practices would emphasize preservation of native vegetation, minimized land clearing, minimized structures, and reclamation plantings.

Secondly, alternative B would help address the problem of shoreline vegetation trampling from public access and recreational use. These impacts often result from boaters taking breaks along the river, and occur at unofficial canoe takeouts, at social trails along the shoreline, and at active shoreline recreation sites. All of these activities have adverse effects on the scenic and aesthetic value of the Wekiva River System. With the projected increase in recreation demand and regional population in the future, these threats to the scenic value would likely increase or worsen if not actively addressed. Alternative B would include an expansion of current partnerships with private businesses and concessioners who operate on the Wekiva River System, including a public awareness/outreach component.

This alternative would also include efforts that educate the public via events and media announcements that encourage the public to directly experience and learn about the Wekiva Wild and Scenic River System and

understand its status and health. An informational “branding initiative” for the Wekiva Wild and Scenic River System would complement these outreach efforts, with unified signs at all river crossings and access points. These efforts could help reduce shoreline impacts by making boaters and other river users more aware of the implications of their actions on the river. As a result of the various alternative B objectives described above, the impacts of shoreline vegetation on scenic values could be long term, beneficial, and localized to widespread.

Middens. Similar to the previous issue of shoreline development and vegetation trampling, the many shell middens along these waterways also contribute to the scenic and aesthetic value of the Wekiva River System. However, vandalism, disturbances, vegetation trampling, and the use of the middens as on-river restrooms all result in a notable visual disturbance. Alternative B includes a series of objectives and actions that would protect the middens as cultural resource sites. This alternative includes enhanced efforts to monitor and protect cultural resources, including middens, as well as to educate the public regarding their significance. In addition, actions described earlier to protect shoreline vegetation as part of alternative B would also have the beneficial effect of protecting midden sites.

Actions in alternative B would result in impacts that are long term, beneficial, and localized.

Recreation Demand and Crowding. As described in alternative A, the scenic and aesthetic value of the river system is diminished on busy recreation days when many motorboaters, canoeists, kayakers, and/or tubers populate the Wekiva River, Wekiwa Springs Run, and/or Rock Springs Run. Adverse visual impacts of many boats in the viewshed and noise disturbances from loud boats and visitors are common on heavily used river segments on such days. The objectives and actions for recreation management in alternative B could help remedy this issue if

they are done effectively. By completing a recreation assessment, creating a recreation facility master plan, partnering with private businesses and concessioners, assessing and monitoring user capacity (see “User Capacity” section in chapter 2) thresholds for visitor experience, and developing several public education programs, alternative B could have a positive effect on controlling visual and noise disturbances from heavy recreational use on the river system. As recreation pressure increases in the Wekiva River System, these actions of alternative B could result in impacts that are long term, beneficial, and localized to widespread.

Motorized Watercraft. As in alternative A, the noise, gasoline fumes, and water disturbances caused by motorized watercraft on the Wekiva River could generate adverse impacts on the river’s scenic and aesthetic value. The objectives and actions for recreation management, scenic value protection, and public education in alternative B would help minimize these adverse effects from motorized watercraft. The alternative B actions would include supporting motorized watercraft restrictions on Rock Springs Run and Black Water Creek. Use and noise levels from watercraft would be assessed and monitored. Regulations affecting the number of watercraft, speed, and noise for various segments of the river system would be improved and enforced. As a result, alternative B could result in impacts that are long term, beneficial, and localized to widespread.

Cumulative Effects

Roads, Bridges, and Trails in the River Viewshed. The proposed Wekiva Parkway bridge (to replace the existing SR 46 bridge) might add to the intrusiveness of human impact on the river, both visually and audibly. The new bridge will be larger than the existing bridge. This could create a notable increase in visual disturbance to the river corridor’s viewshed. In addition, the anticipated higher speeds and volumes of vehicles on the new bridge, particularly trucks, could create

additional noise disturbances in this segment of the river. The Wekiva Parkway bridge is currently in the design and review stage.

The SR 44, CR 44A, and Lake Norris Road bridges over Blackwater Creek also disturb the scenic values of the river system on Blackwater Creek. Alternative B includes objectives and actions that encourage the Florida Department of Transportation and Lake County to pursue a new alignment and design of the SR 44 and CR 44A junction so that only one bridge crossing of Blackwater Creek is necessary at that location.

Alternative B would also include an action that works to ensure that no new roads for motor vehicles are constructed across waters of the Wekiva River System. This could result in an impact that is long term, beneficial, and basin-wide.

Also, as discussed in the impact analysis of alternative A, a regional trail connection across the Wekiva River is being considered by Seminole County and Lake County. Two possible alignments/crossings are along the proposed Wekiva Parkway bridge and across a new bridge south of SR 46 at the old railroad alignment. Members of the advisory management committee have been involved in the trail planning discussions and have expressed concerns about the impact of new bridge on the Wekiva Wild and Scenic River System. Alternative B includes an action to ensure that any trails for bicycle or pedestrian use across the river system would minimize visual intrusion.

Light Pollution. Artificial light pollution associated with residential and commercial land development near the Wekiva Wild and Scenic River System has adverse effects on the dark skies over the river corridor and surrounding lands. The effects could be localized or widespread (e.g., lights from developments shining along shorelines or a brightened night sky from nearby urbanized areas, respectively). Alternative B includes an action that promotes the establishment of local government regulations that limit the intrusion of

artificial light to protect dark skies within the river corridor. These efforts would be complemented by educational programs that would provide information about the wild and scenic river system and the importance of dark nighttime skies. This alternative also includes an action that would discourage exposed lighting on the proposed Wekiva Parkway bridge. As a result, alternative B could result in impacts that are long term, beneficial, and localized to widespread.

Overall. As discussed above and in alternative A, scenic and other natural aesthetic values in the river system corridor could be adversely affected by continued private land development along the shorelines (e.g., docks), road and bridge development, and light pollution along shoreline and overhead from nearby urbanized areas. In addition, the scenic and aesthetic value of the Wekiva River System would also continue to be adversely affected by noise from commercial jets flying overhead to and from the nearby Orlando Sanford International Airport. The continued and possibly increasing uncontrolled public access to the river system would also continue to have adverse effects on the scenic and aesthetic values of the river system. For example, future expansions of the private commercial boating operations along the river system could have adverse effects (e.g., Wekiva Island, Wekiva Falls Resort).

Collectively, these other actions would have an impact that is long term, minor to moderate, adverse, and localized to widespread. Many of these impacts could

worsen in the future because of continued population growth and recreation demand. However, alternative B includes multiple objectives and actions that might help minimize or mitigate the impact of these threats, and thus would contribute to protecting scenic values from these cumulative effects. This means that alternative B could have an impact that is long term, beneficial, and widespread. The effects of these other actions, together with the effects from alternative B described above, would result in long term, minor, adverse cumulative impacts on scenic values. However, the impacts of alternative B actions on the scenic values would comprise a relatively small portion of the overall cumulative effect.

Conclusion

Compared to alternative A, the coordinated, multiagency actions included in alternative B could contribute to the protection of scenic values of the Wekiva Wild and Scenic River System. Thus alternative B would have long-term, beneficial impacts that range from localized to widespread.

The effects of other actions, together with the effects of alternative B actions described above, would result in long-term, minor, adverse cumulative impacts. However, the impacts of alternative B actions on the scenic values would comprise a relatively small portion of the overall cumulative effect.

RECREATION VALUES

METHODS OF ASSESSING EFFECTS

To provide a metric for quantifying the intensity of the impacts on recreation values, the definitions for the impact intensity and thresholds are included below:

Negligible: The action would not have any noticeable or measureable changes to available recreational opportunities on the river system or to the recreational experience for the visitor. River users would likely be unaware of any associated effects.

Minor: The effects on recreation values would be detectable and measurable, but very limited in scale and degree. The action would yield changes to available recreational opportunities on the river system or to the recreational experience for the visitor, but the effects would be of little consequence.

Moderate: The effects on recreation values would be apparent and would have some influence on the visitor experience. The action would yield changes to available recreational opportunities or to the recreational experience that would have notable consequences that are either intrusive or beneficial to the visitors' experiences on the river system. However, the consequences are not widespread, severe, or exceptionally favorable.

Major: The effects on recreation values would be very apparent and would have direct and substantial influence on visitor experiences. The action would yield considerable changes to available recreational opportunities or to the recreational experience that would have widespread, severe, or exceptionally favorable consequences that are either very intrusive or very beneficial to the visitors' experiences on the river system.

EFFECTS OF ALTERNATIVE A

Analysis

The recreation values of the Wekiva Wild and Scenic River System could be affected by the following.

Recreation Demand and Crowding. The recreation values of the Wekiva River System become limited or degraded on busy days when many swimmers, motorboaters, canoeists, kayakers, and/or tubers populate the Wekiva River, Wekiwa Springs Run, and/or Rock Springs Run. Generally, as the number of river visitors increases, the number of visitor conflicts increases and the quality of the visitor experience decreases. This results from overcrowding in the river, which limits the available water for free and uninhibited river recreation. As population growth continues throughout the region, the recreation demands would likely increase, compounding the issue further. Currently, there are no coordinated, interagency systems in place to measure, monitor, and regulate the increasing recreation demands on the overall river system and the competing recreational uses of different sections on the river system. Alternative A would maintain the status quo on management of this issue. Thus, alternative A would have an impact on recreation values that would continue to be long term, minor, adverse, and localized to widespread.

Public and Private Access to the River System. Much of the Wekiva River, Wekiwa Springs Run, and Rock Springs Run lie within public lands (e.g., state parks, state forest). Official river access points on the public lands are controlled and limited to a very few number of sites. Given the limited number of public access points, visitor use capacity could be effectively monitored and managed at these public access areas. Many of these public access sites already have established restrictions on the numbers of tubes and boat rentals

they allow or on the number of vehicles allowed into the respective park. However, in these cases, visitor volume is restricted according to the individual site management plans, which might not take into account the volume of users from other access points along the water.

Private access to the river system exists at many locations, particularly along the Wekiva River. In addition to private boat rental sites and ramps such as Wekiva Island, Wekiva Falls Resort, and Kings Landing (on Rock Springs Run), every private property along the Wekiva River has rights under Florida statute for access to the water. The volume of watercraft is not controlled at these private access sites. Alternative A maintains the current management actions affecting private and public access to the Wekiva River System. Thus, as it relates to visitor use capacity issues, alternative A would have an adverse effect on the recreation values of the river system as recreation demands increase in the future. The resulting impact would continue to be long term, minor, and adverse.

Shoreline Rest Stops and Campsites.

Designated shoreline campsites along the river system are quite limited (six total). Rock Springs Run has three designated campsites, the Wekiva River has one, and Black Water Creek has two. Pull-out areas and rest stop sites along these waterways are also limited. The only designated places currently available to pull out, rest, or picnic are at the designated campsites or at park landings and marinas. If the campsites are already occupied, the number of available designated rest stops decreases. Although most boaters only access the rivers via designated entry/exit points, many visitors currently are getting out of their boats and using nondesignated sites for resting, picnicking, and camping (including midden sites). Some areas are being used heavily as party spots for various groups. This uncontrolled access often has other adverse impacts on natural and cultural resources and aesthetic values of the river system. This issue would be compounded as recreational use increases.

Alternative A would maintain the status quo in managing and enforcing shoreline camping and resting sites. As a result, alternative A would continue to have an impact on the recreation values related to shoreline rest stops and campsites of the river system that is long term, minor, adverse, and widespread.

Navigational Hazards. Boat navigation hazards, such as downed trees and other vegetation, are a recurring problem and are removed as soon as possible by various land and water management agencies according to established policy. Immediately after storms, however, there might be multiple areas that are blocked by fallen trees or other debris. During times of low water levels, navigation can be very difficult in some areas when underwater logs, branches, and other obstructions are closer to the water surface. However, this challenging setting can contribute to the “wild” nature of the boating experience. Alternative A would continue the status quo in managing and removing navigational hazards in the Wekiva River System. As a result, with regard to navigational hazards, alternative A would continue to have a long-term, beneficial effect on recreation values.

Motorized Watercraft. Motorized watercraft could disturb and compete with more passive recreational visitors such as canoeists and kayakers, particularly those going on the river system for nature appreciation and wildlife observation. The noise and wake generated by most motorized boats have adverse effects on these users. Use of motorized watercraft on the Wekiva River System also could cause disturbance to submerged vegetation, such as eelgrass beds, and create shoreline wake impacts that cause erosion. These effects would likely increase as boating demands on the river system increase in the future.

An increase in the use of personal watercraft (e.g., jet skis) along the river corridor is also likely. Jet skis contribute to user conflicts and environmental damage. The ability of jet skis to access very shallow water allows them to

access areas where only nonmotorized boats could otherwise access. The noise from these crafts also disturbs other people on the waterway. The availability, small size, and speed of these craft make them attractive to young or inexperienced operators and lead to serious safety concerns. Since no coordinated effort is currently in place to regulate the volume of watercraft use where it is permitted and since use is likely to grow, alternative A would have an impact on recreational values from motorized watercraft that is long-term, minor to moderate, adverse, and localized to widespread.

Restroom Facilities. With the exception of the centralized restroom facilities at adjacent state parks, sanitary facilities are currently lacking along the river system. Given the unavailability of restrooms, users who access various shoreline sites throughout the basin for swimming, picnicking, or camping often use the waterways, banks, and the immediate uplands and middens as restrooms. This results in unsanitary conditions at several heavily used recreation sites along the shoreline and middens. Alternative A maintains the status quo management and planning for restroom facilities, and thus would continue to have long-term, minor, adverse effects on the recreation values with respect to the need for restroom facilities.

Public Education and Interpretation. Education and resource interpretation programs in public recreation areas are integral to making the public aware of various natural and cultural resources and issues, site history, stewardship opportunities, preferred visitor behavior guidelines, and official regulations. Educational and interpretive signs are the most common and widespread medium used for such programs. Currently, educational and interpretive signs are relatively limited and/or dispersed along the Wekiva River system. Given the number of river users and the multiple access points, many visitors to the river system might not be informed of important information that might otherwise affect their experience on the river or might alter their behavior while on the river. If visitors become

more aware of the issues affecting the river system and its values, they might be more willing and likely to avoid behaviors that have adverse impacts on natural and cultural resources and to the experience of other visitors.

Alternative A would maintain the current level of activities and actions that relate to visitor education. As a result, this alternative would have a continuing beneficial effect on the recreation values in terms of public awareness efforts.

Cumulative Effects

Recreation values of the Wekiva River System could be adversely affected by development and population increases in the region. Expanded or new river boating operations along the Wekiva River System could accompany this growth. If unrestricted private and public access to the rivers continues in the future (i.e., without visitor use capacity limits), this projected recreation demand increase could have substantial effects on the recreation values of the river system. Overcrowding and user conflicts could become problematic. These actions and trends could have an impact that is long term, minor to moderate, adverse, and widespread. Because alternative A maintains the current management levels related to the effects of increased recreation demand and river accessibility, a continuation and increase of current impacts on the recreation values could be expected. Thus, the impacts of these recreation demands, combined with the impacts of alternative A actions, could result in long-term, minor to moderate, adverse, and widespread cumulative impacts. The impacts of alternative A on the current recreation values would comprise a slight contribution to this overall cumulative effect.

However, the expansion and improvement of existing and new water access sites could also have positive effects on the recreation values of the river system. Future expansion of boat launch/takeout sites on both public and

private lands could offer the communities improved amenities and opportunities for enjoying the Wekiva River System. For example, the Florida Park Service is in the process of improving the Katie's Landing boat launch/takeout with better shore facilities and amenities (e.g., restrooms, picnic areas, expanded parking). The management plan for the three Florida state parks in the basin includes some future actions that might increase interpretation and educational programs in the parks, which could have a positive effect on recreation values. These actions would have an impact on recreation values that is long term, beneficial, and localized to widespread.

Because alternative A maintains the status quo on recreation management efforts, this alternative would have a negligible effect on potential river accessibility improvements. Thus, the impacts of these other actions and threats, combined with the impacts of alternative A actions, would result in long-term, beneficial, and localized to widespread cumulative impacts. The impacts of alternative A on the current recreation values would comprise a slight contribution to this overall cumulative effect.

Conclusion

Implementing alternative A would result in a continuation of status quo management actions.

Overall, this alternative would continue to have long-term, adverse and beneficial impacts that range from minor to moderate and localized to widespread.

The impacts of other actions relating to recreation demands, combined with the impacts of alternative A, could result in long-term, minor to moderate, adverse, and widespread cumulative impacts. The impacts of alternative A on the current recreation values would comprise a slight contribution to this overall cumulative effect.

EFFECTS OF ALTERNATIVE B

Analysis

Implementing alternative B, the preferred alternative, would increase management emphasis and interagency coordination for preserving and improving the recreation values on the Wekiva Wild and Scenic River System. When compared to the current conditions under alternative A, the holistic and collaborative management improvement actions included in alternative B would help enhance the visitor experience as well as protect other values of the river system. Visitor recreation on the Wekiva River System could be affected by the following.

Recreation Demand and Crowding. The recreation values of the Wekiva River System become limited or degraded on busy days when many swimmers, motorboaters, canoeists, kayakers, and/or tubers populate the Wekiva River, Wekiwa Springs Run, and/or Rock Springs Run. This results from overcrowding in the river, which limits the available open water for free and uninhibited river recreation. As population growth continues throughout central Florida, the recreation demands would likely increase, compounding the issue further.

Alternative B includes a series of objectives and actions that would generate: (1) a recreation assessment, (2) a facilities master plan, (3) a recreation monitoring and management plan; and (4) an education program that could help river users understand the value, status, and health of the Wekiva River System. Collectively, these actions would assess current resource and recreation conditions, determine which resource are in need of protection, and establish user capacity (see "User Capacity" section in chapter 2) for various resources, values, and impacts (natural resources, visitor experience, litter, etc.) that would be used as monitoring and enforcement thresholds. This overall effort would create indicators and standards that would help identify appropriate visitor use capacities on the river system. As a result, alternative B

could have an impact that is long term and beneficial.

Public and Private Access to the River System. Although many of the public river access sites already have established restrictions on the numbers of tubes and boat rentals they allow or on the number of vehicles allowed into the park, their respective visitor volumes are restricted according to the individual site management plans (which might not take into account the volume of users from other access points along the water). Furthermore, private access to the water exists at many locations, particularly along the Wekiva River.

An intergovernmental effort to measure, assess, monitor, and control total visitor use volume (via both public and private high-volume access points) would help alleviate many of the adverse resource impacts and diminished visitor experience quality. Alternative B includes actions that target the visitor capacity issue (e.g., the recreation assessment and the monitoring and management plan). In addition, this alternative includes actions that emphasize public agency purchase of commercial properties with private access to the river system (if and when they become available). This would allow public agencies to maintain and improve public access to the water, and would allow the agencies to better monitor and control visitor use volumes on the river system. As a result, alternative B could affect the recreation values in a way that is long term, beneficial, and widespread. To be most effective, the plans would need to find ways to identify total capacity and appropriate control mechanisms for both private and public access points.

Shoreline Rest Stops and Campsites.

Designated shoreline campsites, pullouts, and rest stops along the river system are quite limited. Use of nondesignated sites generates multiple adverse effects on natural and cultural resources, as well as the scenic quality of the river system. Via the proposed recreation assessment and the facilities master plan efforts, alternative B would include actions

that assess the existing use patterns at both designated and nondesignated sites and determine the appropriate number, location, and allowed use at camping, picnic, and rest stop sites along the shorelines of the river system. By implementing such a plan, adverse impacts on other river resources and values could be contained and possibly reduced. As a result, alternative B could have an impact that is long term, beneficial, and localized with respect to shoreline rest stops and campsites.

Navigational Hazards. Boat navigation hazards, such as downed trees and other vegetation, are a recurring problem and are removed as soon as possible by various land and water management agencies according to established policy. As with alternative A, alternative B would continue the current level of managing and removing navigational hazards in the Wekiva River System. As a result, in terms of navigational hazards alternative B would continue to have a negligible to beneficial effect on recreation values.

Motorized Watercraft. The noise and wake generated by most motorized boats and personal watercraft (e.g., jet skis) have adverse effects on the more passive recreational activities of canoeists and kayakers, particularly those using the river system for nature appreciation and wildlife observation. Use of motorized watercraft on the Wekiva River System could also disturb submerged vegetation and create shoreline wake impacts that cause erosion. These effects would likely increase as boating on the river system increase in the future.

Various actions included in alternative B would aim to provide better monitoring and management of motorized watercraft and their impacts. The proposed recreation assessment would help determine appropriate volumes, speeds, sizes, and locations of motorized watercraft use in the river system. The proposed recreation impact monitoring and management plan would subsequently help quantitatively monitor the effects of motorized craft on the Wekiva River by

establishing resource and value impact thresholds.

Alternative B would also support a prohibition of gasoline powered watercraft on Rock Springs Run and Black Water Creek. Lastly, alternative B includes actions that would establish partnerships with private businesses and concessioners who rent operate boat rentals and boat ramps on the Wekiva River System. These partnerships could help encourage these businesses to educate their customers on watercraft regulations and appropriate behavior. All of these actions of alternative B could have long-term, beneficial, and widespread impacts on motorized watercraft-related recreation values.

Restroom Facilities. With the exception of the centralized restroom facilities at adjacent state parks, sanitary facilities are currently lacking along the river system. Given the unavailability of restrooms along the river, boaters who access various shoreline sites throughout the basin for swimming, picnicking, or camping often use the waterways, banks, and the immediate uplands and mid-dens as restrooms. Alternative B includes actions that would assess current public use facilities such as restrooms, generate a facilities master plan, and seek ways to fund the implementation of the plan. These actions could collectively improve restroom availability along the river system. As a result, alternative B could have a positive effect on restroom facilities and the recreation values of the river system. The impact could be long term, beneficial, and widespread.

Public Education and Interpretation. Education and resource interpretation programs in public recreation areas are integral to making the public aware of various natural and cultural resources and issues, site history, stewardship opportunities, preferred visitor behavior guidelines, and official regulations. Educational and interpretive signs are common and widespread medium used for such programs, but educational and interpretive signs are somewhat limited along the Wekiva River System. Given the number of river users

and the multiple access points, many visitors to the river system might not be informed of important information that might otherwise affect their experience on the river or might alter their behavior while on the river system.

Alternative B would include provisions that establish partnerships with private businesses, concessioners, agencies and other appropriate entities, which might foster visitor education. This alternative would also include efforts to educate the public via events and media announcements that encourage the public to directly experience and learn about the Wekiva Wild and Scenic River System and understand its status and health. Also, an informational “branding initiative” for the Wekiva Wild and Scenic River System would complement these outreach efforts, with unified signs at all river crossings and access points. As a result of actions such as these, alternative B could have a long-term, beneficial, and widespread effect on public education that would maintain or enhance recreation values.

Cumulative Effects

Recreation values of the Wekiva River System could be adversely affected by anticipated development and population increases in the region. Expanded or new river boating operations along the Wekiva River System could accompany this growth. If unrestricted private and public access to the rivers continues (i.e., without visitor use capacity limits), this projected recreation demand increase could have substantial effects on the recreation values of the river system. Overcrowding and user conflicts could become problematic. If not addressed, these actions and trends could have an impact that is long term, minor to moderate, adverse, and widespread. The management plan for the three Florida state parks in the basin includes some future actions that might increase interpretation and educational programs in the parks, which could have a positive effect on recreation values.

Alternative B includes multiple actions and provisions that could help minimize the impact of these threats by assessing current recreation conditions, determining appropriate recreation use levels and impact thresholds for various resources, and managing the uses accordingly. Thus, alternative B would contribute to preserving and enhancing the recreation values. This means that alternative B could have an impact that is long term, beneficial, and widespread. The impacts of these various threats, together with the impacts of alternative B actions described above, would result in long-term, beneficial cumulative impacts on current recreation values. The impacts of alternative B actions on the recreation values would comprise a modest portion of the overall cumulative effect.

In addition, the expansion and improvement of existing and new river access sites, where appropriate, could also have positive effects on the recreation values of the river system. Future expansion of boat launch/takeout sites on both public and private lands would offer improved amenities and opportunities for enjoying the Wekiva River System. Some examples of such improvements are mentioned in the analysis of alternative A. These other actions would have an impact on recreation values that is long term, beneficial, and localized to widespread. Generally, the actions of alternative B would not detract

from planned improvements to recreation amenities and accessibility. In fact, the actions of alternative B would likely complement these other improvements. This alternative would have an impact that is long term, beneficial, and localized. When the impacts of other actions are combined with the impacts of alternative B actions, a long-term, beneficial, and localized to widespread cumulative impact on potential future recreation values could result. The impacts of alternative B would make a modest contribution to the total impacts.

Conclusion

Compared to alternative A, the coordinated, multiagency actions included in alternative B could help contribute to the preservation and improvement of the river system's recreation values. Thus alternative B could result in long-term, beneficial, and localized to widespread impacts on the recreation values of the Wekiva Wild and Scenic River System.

When the impacts of other actions are combined with the impacts of alternative B, a long-term, beneficial cumulative impact on recreation values would result. The impacts of alternative B would make a modest contribution to these impacts.

WILDLIFE AND HABITAT VALUES

This section includes analyses that discuss the impacts of the alternatives on the outstandingly remarkable value of wildlife and habitat that contribute to the Wekiva River System. For this document, these impact determinations are also applied to the special status species listed in the “Chapter 3: Affected Environment” section. This analysis is based on the very close ecological interconnectedness of the diverse species and habitats in this riparian corridor. Only those species that would be affected by the river management plan are addressed in this environmental assessment.

METHODS OF ASSESSING EFFECTS

To provide a metric for quantifying the intensity of the impacts to wildlife and habitat, the definitions for the impact intensity and thresholds are included below:

Negligible: The action would not have any noticeable or measureable changes to habitat or individual species. For special status species, the change would result in a *no effect* opinion from the U.S. Fish and Wildlife Service.

Minor: The effects on wildlife and habitat would be detectable and measurable, but very limited in scale and degree. The action would yield changes to habitat value or individual species that are minimal and of little consequence. For special status species, the action would result in a *not likely to adversely affect* opinion from the U.S. Fish and Wildlife Service.

Moderate: The effects on wildlife and habitat would be apparent and would have some influence on the ecology of the river system. The action would yield changes to habitat value or species that have notable consequences, but that are not widespread, severe, or highly favorable. For special status species, a measurable change to a population or individuals of a species could occur, and it would be of consequence to

the species, but it probably would result in a *not likely to adversely affect* opinion from the U.S. Fish and Wildlife Service.

Major: The effects on wildlife and habitat would be very apparent and would have direct and substantial influence on the ecology of the river system. The action would yield considerable changes to habitat value and multiple species that have widespread or substantial consequences. For special status species, a noticeable, measurable change could occur in a population or individuals of a species, resulting in a severely adverse or majorly beneficial and possibly permanent effect on the species. The action would result in a *likely to adversely affect* opinion from the U.S. Fish and Wildlife Service if adverse, or a *not likely to adversely affect* opinion if the impact is beneficial.

EFFECTS OF ALTERNATIVE A

Analysis

The wildlife and habitat of the Wekiva Wild and Scenic River System could be affected by the following.

Displacement of Riparian and Aquatic Plant Communities. The riparian and aquatic plant communities along the waterways of the Wekiva River System are integral to the wildlife habitat quality of the entire river system. Currently, these plant communities are adversely affected by recreational use of the river system and by development along certain segments of the river system. The loss or degradation of riparian vegetation caused by public access and recreational use primarily results from vegetation trampling by boaters accessing the water or taking shoreline breaks. These impacts occur at unofficial canoe takeouts and at active shoreline recreation sites (e.g., rope swings, wading areas, etc.). This displacement of native

vegetation contributes to the fragmentation and/or degradation of riparian habitat along the Wekiva River System.

Similarly, the loss or degradation of native aquatic vegetation could result from recreational uses such as motorboating and jet skiing. Boat propellers, anchors, and jet ski engines chop or churn up native aquatic plant communities, causing the aquatic plants to lose their flowering upper portion or become uprooted or otherwise damaged. The impact to native eelgrass areas on the Wekiva River is one example of this effect. In addition, recreational use of the river system could also introduce nonnative, invasive vegetation to the riparian ecosystem (e.g., via boat motors and trailers). Once introduced, the invasive, exotic plants often outcompete native plants and subsequently displace the native riparian plant communities of the river system.

Threats of displacement and degradation of riparian vegetation in and along the Wekiva River System are also caused by land development along certain segments of the rivers, particularly along the Wekiva River in the recreational segment north and south of the SR 46 bridge. The wildlife habitat in these areas has been degraded by development such as houses and associated structures, residential landscaping, docks, and shoreline decks. Alternative A would continue the current level of recreation management and development controls, and thus would not contribute any notable new measures that would further protect the riparian plant communities from these threats.

Therefore, when factoring in the anticipated growth in the region, potential new development along the river system corridor, and recreation demand in the basin, alternative A would result in the continuation of existing impacts on wildlife and habitat that are long term, minor to moderate, adverse, and localized. Alternative A would not result in any new adverse impacts.

Recreation Disturbances to Wildlife. Wildlife and habitat in the Wekiva River

System is directly affected by the proximity, frequency, and degree of human recreation activities along the river corridor. Likewise, the behavior of individual birds, reptiles, mammals, and fish is directly affected by the presence of humans. Aquatic and riparian habitat along the river corridors in the system could be adversely affected by recreational uses such as boating, swimming, tubing, fishing, or even wildlife or nature viewing depending on how loud, how often, and how close the recreational use is to the wildlife habitat or individual. The degree of habitat impact might also have a temporal component, when the timing of the human disturbance coincides with critical wildlife behaviors (nesting, feeding, migrating, etc.).

A secondary (or indirect) effect could also result when wildlife species that are more sensitive to human disturbances are displaced and replaced by higher numbers of more adaptive, generalist species (e.g., raccoons), which might further disrupt the local ecology. Biodiversity typically diminishes over time under these conditions. The recreational use impact on wildlife and habitat could be compounded if the population-driven recreation demand increases in the future.

Litter and dangerous materials discarded along the river system also pose a threat to wildlife. Food materials that are poisonous to wildlife or are enclosed in nondigestible wrapping can harm or kill. Foreign objects, such as plastic bags, soda can rings, rope, and metal with sharp edges, might hurt or entangle wildlife. Fishing line, lures, and lead sinkers, might become caught in the water or in overhanging vegetation.

Alternative A would maintain the current levels of recreation management and litter control, and thus does not include actions that would help protect the wildlife and habitat from these continuing and likely increasing impacts from human activity in the river corridors. As a result, alternative A would continue to have an impact on wildlife and habitat that is long term, minor, adverse, and localized to widespread.

Invasive and Exotic Vegetation. The proliferation of invasive and exotic vegetation is a continuing challenge throughout the Wekiva River System. This proliferation could have widespread and detrimental effects on wildlife and habitat. Species that continue to require attention include, but are not limited to, hydrilla, water hyacinth, wild taro, elephant ear, para grass, Chinese tallow, East Indian hygrophylla, and cattail. Although several state agencies have contributed to aggressively fighting this threat, the challenge would likely continue in the future. As exotic plant infestations increase, the diversity and health of the native plant communities decreases, resulting in a diminished fish and wildlife habitat. When infestations are severe, a complete loss of habitat for some sensitive species might occur.

Alternative A would continue the current multiagency control efforts and expand these efforts if and when additional funding becomes available. Contractors for the Bureau of Invasive Plant Management do much of the exotic vegetation control, with assistance from the Florida Park Service and the Wekiva River Aquatic Preserve. These efforts are often successful in controlling various invasive species. But occasionally, the efforts are not adequate in some river segments (e.g., in years when invasive plant proliferation is severe or widespread). More of these efforts would occur if and when additional funding becomes available. Generally, for controlling invasive plant effects on wildlife and habitat values, alternative A would continue to result in an impact that is long term, beneficial, and localized to widespread.

Invasive and Exotic Fish and Invertebrates. In addition to the threat of invasive plant proliferation in the Wekiva River System, exotic fish and exotic invertebrates threaten the habitat and populations of the many native plant and wildlife species. These exotic species include the armored catfish, brown hopolo, and could include the channeled apple snail (see chapter 3 for more information).

Alternative A would continue the current levels of monitoring and invasive species removal (e.g., armored catfish removal in Wekiwa Spring). If the populations of armored catfish or brown hopolo increase substantially, or if an infestation of channeled apple snail occurs, the current levels of invasive species control might not be adequate to mitigate their impacts. Alternative A could continue to have an impact that is long term, minor to moderate, adverse, and localized.

Multijurisdictional Approach to Habitat Management. Wildlife and habitats in the Wekiva River System cross many jurisdictional and property ownership boundaries. This has sometimes resulted in inconsistent habitat management practices and varying regulatory controls across the basin. Given the number of public land and water management agencies with proprietary and regulatory interests in the Wekiva River basin (local, state, and federal), an opportunity exists for an intergovernmental, collaborative effort that considers wildlife and habitat protection issues from a more regional approach. Although interagency coordination exists on some levels and on some management issues in the Wekiva basin and ecological corridor, it is not inclusive to all jurisdictions, all land-ownerships, all management issues, and/or all habitats. Alternative A would continue the current level of coordination, and thus would have negligible effect on widespread habitat management efforts.

Habitat Fragmentation. Several habitats and natural communities in the Wekiva River basin have been fragmented by roads, residential and commercial development, and public or private recreation sites. Fragmentation is the result of larger blocks of contiguous habitat being broken into smaller patches. For example, maintaining a diversity of wildlife along the Wekiva River system that includes the Florida black bear relies on protecting a corridor of functionally connected habitat to the Ocala National Forest.

This fragmentation has occurred on and between upland habitats, wetland habitats, riparian habitats, and even on some aquatic habitats. Fragmentation also occurs if patches of required avian habitat are not located within sufficient distances for population dispersion. Fragmentation causes both a direct and indirect loss of wildlife habitat. Black bears, for example, favor large blocks of natural habitat and tend to avoid small patches, roads, and developments. Thus a divided landscape — even one consisting of quality habitat — might lose functionality. Fragmentation also hinders the ability to maintain natural communities and manage habitat for wildlife use through processes such as prescribed fire. The ultimate results of fragmentation are diminished biodiversity and a loss of usable habitat for wildlife.

Another negative consequence of fragmentation is an increased difficulty in managing lands for habitat value. For example, it is more challenging to apply prescribed fire to smaller patches of land and to lands interspersed with or located next to developed areas.

To date, some agencies and organizations have made attempts to minimize habitat fragmentation in the Wekiva River basin (e.g., incorporation of wildlife underpasses into the design of SR 46 and the Wekiva Parkway and land acquisition efforts). However, regionally, the regulatory controls and management efforts have not fully addressed the issue of habitat fragmentation. Alternative A would maintain the existing policies and management practices. Alternative A would contribute to minimizing habitat fragmentation in the Wekiva River basin, but is likely to become inadequate over time. With the potential for continued development in the area, alternative A would have an impact that is long term, minor, adverse, and widespread.

Wildlife Mortality on Roads. Traffic on the numerous public roads and highways that intersect wildlife habitat and ecological corridors creates a serious hazard for many wildlife species. Wildlife mortality on roads (or roadkill) is an ongoing problem in the

Wekiva River basin. Black bears have been particularly vulnerable in past years. This wildlife threat would only worsen as traffic volumes on these roads increase with the anticipated population growth and potential development in the area. To date, various public land agencies and organizations have attempted to work with transportation agencies to minimize the threat and impact of wildlife mortality on roads in the area, including the proposed Wekiva Parkway.

Water Quality and Quantity Effects on Wildlife and Habitat. Impacts on water quality and quantity could have several adverse effects on aquatic systems and wildlife habitat.

As described in the analysis of water quality impacts, certain recreational activity degrades water quality and thereby has adverse impacts on wildlife and habitat values. Examples of this include erosion and sedimentation due to trampling of aquatic vegetation and shoreline areas, leaking fuel and turbidity caused by watercraft, and litter in the waterway.

Nutrients from contributing areas in Lake, Seminole, and Orange counties are degrading aquatic communities in the form of algal blooms, infestations of invasive exotic vegetation, and direct population loss of some sensitive endemic aquatic invertebrate species. Higher order species on the food chain, such as the limpkin, which feeds on the native apple snail, could also be negatively impacted.

If not adequately addressed, this nutrient loading might affect more springs and river segments and to greater degrees in the future. In the Wekiva River System, nitrogen loading has been determined to be the controlling factor and therefore the most critical. Collectively, the many nutrient sources in the Wekiva watershed and springshed have considerable adverse effects on water quality.

These sources include but are not limited to fertilizers used on lawns and landscaping in residential and commercial areas, fertilizers used by agriculture, effluent from septic tanks,

and effluent from wastewater treatment plants.

Pollution from automobile fluids, commercial and industrial waste, household chemicals, and medical substances also pose a threat to the Wekiva River system through surface water drainage and groundwater infiltration.

Finally, reduced flows from the springs and within the waterway threaten the health of the Wekiva River System, and consequently its wildlife and habitat values. Withdrawal of water from the aquifer for consumption (drinking, irrigation, industry, and personal use) could result in a reduced volume of water emerging from the springs. This in turn upsets the normal function of aquatic systems and the species using or affected by those systems. It could also alter the concentration of nutrients within the spring run and river system. Similarly, the capture of stormwater that would normally drain naturally to the river system could impact surface water flows, as could the potential extraction of surface water for consumptive use. Impacts to the flows and levels of the Wekiva River System alter the extent of submerged areas and wetlands and the overall ecological balance of the river system.

Currently, various agencies are attempting to measure and address the pollution and nutrient loading issue in the region. Alternative A would continue the current management actions and regulatory efforts of the various federal, state, and local government agencies that have jurisdiction in the Wekiva River basin and springshed. These efforts and measures would continue to have some positive effect on water quality in the Wekiva River System.

However, as development continues to occur in the area, the effects on water quality and quantity could become substantially worse. The population growth could also bring a notable increase in the number of developed residential properties served by septic systems and an increase in the number of chemically maintained lawns and landscaping. A growing

population would also place a burden on finite water resources, which could result in reduced flows and levels of the springs and river system. These changes in the local landscape and land uses could continue and collectively increase the threat of water quality impacts on the Wekiva River System, which in turn would adversely affect wildlife and habitat.

Alternative A would continue the current level of water quality and quantity monitoring and regulation by government agencies, but without comprehensive multiagency collaboration. Thus, alternative A would result in a continuation of impacts on wildlife and habitat that are long term, negligible, adverse, and widespread.

Natural Resource Inventories and Monitoring. The flora and fauna of the Wekiva River basin is spread across a mosaic of lands managed by multiple state and local agencies, as well as large and small tracts of interspersed private lands that are within these jurisdictions. As a result, counting and monitoring of wildlife and plant populations throughout the basin is challenging without a centralized effort. Without a collective, basin-wide inventory and monitoring program, decision-making on issues that affect the flora and fauna is difficult. Currently, federal, state, and local agencies monitor some species populations on a jurisdiction basis. Alternative A would continue this level of wildlife and plant inventorying and monitoring. Thus, this alternative would have no new effect on natural resource inventory and monitoring.

Prescribed Fire. Wildfire is an important attribute in maintaining healthy, diverse natural communities. Fire helps prevent the proliferation of invasive, exotic plant species and maintain a healthy distribution and density of native species. In fact, some plant species even require fire to facilitate seed propagation as part of their natural life cycle. Because wildfire has historically been suppressed, various land management agencies in the Wekiva River basin have incorporated prescribed fires into their land management

activities to replicate the natural process. Alternative A would continue current prescribed fire actions according to existing management plans. This alternative would continue to have an impact that is long term, beneficial, and localized.

Cumulative Effects

As discussed above, several existing and foreseeable future actions and trends in the Wekiva River basin and ecological corridor could continue to adversely impact wildlife and habitat, as well as special status species. Some of the primary examples of these are habitat loss and fragmentation from land and road development, wildlife mortality on roadways, wildlife disturbance from increasing recreational use, and water quality and flow regime changes from land use and practices. Many of these threats and impacts would likely increase or worsen with the expected increases in population, development, traffic, and recreation demands.

Collectively, the effects of these actions would be long term, moderate, adverse, and localized to widespread. Alternative A would continue and maintain the existing level of action on these issues. Thus, a continuation and increase of existing adverse impacts on wildlife and habitat would likely occur under alternative A. The effects of these other actions and trends, combined with the effects of alternative A actions, would result in long-term, minor to moderate, adverse, and widespread cumulative impacts. The impacts contributed by alternative A on wildlife and habitat would comprise a small portion of this overall cumulative effect.

Conclusion

Implementing alternative A would result in a continuation of status quo policies and management actions that relate to wildlife and habitat protection in the Wekiva River System. Continued adverse impacts would be long term and minor and primarily caused by

- (1) displacement of riparian and aquatic plant communities from recreational use and development
- (2) disturbance of wildlife and habitat from recreational use and litter
- (3) invasive and exotic vegetation
- (4) invasive and exotic fish and invertebrates
- (5) habitat fragmentation from roads and development
- (6) wildlife mortality on roads
- (7) degraded water quality and quantity

However, continued prescribed fire and invasive plant control actions would yield impacts that are long term and beneficial.

Therefore, alternative A would have a long-term, minor to moderate, impacts that are both adverse and beneficial. Alternative A would not result in any new impacts and so it would be *not likely to adversely affect* special status species (determination as per compliance with Section 7 of the Endangered Species Act).

The effects of other actions and trends, combined with the effects of alternative A, could result in long-term, minor to moderate, adverse, localized and widespread cumulative impacts. The impacts of alternative A on the wildlife and habitat would comprise a small portion of this overall cumulative effect.

EFFECTS OF ALTERNATIVE B

Analysis

Implementing alternative B, the preferred alternative, would increase management emphasis and interagency coordination on protecting wildlife and habitat of the Wekiva River System. The actions associated with this collaborative, holistic approach of alternative B could have positive effects on habitat when compared to the current conditions and management efforts. The wildlife and habitat conditions could be affected by the following.

Displacement of Riparian and Aquatic Plant Communities. As described in the

impact analysis of alternative A, the riparian and aquatic plant communities along the waterways of the Wekiva River System are integral to the wildlife habitat quality of the entire river system. Recreational use along the river system and development are adversely affecting these plant communities in several areas. The loss or degradation of riparian vegetation results from vegetation trampling by boaters accessing the water or taking shoreline breaks along the river system. As mentioned in the alternative A analysis, the loss or degradation of native aquatic vegetation and introduction of invasive or exotic plants could also result from recreational uses such as motorboating and jet skiing.

Alternative B would help address the problem of damage to riparian vegetation from recreational use. With the projected increase in recreation demand and regional population in the future, these threats to the habitat would likely increase if not actively addressed. Alternative B would include an expansion of current partnerships with private businesses and concessioners who operate on the Wekiva River System, which includes a public awareness/outreach component. This alternative would also include efforts to educate the public via events and media announcements that encourage the public to directly experience and learn about the Wekiva Wild and Scenic River System and understand its status and health. An informational “branding initiative” for the Wekiva Wild and Scenic River System would complement these outreach efforts with unified signs at all river crossings and access points. These efforts could help reduce shoreline and instream impacts by making boaters and other river users more aware of the effects of their actions on the river system. In addition to these educational efforts, alternative B encourages patrols by off-duty law enforcement officers to assist in the enforcement of motorboat restrictions.

As described in alternative A, vegetation/wildlife habitat in some of the Wekiva River System has been degraded by development such as houses, residential landscaping, docks,

and shoreline decks. Alternative B includes actions aimed at improving the regulatory control and code enforcement of development near the Wekiva River System. As a way to minimize impacts to wildlife habitat along shorelines and riparian corridors, alternative B would promote waterfront development regulations that are enforced and effective by emphasizing collaboration local governments. These efforts would focus on the protection of native vegetation along the riparian corridors.

If necessary, alternative B would also promote the improvement or expansion of local government regulations on these riverfront activities and structures (beyond what is currently regulated). These efforts would be complemented by an educational program that would be aimed at local government planners and decision-makers to provide information about the river system and its social and ecological values.

Alternative B also has an objective to implement and strengthen development regulations and practices at publicly owned recreation areas on the Wekiva River System. These guidelines for public agencies would emphasize preservation of native vegetation, minimized land clearing, minimized structures, and reclamation plantings.

As a result of the various alternative B objectives and actions described above, the impacts on wildlife and habitat could be long term, beneficial, and localized to widespread.

Recreation Disturbances to Wildlife. As described in the impact analysis for alternative A, wildlife and habitat value in the Wekiva River System is affected by the proximity, frequency, and degree of human recreation activities on or near the river corridors. A secondary effect could also result when wildlife species that are more sensitive to human disturbances are displaced and replaced by higher numbers of more adaptive, generalist species. Biodiversity typically diminishes over time under these conditions. In addition, litter and dangerous materials discarded along the

river system threaten wildlife that might ingest or be hurt by the foreign materials.

The impact of recreational use on wildlife and habitat could be compounded if the population-driven recreation demand increases in the future.

Alternative B would include an expansion of current partnerships with private businesses and concessioners who operate on the Wekiva River System, which includes a public awareness/outreach component. This alternative would also include efforts to educate the public via events and media announcements that encourage the public to directly experience and learn about the Wekiva Wild and Scenic River System and understand its status and health. An informational “branding initiative” for the Wekiva Wild and Scenic River System would complement these outreach efforts, with unified signs at all river crossings and access points. These efforts could help minimize recreational disturbances on wildlife by making boaters and other river users more aware of the implications of their actions on the river system. As the result of implementing the various objectives and actions described above, alternative B would have an impact that is long term, beneficial, and widespread.

Invasive and Exotic Vegetation. The proliferation of invasive and exotic vegetation is a continuing challenge throughout the Wekiva River System. If the invasive vegetation becomes dominant, it could crowd out more diverse native plants and take over entire reaches of the river system. This could decrease, or perhaps even eliminate, the value of the habitat in some areas. Alternative B would continue the existing multiagency invasive and exotic vegetation monitoring and control efforts in the Wekiva River basin. Species that continue to require attention include, but are not limited to, hydrilla, water hyacinth, wild taro, elephant ear, para grass, Chinese tallow, East Indian hygrophylla, and cattail. Increases of these efforts would occur if and when additional funding becomes available. Contractors for the Bureau of

Invasive Plant Management would continue to work with the assistance from the Florida Park Service and the Wekiva River Aquatic Preserve on this matter. Generally, for controlling the effects of exotic and invasive plants on wildlife and habitat values, alternative B would result in an impact that is long term, beneficial, and localized to widespread.

Invasive and Exotic Fish and Invertebrates. As discussed in the alternative A impact analysis, exotic fish and exotic invertebrates also threaten the habitat and populations of the many native plant and wildlife species. These exotic species include the armored catfish, brown hopolo, and could include the channeled apple snail in the future.

Alternative B would continue and expand the current levels of monitoring and invasive species removal. This alternative includes actions that would directly assess the impacts associated with the proliferation of invasive exotic fishes and invasive exotic invertebrates within the Wekiva River System and develop actions for expanding monitoring and control strategies. As a result, alternative B could have an impact that is long term, beneficial, and widespread.

Multijurisdictional Approach to Habitat Management. As described in the impact analysis of alternative A, the different wildlife and habitat being addressed in this environmental assessment cross many jurisdictional and property ownership boundaries. This has resulted in sometimes inconsistent habitat management practices and varying regulatory controls on the lands across the basin.

Alternative B would result in a comprehensive land and water management effort that applies more of a holistic approach. In addition to coordinating river management goals and objectives, the river management plan would also promote collaborative management of upland, wetland, riparian, and aquatic habitat by prompting the land management agencies in the basin to work cooperatively. The plan could also encourage consistent, resource-based land use regulations across local

government jurisdictions, where appropriate. This could also have positive effects on wildlife and habitat values. These efforts would be complemented by an educational program that would be aimed at local government planners and decision-makers to provide information about the river system and its social and ecological values. As a result, alternative B could have an impact on wildlife and habitat that is long term, beneficial, and widespread.

Habitat Fragmentation. As described in the impact analysis for alternative A, several habitats and natural communities in the Wekiva River basin have been fragmented by roads, residential and commercial development, developed recreation sites, and some recreation activities. The negative results of fragmentation are diminished biodiversity and a loss of usable habitat for wildlife. Another adverse impact is the increased difficulty in managing lands for habitat value. For example, it is more challenging to apply prescribed fire to smaller patches of land and to lands interspersed with or located next to developed areas.

Alternative B would provide more focus and emphasis on the importance of intergovernmental coordination to achieve habitat contiguity than alternative A. In addition to providing a basinwide, interagency mechanism for land management, the proposed management plan under alternative B includes objectives that

- (1) promote the acquisition of public lands or conservation easements on lands that are gaps in critical wildlife movement corridors or possess unique habitat features throughout the Wekiva basin and ecological corridors;
- (2) encourage the incorporation of habitat connection corridors on property development plans in the basin;
- (3) discourage additional new road construction within the Wekiva River basin that could impede the normal movement of wildlife and avoid the

- construction of new roads through conservation lands;
- (4) establish smoke corridors and improve interagency cooperation regarding prescribed fire;
- (5) address the potential impact of road construction on such wildlife movement through design for wildlife crossings and other mitigative measures; and
- (6) educate local government planners, decision makers, and the public on the importance of ecosystem connectivity and strategies to protect it.

Collectively, the actions of alternative B could have an impact that is long term, beneficial, and widespread.

Wildlife Mortality on Roads. Traffic on the numerous public roads and highways that intersect the area creates a serious hazard for many wildlife species. This wildlife threat would only worsen as traffic volumes on these roads increase with the anticipated population growth and potential development in the area. To date, various public land agencies and organizations have attempted to work with transportation agencies to minimize the threat and impact of wildlife mortality on roads in the Wekiva River basin.

Alternative B would promote and improve such efforts and would also pursue mitigation or removal of existing impediments or threats to wildlife movement from roads, particularly between the Wekiva River basin and the Ocala National Forest. This alternative would also discourage additional new road construction within the Wekiva basin that could impede wildlife movement or notably increase the risk for wildlife mortality. As a result of these actions, alternative B could have an impact that is long term, beneficial, and widespread.

Water Quality and Quantity Effects on Wildlife and Habitat. As discussed in the impact analysis of alternative A, impacts to water quality and quantity have several adverse effects on aquatic systems and wildlife and habitat.

As described in the analysis of water quality impacts, certain recreational activity degrades water quality and thereby adversely impacts wildlife and habitat values. Examples of this include erosion and sedimentation due to trampling of aquatic vegetation and shoreline areas, leaking fuel and turbidity caused by watercraft, and litter in the waterway.

Nutrients from contributing areas of Lake, Seminole, and Orange counties have resulted in degradation of the aquatic communities in the form of algal blooms, infestations of invasive exotic vegetation, and direct population loss of some sensitive endemic aquatic invertebrate species. Higher order species in the food chain that rely upon aquatic species could also be negatively impacted. Many nutrient sources in both the Wekiva watershed and springshed contribute to adverse effects on water quality. These sources include but are not limited to fertilizers used on lawns and landscaping in residential and commercial areas, fertilizers used by agriculture, effluent from septic tanks, and effluent from wastewater treatment plants.

Pollution from automobile fluids, commercial and industrial waste, household chemicals, and medical substances also pose a threat to the Wekiva River system through surface water drainage and groundwater infiltration.

Reduced flows from the springs and within the waterway threaten the health of the Wekiva River System, and consequently its wildlife and habitat values. Withdrawal of water from the aquifer for consumption (drinking, irrigation, industry, and personal use) could result in a reduced volume of water emerging from the springs. This in turn upsets the normal function of aquatic systems and the species using or affected by those systems. Water withdrawal might also alter the concentration of nutrients within the spring run and river system. Similarly, the capture of stormwater that would normally drain naturally to the river system impacts surface water flows, as could the potential extraction of surface water for consumptive use. Impacts to the flows and levels of the Wekiva River System

alter the extent of submerged areas and wetlands, and the overall ecological balance of the river system.

Currently, various agencies are attempting to measure and address the pollution and nutrient loading issue in the Wekiva River System. Alternative B would continue the current management actions and regulatory controls that are administered by various state and local government entities. In addition, alternative B would promote a collaborative and expanded effort of water quality monitoring and control in the Wekiva basin and springshed. This alternative includes numerous actions that target reduced nutrient loading into the river system by minimizing existing nutrient sources and avoiding future sources. Alternative B would also support a continuation and expansion of actions to protect the flow regime of the Wekiva River System. This alternative includes numerous actions that aim for improved flow monitoring, flow management, groundwater withdrawal regulations, and water use efficiency. The proposed actions in this alternative affect current and future land uses throughout the Wekiva watershed and springshed.

Alternative B includes many actions that would improve water quality and quantity. Refer to the analysis of water quality and quantity impacts of alternative B for an explanation of these actions. Consequently, implementing alternative B would result in impacts that are long term, beneficial, and widespread.

Natural Resource Inventories and Monitoring. As described in alternative A, the flora and fauna of the Wekiva River basin are spread across a mosaic of lands managed by multiple state and local agencies, as well as large and small tracts of interspersed private lands that are within these jurisdictions. Counting and monitoring of wildlife and plant populations throughout the basin can be challenging. Currently, federal, state, and local agencies monitor species populations on a jurisdiction basis.

Alternative B would promote an increased level of wildlife and plant inventory and monitoring. This alternative includes objectives that would pursue

- (1) species-specific surveys followed by annual monitoring for aquatic invertebrates in the Wekiva River System and springs such as Wekiwa Springs hydrobe, Wekiwa siltsnail, and Orlando cave crayfish;
- (2) a continued effort to monitor the condition of, and any changes to, submerged aquatic vegetation beds, particularly eelgrass beds;
- (3) monthly bird surveys on the Wekiva River System and surrounding riverine systems, and an annual report that assesses trends in bird populations;
- (4) an assessment of the extent to which West Indian Manatees use the lower Wekiva River and the various factors associated with their feeding, movement, and other behaviors in relation to the St. Johns River;
- (5) annual monitoring programs for reptiles and amphibians;
- (6) actions to monitor movement and behavior patterns of bears and other wildlife, including the use of wildlife crossings;
- (7) consultation with local governments, environmental agencies, and conservation organizations to identify critical and unique features for protection; and
- (8) monitoring of invasive and exotic vegetation, fish, and invertebrates within the Wekiva River System in conjunction with control efforts.

Alternative B could have a long-term, beneficial, and widespread impact on improving the basinwide natural resource inventory and monitoring.

Prescribed Fire. Wildfire is an important attribute in maintaining healthy, diverse natural communities. Fire helps prevent the proliferation of invasive, exotic plant species and maintain a healthy distribution and density of native species. Some plant species

even require fire to facilitate seed propagation as part of their natural life cycle. As described in the impact analysis of alternative A, various land management agencies in the Wekiva River basin have incorporated prescribed fires into their land management activities to replicate the natural process that has been historically suppressed. Alternative B would continue and improve these current prescribed fire actions in the basin. Furthermore, as this land management tool becomes more accepted and understood by the public, more widespread use of prescribed fire might occur in the Wekiva basin. As a result, alternative B would have an impact that is long term, beneficial, and localized.

Cumulative Effects

Many existing and foreseeable future actions could continue to affect wildlife and habitat, including special status species. Some of the primary examples are habitat loss and fragmentation from land and road development, wildlife mortality on roadways, Wildlife disturbance from increasing recreational use, and water quality and flow regime changes from land use practices. Many of these threats and impacts would increase or worsen in the future with increases in population, urbanization, road development, and wildlife disturbance from recreational activities.

Water quality degradation has also resulted in long term, moderate, adverse, and widespread impacts to wildlife.

A recent example of efforts to enhance habitat connectivity and mitigate roadway mortality is the incorporation of wildlife crossings and underpasses into the Wekiva Parkway design.

Overall, alternative B could have an impact that is long term, beneficial, and widespread. The impacts of other actions and trends, together with the impacts of alternative B actions described above, would result in long-term, beneficial cumulative impacts. The impacts of alternative B actions on wildlife

and habitat would contribute a modest portion to the overall cumulative effect.

Conclusion

Alternative B would contribute to preserving and enhancing wildlife and habitat values of the Wekiva River basin and would result in long-term, beneficial impacts that are widespread. The coordinated, multiagency actions included in alternative B would help minimize and mitigate many threats to natural communities, and thus contribute to the protection of wildlife and habitat values. Also,

as it pertains to compliance with Section 7 of the Endangered Species Act, alternative B is *not likely to adversely affect* special status species.

The impacts of other actions and trends, together with the impacts of alternative B actions described above, would result in long-term, negligible to beneficial cumulative impacts. The impacts of alternative B actions on the wildlife and habitat would comprise a modest portion of the overall cumulative effect.

HISTORIC AND CULTURAL RESOURCE VALUES

METHODS OF ASSESSING EFFECTS

In this environmental assessment, impacts on historic and cultural resource values are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the CEQ that implement NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act (NHPA). The NPS must comply with these laws for federal undertakings. Actions by a state or county agency would need to comply with Florida state laws and regulations.

In accordance with the Advisory Council on Historic Preservation's regulations (36 CFR Part 800, Protection of Historic Properties), 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 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.

Because this environmental assessment is written by a federal agency, 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

on the criterion of effect and criteria of adverse effect found in the advisory council's regulations.

The following are the definitions of intensity levels.

Negligible: The effects on the resource(s) would be barely measurable, with no perceptible consequences on the historic and cultural resource values of the Wekiva Wild and Scenic River System. The Section 106 determination of effect for properties listed or eligible for listing on the National Register would be *no adverse effect*.

Minor: The effects on the resource(s) would be discernible, but would not diminish or benefit the historic and cultural resource values of the Wekiva Wild and Scenic River System. The determination of effect for Section 106 would be *no adverse effect*.

Moderate: The effects on the resource(s) would be discernible, and would diminish or benefit the historic and cultural resource values of the Wekiva Wild and Scenic River System. If resources are diminished, the determination of effect for Section 106 would be *adverse effect*. A memorandum of agreement is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the memorandum of agreement to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.

Major: The effects on the resource(s) would be immediately discernible, and would severely diminish or greatly benefit the historic and cultural resource values of the Wekiva Wild and Scenic River System. If resources are diminished, the determination of effect for Section 106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed

upon, and the NPS and applicable state or tribal historic preservation officer and/or advisory council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

EFFECTS OF ALTERNATIVE A

Analysis

As stated in chapter 1, this environmental assessment addresses primarily archeological resources that are the physical evidence of past human activity and can represent both prehistoric and historic occupations. The following would affect these resource values.

Research and Surveys. The historic and cultural resources of the Wekiva River basin are spread across a mosaic of lands managed by various state and local agencies, as well as large and small tracts of interspersed private lands. Some of the lands within the state forests have been surveyed for archeological resources. Only portions of the three state parks —Lower Wekiva, Rock Springs Run, and Wekiwa Springs — have been systematically surveyed. Private land and local government lands have been selectively examined by professional archeologists on a piecemeal basis. Therefore, substantial tracts of land in the basin remain undocumented.

As a result of this fragmented approach, gaining an understanding about historical resources within a larger regional context is challenging. The existing archeological and historical data point to a long and rich human history in the river basin, extending over 10,000 years. However, without a basinwide understanding of the historic resources in the region, decision-making on issues that might affect these properties becomes more difficult.

Alternative A would continue the current agency- and project-specific survey approach. Thus, this alternative would continue to have a localized, beneficial effect on improving knowledge of historic and cultural resources

of the river system, in both the short and long term.

Monitoring Archeological Resources.

Impacts on archeological resources are a result of both natural and human causes. Naturally occurring impacts include erosion, animal burrowing, slumpage, and tree fall. Human activities also play a role in the degradation of both submerged and terrestrial archeological sites. Shell middens are particularly vulnerable to the effects of people, which include vandalism, looting, shell mining, bulldozing, vegetation trampling, and littering. At least 18 shell middens on the riverbanks in the state parks have been impacted by these activities.

Although most boaters only access the rivers via designated entry/exit points, many visitors are getting out of their boats and using non-designated areas, including midden sites, for resting, or picnicking. Some areas are also being used heavily as party spots for various groups. Boaters who access various shoreline sites often use the riverbanks, including middens, as restrooms. The use of archeological sites in this manner results in the continuing degradation of these resources.

Agencies with jurisdiction under existing state law and regulation are required to monitor and protect archeological resources. Under alternative A, these actions would continue. The three state parks, Seminole State Forest, and the St. Johns River Water Management District all have guidelines and personnel trained to recognize sites and to monitor ground-disturbing activities in consultation with the Florida Division of Historical Resources. The St. Johns River Water Management District has one archeologist and uses consultants as needed. Seminole State Forest also has one archeologist. Law enforcement personnel would receive training in archeological resource protection as staff time and budgets permitted. The state agencies also have access to the Bureau of Archaeological Research Stewardship Volunteer Program and the Sitewatch Program.

Unlike state land holdings, county and municipal laws and regulations generally do not provide a legal framework for law enforcement in regard to archeological and historic sites, although some land use codes require that these resources be taken into account for planned ground-disturbing activities for land development. With the exception of human burials, private lands are generally exempt from state and federal laws governing historical and archeological resources. Land development activities that require federal funding or permitting are subject to federal preservation laws.

Because of the fragmented jurisdiction in the river system under alternative A, monitoring is sporadic and protection is limited, resulting in a continued adverse effect on historic and cultural resource values. With the anticipated future increases in recreation demand and population growth near the river, in the long term alternative A would have an impact on the historic and cultural resource values of the river system that would continue to be minor to moderate and adverse.

Public Education and Interpretation.

Education and resource interpretation programs in public recreation areas are integral to making the public aware of various cultural resource issues, site history, stewardship opportunities, visitor guidelines, and official regulations. Currently, educational and interpretive signs regarding the history and culture of the region are relatively limited in the Wekiva River basin. For example, in the Rock Springs Run State Reserve, there is an interpretive boardwalk built next to a midden known as Twin Mounds.

The management plan for the three Florida state parks in the basin includes some future actions that might increase interpretation and educational amenities in the parks. However, given the number of river users and the multiple access points, many visitors to the river system might not be aware of important information that might affect their experience or might alter their behavior while on the river system. If visitors become more aware of the

river system's cultural history, they might be more likely to avoid behaviors that have adverse impacts to shell middens and other archeological sites. Alternative A maintains the current level of activities and actions that relate to visitor education. As a result, this alternative would continue to have a negligible to beneficial effect on the historic and cultural resource values from public awareness efforts.

Cumulative Effects

The historic and cultural resource values of the river corridor has been and could continue to be adversely affected by private land development along the shorelines, public projects, and increased recreational use due to population growth in the area. The ongoing and possibly increasing public access to the river system would also continue to have long-term, minor to moderate, adverse impacts on the archeological sites and historic landscapes of the river system. Alternative A would continue and maintain the existing level of action on these issues.

Actions taken by agencies might affect cultural resources. For example, prescribed fires could adversely affect surface artifacts or historic structures, if any. Agencies would be encouraged to conduct cultural resource surveys or clearances before such potentially disturbing activities to avoid or mitigate adverse effects caused by such actions.

In all, the potential impacts associated with implementation of alternative A would result in the continuation of both beneficial and minor to moderate long-term adverse effects on historic and cultural resources. The adverse impacts of alternative A, in combination with the long-term minor to moderate adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a minor to moderate adverse cumulative impact. The adverse impacts of alternative A would be only a slight contribution to the overall cumulative effects.

Conclusion

Implementing alternative A would result in a continuation of status quo policies and management actions that relate to the historic and cultural resource values of the Wekiva River System. As a result, this alternative would continue long-term, adverse impacts that range from minor to moderate, particularly if recreation demand increases substantially in the area. Alternative A would result in no new effects on historic and cultural resource values but would continue *adverse effects* on some cultural resources under Section 106.

The cumulative impacts would be long term, minor to moderate, and adverse; this alternative would have a slight contribution to these cumulative effects.

EFFECTS OF ALTERNATIVE B

Analysis

Implementing alternative B, the preferred alternative, would increase management emphasis and interagency coordination to preserve the historic and cultural resources of the Wekiva Wild and Scenic River System. When compared to the current conditions and piecemeal management efforts, this holistic and collaborative approach could strengthen resource protection and enhance this value. The following would affect historic and cultural resource values.

Research and Surveys. As stated in alternative A, the historic and cultural resources of the Wekiva River basin are spread across a mosaic of lands managed by various state and local agencies, as well as large and small tracts of interspersed private lands that are within multiple local government jurisdictions. Given the number of agencies with proprietary and regulatory interests in the Wekiva River basin, an opportunity exists for a collaborative, intergovernmental effort that considers cultural resource protection issues from a more holistic, regional perspective. Because alternative B would institute a river system

management plan that includes many of the surrounding public and private lands, this alternative could result in a comprehensive resource management effort, a long-term and beneficial impact.

To date, under this alternative, the following research studies have been identified.

- Native American cultural heritage in the region
- a comprehensive history of public lands, including all known historic and cultural properties
- the history of industry and transportation development in the context of economic activities such as farming, timber, turpentine production, and tourism
- environmental change and human adaptation
- land conservation, private land grants, and public land acquisition and development (e.g., state parks and forests, the role of the Apopka Sportsmen's Club, the Seminole Woods property, and the Spanish Land grant)

Under alternative B, areas that have not been previously surveyed would be identified and prioritized. These areas would be surveyed and documented, and a record of each resource (site, building, landscape or historic district) would be recorded with the Florida Division of Historical Resources. Also under alternative B, a system to prioritize significant resources would be established for monitoring and protection purposes (see following monitoring section).

With this multijurisdictional, coordinated approach to survey and research, alternative B would have an impact on historic and cultural resource values that is beneficial and widespread, in both the short and long term. This alternative would provide the information needed for agencies and private landowners to make informed decisions about land management practices and protection of historic properties. Information from these regional studies could also be used by state agencies,

tribes, local governments, and communities to educate local residents and visitors about the rich cultural heritage of the Wekiva River System and surrounding area.

Monitoring Archeological Resources.

Numerous archeological sites including shell middens are present along the waterways and contribute to the historic and cultural resource values of the Wekiva River System. As stated in alternative A, impacts on archeological resources are a result of both natural and human causes. Alternative B includes a series of objectives and actions that would protect these archeological sites. These include assigning at least one trained public agency staff member (“Cultural Resource Coordinator”) to regularly monitor resources and implement protection and management strategies. In addition, this alternative includes the implementation of the state Division of Historical Resources (Bureau of Archaeological Research Division’s) “Best Management Practices (BMPs) Guide to Protecting Archaeological Sites” to stabilize and protect, at a minimum, the high priority sites. A memorandum of understanding could be created to establish this position through a partnership of multiple agencies.

Also, additional law enforcement personnel would receive training in archaeological resource protection through the Bureau of Archaeological Research. Off-duty law enforcement officers could patrol high priority sites on weekends and holidays.

This alternative also emphasizes shoreline vegetation stabilization, which would also contribute to the protection and stabilization of shell middens and other archeological sites. Alternative B would include continued consultation with the Florida Division of Historical Resources, particularly in regard to planned ground-disturbing activities.

Alternative B also has an objective to implement and strengthen development regulations and practices at publicly owned recreation areas on the Wekiva River System. These guidelines for public agencies would

emphasize preservation of native vegetation, minimized land clearing and facilities construction, and reclamation plantings. Where feasible, current and future trails would be rerouted at least 50 feet from archeological sites and have adequate vegetative barriers to discourage access. These actions would help to preserve or improve the condition of both archeological sites and historic landscapes. With these monitoring and protection actions in place, alternative B would result in impacts to the historic and cultural resource values that are long term, beneficial, and localized to widespread.

Public Education and Interpretation.

Education and resource interpretation programs in public recreation areas are integral to making the public aware of cultural resource issues, site history, stewardship opportunities, preferred visitor behavior guidelines, and official regulations. Educational and interpretive signs are typically the most common medium used for such programs. Currently, educational and interpretive signs are somewhat limited in the Wekiva River basin.

The management plan for the three Florida state parks in the basin includes some future actions that might increase interpretation and educational amenities on public lands.

However, given the number of river system users and the multiple access points, many visitors to the river system might not be aware of important information that might affect their experience or might alter their behavior while on the river system. Alternative B would include provisions that establish partnerships with private businesses, concessioners, and other appropriate entities that might foster visitor education. As a result, alternative B could have a long-term, beneficial, and widespread effect on public education that would maintain or enhance historic and cultural resource values. As part of this effort, local and state agencies in the river basin could cooperatively establish a systemwide educational and interpretive program that sends a consistent message to visitors about river use and behavior, as well as educates

them on Wekiva River System natural and cultural resource, history, and threats.

Cumulative Effects

Historic and cultural resource values of the Wekiva Wild and Scenic River System have been and could continue to be adversely affected by private land development along the shorelines (e.g., docks), public projects, and increased recreational use due to population growth in the region. The continued and possibly increasing public access to the rivers would also continue to have adverse effects on the historic and cultural resource values of the river system. Collectively, these actions would have an impact that is long term, minor to moderate, adverse, and localized to widespread.

Actions taken by agencies might affect cultural resources. For example, prescribed fires could adversely affect surface artifacts or historic structures, if any. Agencies would be encouraged to conduct cultural surveys or clearances before to such potentially disturbing activities to avoid or mitigate adverse effects caused by such actions.

Alternative B includes multiple actions and provisions that might help minimize or mitigate the impact of these threats, and thus would help protect resources that contribute to the value of the rivers. This means that alternative B would have an impact that is long term, beneficial, and local to widespread.

As described above, the implementation of alternative B would result in beneficial, long-term effects on historic and cultural resources. The beneficial impacts of alternative B actions, in combination with the long-term minor to moderate adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a minor, beneficial, cumulative impact. The impacts of alternative B would be a modest contribution to the overall cumulative effects.

Conclusion

Compared to alternative A, the coordinated, multiagency actions included in alternative B would help contribute to the protection of the historic and cultural resource values of the Wekiva Wild and Scenic River System. Thus, alternative B would result in long-term, beneficial impacts. Overall, implementing alternative B would have *no adverse effect* on cultural resources and values under Section 106.

When the impacts of other actions are combined with the impacts of alternative B, a long-term, beneficial, and localized to widespread cumulative impact on historic and cultural resource values could result. Alternative B would contribute a modest portion of these impacts.

WATER QUALITY AND QUANTITY VALUES

METHODS OF ASSESSING EFFECTS

To provide a measurement for quantifying the intensity of the impacts to water quality and quantity, the definitions for the impact intensity and thresholds are included below.

Negligible: The action would not have any noticeable or measureable changes on water quality or water quantity conditions.

Minor: The effects on water resources would be detectable and measurable, but very limited in scale and degree. The action would yield changes to water quality or water quantity that are minimal and of little consequence.

Moderate: The effects on water resources would be apparent and would have some influence on river health. The action would yield changes to water quality or water quantity that have notable consequences, but that are not widespread, severe, or highly favorable.

Major: The effects on water resources would be very apparent and would have direct and substantial influence on river system health. The action would yield considerable changes to water quality or water quantity that have widespread and severe or exceptionally favorable consequences.

EFFECTS OF ALTERNATIVE A

Analysis

The water quality and quantity value of the Wekiva Wild and Scenic River System could be affected by the following.

Effects of Recreational Uses on Instream Water Quality. The water quality of the Wekiva River System has been degraded by various recreation uses along the various waterways in the system. Boaters, swimmers, and tubers who access the shorelines and

middens while recreating throughout the river system have contributed to shoreline erosion and sedimentation in the water by climbing and walking on unstable slopes. These activities have also displaced shoreline vegetation in several areas in the system. Once the shoreline vegetation is lost, the slopes are even more susceptible to erosion and sedimentation. Irresponsible users have also deposited litter (e.g., cans, plastic waste) in the water. This littering contributes to degradation in water quality.

Motorized watercraft also have adverse effects on water quality through lost engine fuel and propeller damage to native aquatic vegetation (which contributes to water quality). Alternative A would maintain the status quo in terms of managing the impact of recreation on water quality. Thus, with the expected increases in regional population and recreation demand on the river system in the future, alternative A would continue existing impacts on water values from recreational use that are long term, minor, adverse, and localized to widespread.

Effects of Land Use on Instream Water Quality. Nutrient loading and pollution has several adverse effects on aquatic systems. Nutrients from contributing areas of Lake, Seminole, and Orange counties are causing degradation of the aquatic communities that were key factors in the Wekiva's Wild and Scenic River designation. This nutrient loading might threaten the river system to even greater degrees in the future.

High nutrient levels contribute to algal blooms, infestations of invasive or exotic vegetation, and direct population loss of some sensitive endemic species. Measuring, reducing, and mitigating these water quality effects is challenging because nutrient loading to the river system has many sources. Nutrient loading into the river system originates in both surface water and groundwater flows. Thus, to fully assess impacts from nutrient loading,

land uses throughout the surface watershed and the groundwater springshed must be considered. Depending on the location within the basin or springshed and the topography or underground composition, a particular land use could contribute nutrient loading to the surface water (via runoff), to the groundwater (via groundwater recharge), or both. The watershed and springshed of the Wekiva River System cover a very large land area. Complicating matters, the watershed and springshed boundaries extend across several government jurisdictions and several land use types (e.g., from high-density, urban residential lands to open, agricultural lands). Different land use practices contribute different levels of nutrient loading.

In the Wekiva River System, nitrogen loading has been determined to be the controlling factor and therefore most critical. Collectively, the many nitrogen sources in the Wekiva watershed and springshed have considerable adverse effects on water quality. These sources include, but are not limited to, fertilizers used on lawns and landscaping in residential and commercial areas, fertilizers used by agriculture, effluent from septic tanks, and effluent from wastewater treatment plants. In addition to nutrient loading, pollution from automobile fluids, commercial and industrial waste, household chemicals, and medical substances pose a threat to the Wekiva River System through surface water drainage and groundwater infiltration.

As new development occurs in the Wekiva River basin and springshed, the effects of land use practices on water quality could become considerably worse. Future population growth could also bring an increase in the number of residential properties served by septic systems and an increase in chemically maintained and fertilized lawns and landscapes. Both of these changes in the local landscape could increase the threat of adverse water quality impacts on the Wekiva River System.

Alternative A would continue the current management actions and regulatory efforts of

the various state and local government agencies that have jurisdiction in the Wekiva River basin and springshed, including those actions required in the Wekiva area by special state legislation. Land use effects on instream water quality under alternative A would continue to have an impact that is long term, minor to moderate, adverse, and widespread.

Effects of Land Use on Flow Regimes (Water Quantity Conditions). Instream flow throughout the Wekiva River System is affected by several factors throughout the watershed and springshed. Land development, increasing water demand, and climatic variations and events are notable factors that affect flows in the Wekiva River System.

As development continues, the amount of impervious surface area would continue to increase. This landscape alteration could directly diminish groundwater recharge, which in turn, diminishes spring flows into the river system. An increase in impervious surfaces can also alter the surface flow regimes of an area, resulting in greater evaporation loss and increased or decreased surface flows into the river system.

Because the Wekiva River System is heavily dependent on spring flows, it is more sensitive to changes in groundwater levels. An increasing regional population and expanding urban area would continue to increase demands on central water supply systems that rely on groundwater wells. Considerable effects on the Wekiva system may also occur if surface waters from the Wekiva River System are used as a supply source for future water demands.

Ultimately, instream flows also directly affect several other values of the Wekiva Wild and Scenic River System. The condition of water quality, historic and cultural resource values, wildlife and habitat, and recreational uses are all dependent on adequate instream flows. Thus, major alterations to flows in the Wekiva River System could affect several other values that contribute to the Wild and Scenic River designation.

Alternative A would continue these current actions to protect the flow regime of the Wekiva River System. However, with the potential increases in impervious surfaces, land use changes, population growth and the increased water demand that would accompany this growth, additional comprehensive, intergovernmental actions would likely become necessary to ensure the protection of the Wekiva River System and all of its associated resource values. Alternative A would continue to have an impact on instream flow regime that is long term, minor to moderate, adverse, and widespread.

Cumulative Effects

A variety of local and state government policies and regulatory actions have contributed to the protection of water quality and flow regime. To date, management actions by multiple agencies have helped protect the flow regime in the Wekiva River System. In 2007 the district concluded that the existing minimum flows and levels for these springs were adequate to protect the system from “significant harm”. A district reevaluation of the Wekiva River and Black Water Creek minimum flows and levels is scheduled for 2012. Although minimum flows and levels are being met, increased water demand in the basin and springshed could contribute to reduced flows. This pressure would likely be compounded by the increased demand from future population growth in the region.

Although citrus groves and row crops are in decline within the Wekiva area, other forms of agriculture, such as indoor foliage nurseries, continue to use significant quantities of water.

Currently, various agencies are attempting to measure and address the nutrient loading issue in the Wekiva basin and springshed. Some examples of existing agency actions are as follows:

- (1) The St. Johns River Water Management District is implementing a Pollutant Load Reduction Goals program for Wekiwa

Springs, the Wekiva River, Rock Springs, and Rock Springs Run that establishes nutrient loading targets and analyzes discharges into waters that have impaired water quality.

- (2) The Florida Consumer Task Force has recommended a model ordinance for local governments to enforce fertilizer levels.
- (3) The Florida Department of Environmental Protection has established requirements for advanced wastewater treatment in the area.
- (4) The Florida Department of Health has proposed draft nutrient load reduction rules for domestic onsite wastewater disposal systems (on hold pending legislative action).

As discussed above, the water quality and water quantity conditions of the river system could be adversely affected by recreational use, increased development, increased water demands, and other land use activities. Collectively, these actions and trends would have an impact that is long term, moderate, adverse, and localized to widespread.

Alternative A would continue the existing level of action on these issues. As described in the above section, the water quality and quantity conditions in the Wekiva system might be partially mitigated by some of these ongoing actions within this alternative. However, other adverse effects on water quality and flow regime would likely continue under alternative A. Many of these effects could increase or worsen with the projected increases in population, potential development, and recreation demands.

As a result, the impacts of these other actions and trends, combined with the impacts of alternative A actions, would result in long-term, minor to moderate, adverse, and localized to widespread cumulative impacts. The impacts of alternative A on the water quality and quantity values would comprise a small portion of this overall cumulative effect.

Conclusion

Implementing alternative A would result in a continuation of current actions that address water quality and water quantity threats in the Wekiva River System. In terms of recreation impacts on water quality, this alternative would continue to have an impact that is long term, minor, adverse, and widespread. Regarding land use effects on water quality, alternative A would continue effects that are long term, adverse, and widespread. Finally, with respect to flow regimes (water quantity), alternative A would have an impact that is long term, minor, adverse, and localized to widespread.

The effects of alternative A actions, combined with the effects of actions by others, would have a long-term, minor to moderate, and adverse cumulative impact. Alternative A would contribute a small portion to these cumulative impacts.

EFFECTS OF ALTERNATIVE B

Analysis

Implementing alternative B, the preferred alternative, would increase management emphasis and interagency coordination on protecting the water quality and quantity in the Wekiva River System. When compared to the current conditions and current management efforts (alternative A), the actions associated with the collaborative, holistic approach of alternative B could have positive effects on water quality and water quantity issues. The water quality and water quantity conditions in the Wekiva River System could be affected by the following.

Effects of Recreational Uses on Instream Water Quality. As described in alternative A, recreation in the Wekiva River System has contributed to a degradation of water quality. Boaters, swimmers, and tubers who access the shorelines and middens have contributed to shoreline erosion and sedimentation in the river system by climbing and walking on

unstable slopes. These activities have also displaced shoreline vegetation in several areas. Irresponsible users have also deposited litter in the water, which contributes to degradation in water quality. Motorized watercraft also have adverse effects on water quality through spilled engine fuel and propeller damage to native aquatic vegetation (which contributes to water quality). With the projected increase in recreation demand and regional population in the future, these threats to water quality would likely increase or worsen if not adequately addressed.

The objectives and actions for recreation management in alternative B could help remedy or minimize this issue if they are implemented effectively. By completing a recreation assessment, creating a recreation facility master plan, and assessing and monitoring user capacity thresholds for water quality, alternative B could have a positive effect on maintaining or improving water quality conditions in the river system. The expansion of partnerships with private businesses and concessioners who operate on the Wekiva River System (which would include a public awareness/outreach component) could serve as a preventive measure to reduce shoreline impacts by making users more aware of the implications of their actions on the river system.

Another preventive measure under this alternative would be the development of events and media announcements that encourage the public to experience and learn about the Wekiva Wild and Scenic River System and understand its status and health. As a result of the various alternative B objectives and actions described above, the impacts on water quality conditions from recreational uses on instream water quality could be long term, beneficial, and localized to widespread.

Effects of Land Use on Instream Water Quality. As described in alternative A, nutrient loading and other pollution have several adverse effects on aquatic systems, including degradation of the aquatic communities that were key factors in the Wekiva's Wild and

Scenic River designation. This nutrient loading might threaten the river system to even greater degrees in the future.

The deteriorated water quality conditions in the Wekiva River System caused by high nutrient levels could contribute to algal blooms, infestations of invasive exotic vegetation, and direct population loss of some sensitive endemic species. Measuring, reducing, and mitigating these water quality effects is challenging because nutrient loading to the river system has many sources. The watershed and springshed of the Wekiva River System cover a very large land area. Complicating matters, the watershed and springshed boundaries extend across several government jurisdictions and several land use types.

In the future, as development continues to occur in the Wekiva basin and springshed, the effects of land use practices on water quality could become considerably worse. Future population growth would also bring a notable increase in the number of residential properties served by septic systems and an increase in chemically maintained and fertilized lawns and landscapes. Both of these changes in the local landscape could increase the threat of adverse water quality impacts on the Wekiva River System.

Alternative B would continue the current management actions and regulatory controls that are administered by various state and local government entities (see alternative A). In addition, alternative B would promote a collaborative and expanded effort of water quality monitoring and control in the Wekiva basin and springshed. This alternative includes numerous actions that target reduced nutrient loading into the river system by minimizing existing nutrient sources and avoiding future sources. The proposed actions in this alternative affect current and future land uses throughout the Wekiva watershed and springshed. Some examples of these alternative B objectives and related actions are as follows:

- (1) Protect springs, wetlands, surface waters, karst features, and high groundwater recharge areas in the basin and springshed through land acquisition and conservation easements.
- (2) Promote the enforcement of the “Outstanding Florida Waters” statute by reviewing and monitoring activities in the basin that may degrade water quality and violate the statute.
- (3) Evaluate and as appropriate expand or improve stormwater management ordinances and regulations.
- (4) Support the implementation of the Wekiva River System Total Maximum Daily Loads/Basin Management Action Plan program; and review and comment on future total maximum daily load evaluations by state agencies.
- (5) Develop a communication program for residents, businesses, landscaping professionals, developers, and public employees to address fertilizer application practices and the harm caused by nutrient loading to surface water and groundwater quality.
- (6) Evaluate and retrofit existing stormwater management facilities with innovative nutrient removal treatments.
- (7) Assess and promote strengthening of local and state regulations on setbacks, buffers, and allowable land uses and discharges near karst features.
- (8) Encourage proper maintenance of septic systems and retrofitting with performance-based on-site septic systems that minimize nutrient loading.
- (9) Convert urban areas with high septic tank density to central sewer where feasible.
- (10) Enforce, assess, and strengthen regulations and education efforts of state agencies and local governments relating to lawn and landscaping practices and the responsible use of fertilizer; and promote research and education on the fertilizer effects of using reclaimed water for irrigation.
- (11) Support research and monitoring regarding the impacts of land application of reclaimed water on shallow groundwater and the Floridan Aquifer.

- (12) Create an annual workshop for local government planners and decision-makers to provide information about the function of springsheds and strategies for springshed protection.
- (13) Support additional research relating to the health of aquatic vegetation and algal growth that can be indicators of nutrient levels.

As a result of these objectives and related actions, alternative B would have impacts on the effects of land use on instream water quality that are long term, beneficial, and widespread.

Effects of Land Use on Flow Regime (Water Quantity Conditions). As described in alternative A, instream flow throughout the Wekiva River System is affected by several factors throughout the watershed and springshed. Land development, increasing municipal water demand, and climatic variations and events are some of the most notable factors that affect instream flows in the Wekiva River System.

If development continues in the Wekiva springshed, the amount of impervious surface area would continue to increase and diminish groundwater recharge and spring flows into the river system. An increase in impervious surfaces can also alter the surface flow regimes of an area, resulting in greater evaporation loss and increased or decreased surface flows into the river system.

Because the Wekiva River System is heavily dependent on spring flows, it is more sensitive to changes in groundwater levels. An increasing regional population and expanding urban area would also continue to increase demands on central water supply systems. This growth might also have considerable effects on the Wekiva System if surface waters in the basin are used as a supply source for these future water demands.

To date, actions by multiple agencies have helped protect the flow regime in the Wekiva River System.

Alternative B would support a continuation of actions such as these to protect the flow regime of the Wekiva River System. In addition, alternative B would promote an expanded, collaborative, intergovernmental effort to protect this hydrologic resource. This alternative includes numerous actions that aim for improved flow monitoring, flow management, groundwater withdrawal regulations, and water use efficiency. The proposed actions in this alternative would affect current and future land uses throughout the Wekiva River System. Some examples of these alternative B objectives and related actions are as follows:

- (1) Support efforts to update existing minimum flows and levels and determine if additional or revised minimum flows and levels are needed throughout the basin.
- (2) Evaluate existing and proposed water withdrawals and participate in rulemaking processes that would help strengthen policies and regulations that limit water consumption, as appropriate.
- (3) Monitor the outstandingly remarkable values of the Wekiva River System that are affected by flows and water levels to determine if additional actions are needed to protect them.
- (4) Work with local governments, state agencies, and the private sector to promote water conservation policies that relate to water rate structures, irrigation systems, fixtures and appliances, landscaping, low-impact development standards, and designs that protect nonirrigated open space.
- (5) Promote the efficient use of reclaimed water use in the basin and springshed and evaluate whether the use of reclaimed water (including the supplemented reclaimed water sources) has an adverse impact; evaluate whether the transport of water outside of the basin or springshed has an adverse impact.
- (6) Encourage nurseries, landscaping contractors, and agricultural operations to comply with irrigation best management practices.

- (7) Create an annual workshop for local government planners and decision-makers to provide information about the function of springsheds and strategies for springshed protection.

As a result of these objectives and related actions, the impacts on flow regimes under alternative B would be long term, beneficial, and widespread.

Cumulative Effects

As discussed above, the water quality and water quantity conditions of the river corridor could be adversely affected by recreational use, development, water demands, and land use activities. Many of these threats might increase in the future with continued development and population growth throughout the region. If not addressed, these actions would have an impact that is long term, moderate, adverse, and localized to widespread.

Although citrus groves and row crops are in decline within the Wekiva area, other forms of agriculture, such as indoor foliage nurseries, continue to use significant quantities of water.

Alternative B includes multiple actions and provisions that could help minimize the impact of these threats and thus could contribute to protecting water quality and the water quantity from these other effects. In addition, land management agencies in the area have

management plans that target the public acquisition of private lands in critical groundwater recharge areas (e.g., Florida State Parks and the St. Johns River Water Management District). Overall, alternative B could have an impact that is long term, beneficial, and localized to widespread. The impacts of these other actions, together with the impacts of alternative B actions described above, would result in long-term, minor, beneficial cumulative impacts. The impacts of alternative B actions on the water quality and water quantity values would comprise a small to medium portion of the overall cumulative effect.

Conclusion

Alternative B would result in long-term, beneficial impacts that range from localized to widespread. The coordinated, multiagency actions included in alternative B could help contribute to the protection of the water quality and water quantity value conditions of the Wekiva Wild and Scenic River System.

When the impacts of other actions are combined with the impacts of alternative B, a long-term, beneficial, cumulative impact on water quality and quantity values could result. The impacts of alternative B actions on the water quality and water quantity values would comprise a small to medium portion of the overall cumulative effect.

