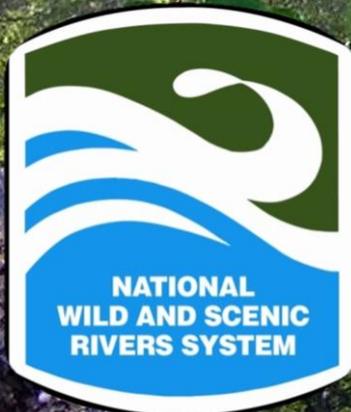




Wekiva Wild and Scenic River System Comprehensive Management Plan



Wekiva River System Advisory Management Committee
May 2012

Prepared with assistance from



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Wekiva Wild and Scenic River System Comprehensive Management Plan

Wekiva River System Advisory Management Committee

in partnership with the

National Park Service



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May 2012

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This plan to manage the Wekiva River System is only possible because of the contributions of countless individuals and organizations that have striven to protect the Wekiva River System over the last several decades. Their legacy is a wonderful natural resource that, with careful management by individuals, managers, and organizations, will continue to serve the people of Florida for decades to come.

Lastly, a very big thank you to Nancy Prine who serves as Chair of the Advisory Management Committee and displayed immense patience throughout the entire process in dealing with questions, suggestions, and comments as well as facilitating discussions between the Pandion Systems planning team and members of the Advisory Management Committee.

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Acronyms List

AMC – Wekiva River System Advisory Management Committee	LCWA – Lake County Water Authority
AP – Wekiva River Aquatic Preserve	LG – Local Government (city and/or county)
BMAP – Basin Management Action Plan	LNCA – Lake Norris Conservation Area
BTITF – Board of Trustees of the Internal Improvement Trust Fund	LWRPSP – Lower Wekiva River Preserve State Park
CAMA – Coastal and Aquatic Managed Areas	MFLs – Minimum Flows and Levels
CUP – Consumptive Use Permit	NGCO – Non-Governmental Conservation Organization
ECFRPC – East Central Florida Regional Planning Council	NPS – National Park Service
EIS – Environmental Impact Statement	OFW – Outstanding Florida Waters
EPA – Environmental Protection Agency	OOCEA – Orlando-Orange County Expressway Authority
ERP – Environmental Resource Permit	ORV – Outstandingly Remarkable Value
FAC – Florida Administrative Code	ORVs – Outstandingly Remarkable Values
FDACS – Florida Department of Agriculture and Consumer Services	PLRG – Pollutant Load Reduction Goal
FDCA – Florida Department of Community Affairs	RPC -- Regional Planning Council
FDEP – Florida Department of Environmental Protection	RSRSR – Rock Springs Run State Reserve
FDEPLE – Florida Department of Environmental Protection Law Enforcement	SAV – Submerged Aquatic Vegetation
FDHR – Florida Division of Historical Resources	SJRWMD – St. Johns River Water Management District
FDOH – Florida Department of Health	SSF – Seminole State Forest
FDOT – Florida Department of Transportation	TNC – The Nature Conservancy
FFS – Florida Forest Service	TMDL – Total Maximum Daily Load
FGS – Florida Geological Survey	USACE – U.S. Army Corps of Engineers
FLEPPC – Florida Exotic Pest Plant Council	USCG – U.S. Coast Guard
FNAI – Florida Natural Areas Inventory	USFWS – U.S. Fish and Wildlife Service
FOWR - Friends of the Wekiva River	WAVA – Wekiva Aquifer Vulnerability Assessment
FPS – Florida Park Service	WBATF – Wekiva River Basin Area Task Force
FWC – Florida Fish and Wildlife Conservation Commission	WBWG – Wekiva Basin Working Group
FWCLE – Florida Fish and Wildlife Conservation Commission Law Enforcement	WMD – Water Management District
IPMS – FWC Invasive Plant Management Section	WPPA – Wekiva Parkway and Protection Act
	WRBCC – Wekiva River Basin Coordinating Committee
	WRPA – Wekiva River Protection Act
	WSA – Wekiva Study Area
	WRS – Wekiva River System
	WSSP – Wekiwa Springs State Park

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1. Executive Summary



The Wekiva River together with Wekiwa Springs Run, Rock Springs Run and Black Water Creek were designated by the United States Congress as a National Wild and Scenic River in October 2000. Five Outstandingly Remarkable Values (ORVs) have been identified for the river system: scenic, recreation, wildlife and habitat, historic and cultural, and water quality and quantity. In accordance with the Wild and Scenic Rivers Act, these ORVs, the river system’s free flow characteristics, and its immediate environment “shall be protected for the benefit and enjoyment of present and future generations” (section 1(b) Wild and Scenic Rivers Act). Unlike most rivers in the National Wild and Scenic

River System that are managed exclusively by either a federal or state agency, the Wekiva River System is considered a “Partnership Wild and Scenic River.” This means that it is jointly managed by a consortium of local stakeholder groups, referred to as the Wekiva River System Advisory Management Committee (AMC), with oversight and coordination provided by the National Park Service (NPS).

Section 3(d)(1) of the Wild and Scenic Rivers Act requires that a comprehensive management plan be developed to serve as the basis for protecting a designated river’s values. This document was developed by the AMC in collaboration with the NPS, and serves to fulfill the requirement of section 3(d)(1).

The Wekiva River System is located within central Florida, including parts of Lake, Orange, and Seminole counties. The river system is just north of Orlando, one of Florida’s principal metropolitan areas with a rapidly growing population. Approximately two million people reside in the tri-county area according to 2006 estimates by the U.S. Census Bureau.

Over the past thirty years, human actions and an increasing population have created challenges to managers of the Wekiva River System’s outstanding values. Wildlife habitat has been fragmented, and numerous exotic species have invaded natural areas. Diverse recreation demands have created conflict between users and threaten the ecological integrity of the natural resources people come to enjoy. Water quality and quantity have also been affected by land use within and around the Wekiva River System. Important cultural resources have been degraded by visitors who are unaware of their value or who deliberately seek to loot artifacts.

Despite these challenges, resources of the Wekiva River System remain relatively intact. Resource managers, the public, and all those who enjoy the river system must be diligent in protecting these resources. Without adequate protection, areas of the river system may lose their values when the sights and sounds of modern life intrude upon the back country of the Wekiva River System.



In the face of these challenges, this plan offers an integrated program of goals, objectives, and actions for protecting and enhancing each outstandingly remarkable value. A coordinated effort is needed to implement this plan. Many public agencies and entities share jurisdiction over or interest in the Wekiva River System and will need to pool their staff and resources to achieve the goals and objectives described. Fortunately, public agencies and local governments in the basin have a long history of partnership and cooperation that will provide a solid foundation for implementing this plan. The goals, objectives, and actions are separated into five sections, one for each ORV as well as a sixth section covering educational needs. The action program prepared for each objective should be considered a tool to guide the completion of that objective, rather than an absolute set of instructions. Priorities are subject to change based on direction of the AMC and available resources.

The following summarizes the goals identified for each ORV.

Scenic Goals

1. Maintain and enhance healthy native plant and animal communities in the Wekiva River System.
2. Maintain and enhance the wild and scenic character of the Wekiva River System by limiting the intrusion of the visual and auditory aspects of human development and activity.

Recreation Goals

1. Provide opportunities for recreation on the Wekiva River System that are compatible with the area's natural and cultural features and management objectives.
2. Ensure that river recreation minimizes environmental impacts and user conflicts and is compatible with the preservation of natural and cultural qualities of a National Wild and Scenic River.

Wildlife and Habitat Goals

1. Protect aquatic and aquatic-dependent organisms and their habitats throughout the Wekiva River System and its associated wetlands.
2. Maintain habitat quality, landscape diversity, and ecosystem connectivity within the Wekiva basin area and associated ecosystems with an emphasis on the black bear as an umbrella species.
3. Reduce the impacts of invasive species and exotic species on native species and habitats throughout the Wekiva River System and its associated wetlands.

Historic and Cultural Resource Goals

1. Identify, protect, and preserve historic and cultural resources from human-related and natural threats.
2. Foster an understanding among the public of the significance of the historic and cultural resources of the Wekiva basin.

Water Quality and Quantity Goals

1. Protect instream water quality of the Wekiva River System.
2. Protect flow regimes of the Wekiva River System.

The National Park Service is tasked with administering the Wekiva Wild and Scenic River program in partnership with state and local land managers and guidance from an Advisory Management Committee. A key partner that has been important in advocating for protection of the Wekiva River System is the Friends of the Wekiva River (FOWR), which coordinated the development of this plan. The Wekiva River System Advisory Management Committee (AMC) is composed of representatives of public agencies, local governments, and non-profit organizations. Many members of this committee have been active stewards of the Wekiva basin for years. This management plan calls for the AMC to oversee implementation and refine strategies that will achieve its goals and objectives. An important function of the AMC will be to pursue funding to implement strategies identified in the plan.

The Wekiva River System and its Outstandingly Remarkable Values are significant contributors to the quality of life of residents and the experience of visitors to Florida. Stewardship of this resource and protection of those values will require the ongoing cooperation and dedication of partners. The Wekiva Wild and Scenic River Management Plan has been prepared to facilitate that effort.

2. Background

In 1968, acting upon growing public concern about threatened natural waterways, Congress passed the Wild and Scenic Rivers Act (WSRA) (Public Law 90-542). This Act recognizes the values of certain rivers and their associated ecosystems as outstanding natural treasures that must be protected for the enjoyment of future generations. Several rivers were designated for immediate protection and additional rivers were authorized for study as potential components of the federally protected system. Since then, Congress has amended the Act to either designate or authorize study of additional rivers.

In 1996, at the request of local advocates, Congress Passed Public Law 101-311 authorizing the study of the Wekiva River, Rock Springs Run, and Seminole Creek as possible additions to the National Wild and Scenic Rivers System. After the “Wekiva River Study” was completed and published in 1999, the Wekiva River together with Rock Springs Run, Wekiwa Springs Run, and Black Water Creek¹ were designated by act of the United States Congress as a National Wild and Scenic River on October 13, 2000. Figure 1 depicts the federally designated Wekiva Wild and Scenic River System².

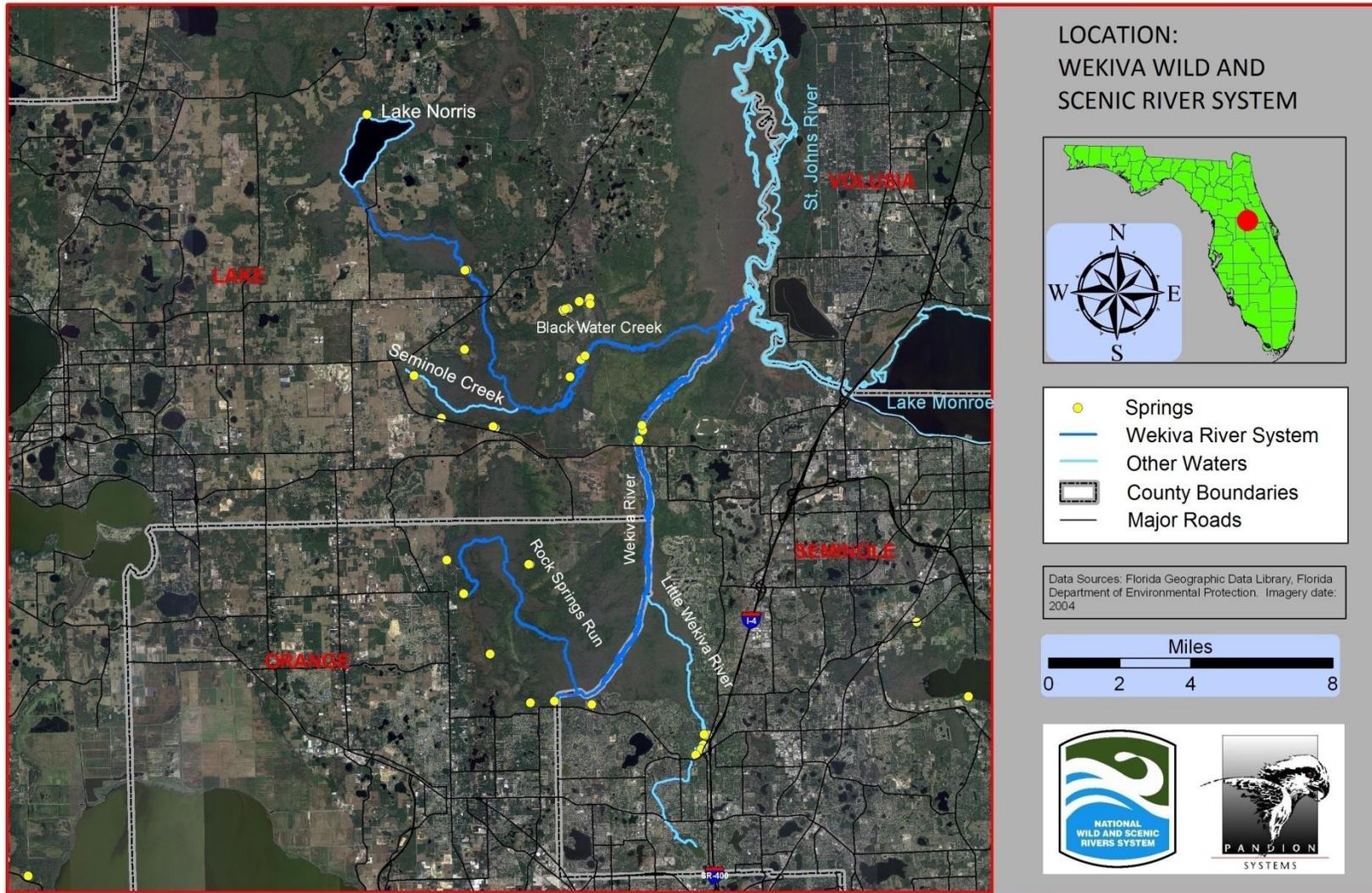
The Wekiva River together with Rock Springs Run, Wekiwa Springs Run, and Black Water Creek were selected for Wild and Scenic protection because they were found to be free-flowing and possessed five outstandingly remarkable values (ORVs) associated with the river environment. These values are: scenic, recreation, wildlife and habitat, historic and cultural, and water quality and quantity. The status of the resources upon which these values depend is described in Section 4.



¹ “Black Water Creek” is the spelling of this tributary to the Wekiva River used by the United States Geographic Survey (USGS), the official keepers of place names for the United States. It is also the spelling of the name in the designating Wild and Scenic Rivers Act amendment. Locally, it is often spelled as one word (“Blackwater Creek”). For consistency, this document will use the former spelling when referring to this tributary.

² For the purposes of this document, the “Wekiva River System” refers to federally designated river segments, including the Wekiva River, Rock Springs Run, Wekiwa Springs Run, and Black Water Creek. This differs from the definition of “Wekiva River System” in the Wekiva River Protection Act, enacted by the Florida legislature in 1988, which includes the Wekiva River, Little Wekiva River, Black Water Creek, Rock Springs Run, Sulphur Run, and Seminole Creek.

Figure 1: Location of the Wekiva Wild and Scenic River System



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2.1. Wekiva River System

The Wekiva River System, consisting of the Wekiva River, Rock Springs Run, Wekiwa Springs Run, and Black Water Creek, is located within Orange, Seminole, and Lake counties in northern central Florida. Two separate boundaries influence hydrology of the river system. The first is the boundary of the surface water drainage basin, generally referred to herein as the “Wekiva basin”. The entire surface water drainage basin is approximately 242 square miles in size, with its northernmost extent reaching into Marion County. A significant portion of this area is in public ownership. The second boundary is that of the “Wekiva springshed”, the aquifer recharge capture area within which water from the surface percolates and travels through underground strata to eventually emerge at the springs. This springshed area encompasses an area extending beyond the surface water basin, primarily to the south and west. Boundaries of the Wekiva surface water drainage basin and springshed are depicted in Figure 2 and Figure 3 respectively.



The interaction between surface water and groundwater is complex. Rain percolates through porous limestone and karst geologic features to the Floridan aquifer, flowing in a generally southwest to northeast direction through the springshed. This groundwater eventually resurfaces via springs in the basin. The river system, however, is fed both by springs from the aquifer and directly through surface runoff. Although the springs provide a relatively consistent flow of fresh water throughout the year (in water flow volume and temperature), the seasonal variations in surface runoff flows may be substantial. By contrast, blackwater streams receive most of their flow from precipitation resulting in annual rainy season over-bank flows. This dynamic surface and groundwater hydrology has created an intricate mosaic of rivers, creeks, lakes, springs, seepage areas, and sinkholes.

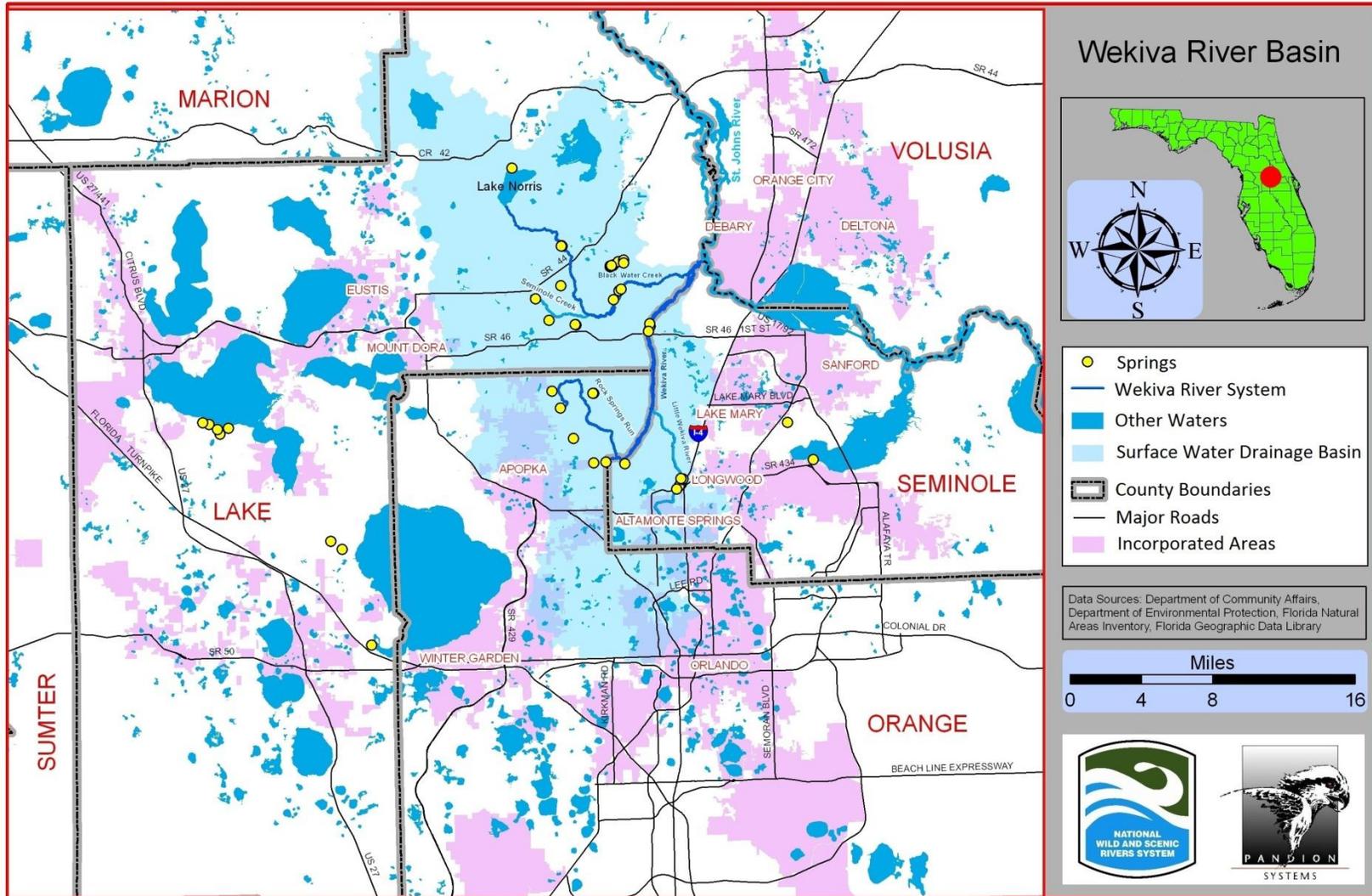
Elevations within the basin range from sea level to about 70 feet above sea level. The climate is considered subtropical, with an average annual temperature of 72 degrees. Daily maximum Fahrenheit temperatures in the summer approach the mid 90's. The average annual rainfall in the Wekiva basin is 52 inches, with June through October being the rainiest season.

The dynamic hydrology of the basin and local climate combine to provide ideal conditions for a diverse variety of natural communities such as pine flatwoods, wet and dry prairie, hydric hardwood hammocks, longleaf pine and wiregrass, xeric scrub oak, sand pine scrub, swamp, and marsh communities. These communities support numerous species of plants and animals, some of which are endangered, threatened, or species of special concern.

Much of the land adjacent to the Wekiva River System is in public ownership by the state of Florida or St. Johns River Water Management District, with smaller public recreational parks owned by various local governments. Much of the private lands adjacent to the river system are within Seminole and Lake counties.

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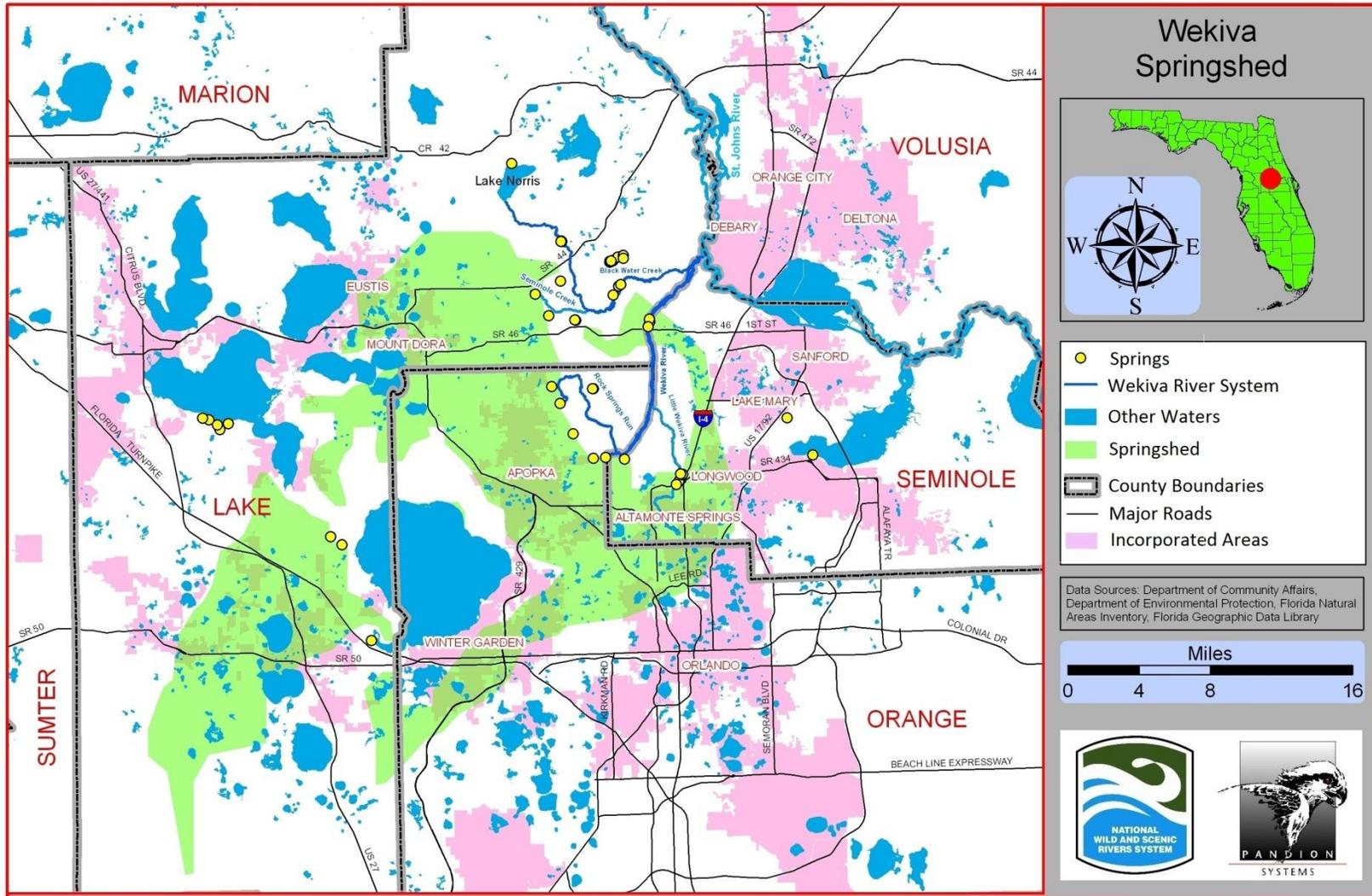
Figure 2: Wekiva Surface Water Drainage Basin



(Approximate municipal boundaries before 2010)

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Figure 3: Wekiva Springshed



(Approximate municipal boundaries before 2010)

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2.1.1. Wekiwa Springs and Wekiwa Springs Run

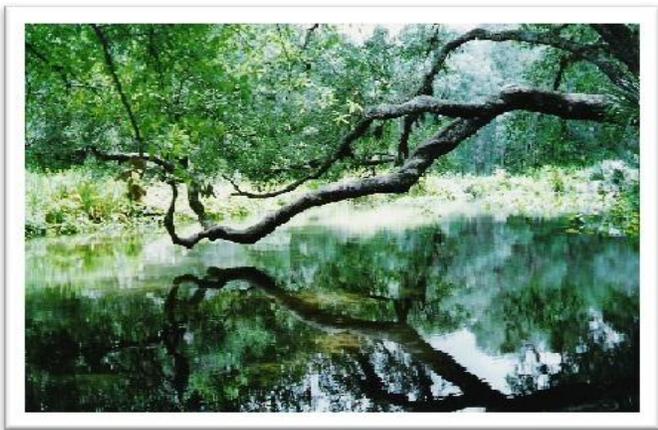
Wekiwa Springs is an artesian flow located within Wekiwa Springs State Park, which is managed by the Florida Park Service, an agency of the Florida Department of Environmental Protection. Wekiwa Springs Run flows approximately one mile before connecting with Rock Springs Run to form the Wekiwa River. (It should be noted for clarification that the spelling of Wekiwa Springs and Wekiwa Springs State Park differs from the spelling of the Wekiwa River.)

Wekiwa Springs is a second magnitude spring with exposed limestone from the Hawthorn Formation just below the water's surface. The spring discharges approximately 48 million gallons per day (MGD) of crystal clear water from at least five horizontal caverns 14 feet below the surface in a kidney shaped pool. The spring and its vicinity are extremely popular for swimming and sunning activities. Estimated peak summer use of the main spring area is between 1,200 and 1,500 persons per day. The bank adjacent to part of the pool has been bulk-headed, and ladders provide swimmer access to the water. Facilities near the main spring area include, a canoe concession, snack bar, playground, two picnic pavilions, restrooms, a visitor center and paved parking. A portion of the slope leading down to the spring is maintained as a grassy area for sun bathing, picnicking, viewing nature, and other uses.



2.1.2. Rock Springs and Rock Springs Run

Rock Springs, another second magnitude spring, is located in Kelly Park, a 237-acre park owned by Orange County. Rock Springs represents one of the few areas in central Florida where the limestone of the Hawthorn Formation is exposed. The primary discharge, originating at the base of a partially submerged limestone bluff, produces an average discharge of approximately 41.8 million gallons per day. The spring run begins at the spring point of discharge and continues down for several hundred feet until it divides into two flows. One flow forms a large public swimming area with concrete retaining walls on two sides. Both flows rejoin below the swimming area, and the spring run then flows northward for about 1.5 miles before turning south. Rock Springs Run continues southward for approximately nine miles before meeting Wekiwa Springs Run to form the Wekiwa River. There are no road crossings or bridges over Rock Springs Run. Most of the land along Rock Springs Run is in public ownership, much of which consists of a floodplain, approximately three miles wide, east to west.



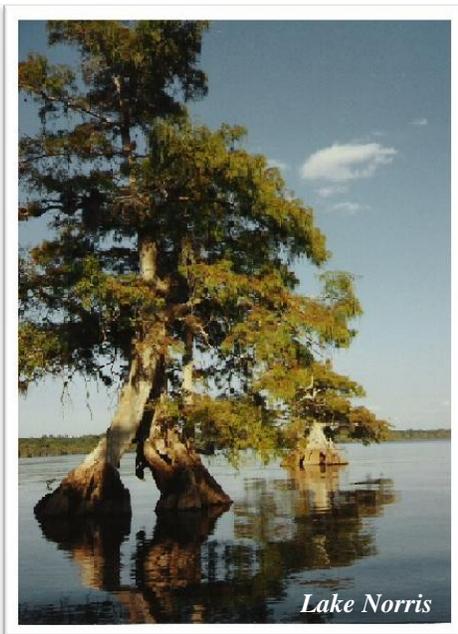
2.1.3. Wekiva River

The Wekiva River flows approximately 14.2 miles from the confluence of Wekiwa Springs Run and Rock Springs Run to the St. Johns River. The Wekiva River is fed by a combination of natural springs as well as about 130 square miles of watershed in north Orange County and northwest Seminole county, and approximately 112 square miles of watershed in Lake County. One-quarter mile downstream of its beginning, the Wekiva River receives discharge from Miami Springs (also known as Sweetwater) Run/Canal. The area between the inflow from Miami



Springs and about 3.75 miles further downstream, where the Little Wekiva River enters, is called Wekiva Swamp. Numerous islands characterize this area. The water is often clear, but can remain tannic for some time after a storm. Approximately six miles downstream of Wekiwa Springs the floodplain narrows and sediments change from organic silts to sand. From here the river meanders northeast towards the St. Johns River. Wekiva Falls Run/Canal, a 2,000 foot tributary originating at Wekiva Falls campground, merges with the Wekiva River just south of the State Road 46 bridge. This bridge crosses the Wekiva River at river mile 6.1. Black Water Creek joins the Wekiva River approximately one mile upstream of the confluence of the Wekiva River and the St. Johns River.

2.1.4. Black Water Creek and Seminole Creek



Black Water Creek is a major tributary to the Wekiva River. Its headwaters are at Lake Dorr in the Ocala National Forest. Upstream of the confluence with Seminole Creek, Black Water Creek is maintained by groundwater seepage, a small spring, and outflow from Lake Norris. The creek falls an average of 1.9 feet per mile over 16 miles between Lake Norris and the Wekiva River. It has an expansive floodplain and a sinuous and braided channel with an abundance of deadwood snags. Through this stretch, Black Water Creek has four crossings, including Sand Road at mile 4.72 within Seminole State Forest, State Road 44 at river mile 11.75, County Road 44A at river mile 11.8, and Lake Norris Road at about river mile 16.8.

Seminole Creek, a tributary of Black Water Creek, originates at Seminole Springs and travels through Seminole Swamp before joining Black Water Creek. Springs contribute a larger portion of the flow downstream of the confluence with Seminole Creek than upstream. Seminole Creek flows across private lands and is in near pristine condition.

Although Black Water Creek is included as part of the officially designated Wekiva Wild and Scenic River System, Seminole Creek is not.

2.1.5. Little Wekiva River

The Little Wekiva River basin receives drainage from an urbanized 42-square-mile area west and north of downtown Orlando. The river flows northward for 15 miles from Lake Lawne just north of State Road 50 in Orange County through Altamonte Springs in Seminole County. The flow of the Little Wekiva is augmented by five springs. The first part of its journey traverses a significantly altered landscape, passing through residential neighborhoods, along structural abutments, through culverts, and under roads. North of State Road 434, the Little Wekiva River

flows into Wekiva Swamp, joining the Wekiva River about half way between Wekiwa Spring and the St. Johns River. Although the Little Wekiva provides a significant source of water into the Wekiva River, it is not included in the Wekiva Wild and Scenic River System.



2.1.6. Springs

There are currently 31 named springs within the Wekiva basin. Six of these feed directly or indirectly into the Wekiva River, four feed into Rock Springs Run, five feed into the Little Wekiva River and sixteen feed into the Black Water Creek and Seminole Creek drainage basin. Wekiwa Springs and Rock Springs are second magnitude and the remaining 29 springs have a lower flow. Taken together, this complex of springs provides hundreds of millions of gallons of water per day into the various drainages of the Wekiva River basin.



The water that feeds the springs, which in turn feed the headwaters (or spring runs) of two major tributary streams for the Wekiva River, is groundwater. Florida's spring systems are governed by complex hydrologic forces that cause water to recharge the underlying aquifer through permeable soils or fissures, travel through a karst network of underground conduits and porous limestone, and eventually return to the surface. The water that appears at spring boils may have been under the ground for days, weeks, months, years, or decades depending upon its path from the surface and through the aquifer. Much of the water in the Wekiva River System comes from rain

that falls outside the boundaries of public lands in an area known as the Wekiva springshed (Figure 3). Although the boundaries of surface watersheds are relatively easy to identify, springshed boundaries are more difficult to define. However, the quality and quantity of water in the aquifer and springs is affected by land uses just as surface waters are affected by land uses.

2.1.7. Geology

Over geologic time, changes in sea level formed the region now occupied by the Wekiva River and its tributaries. The river occupies the physiographic region known as the Wekiva Plain, an area slightly lower in elevation than the surrounding Marion Uplands, Mount Dora Ridge, and Orlando Ridge. The Wekiva Plain appears to have been "cut down" during periods of receding sea level. When recurrent rises in sea level inundated the lowered area, deposited sediments contributed to the present Wekiva Plain. The surface and near surface deposits in the area range from unconsolidated sands to well hardened limestones and dolomites. The Hawthorn Formation, a sandy phosphatic limestone of late middle Miocene age (approximately 13 million years old) underlies the entire area, and outcrops of this formation are exposed at Rock Springs and Wekiwa Spring.

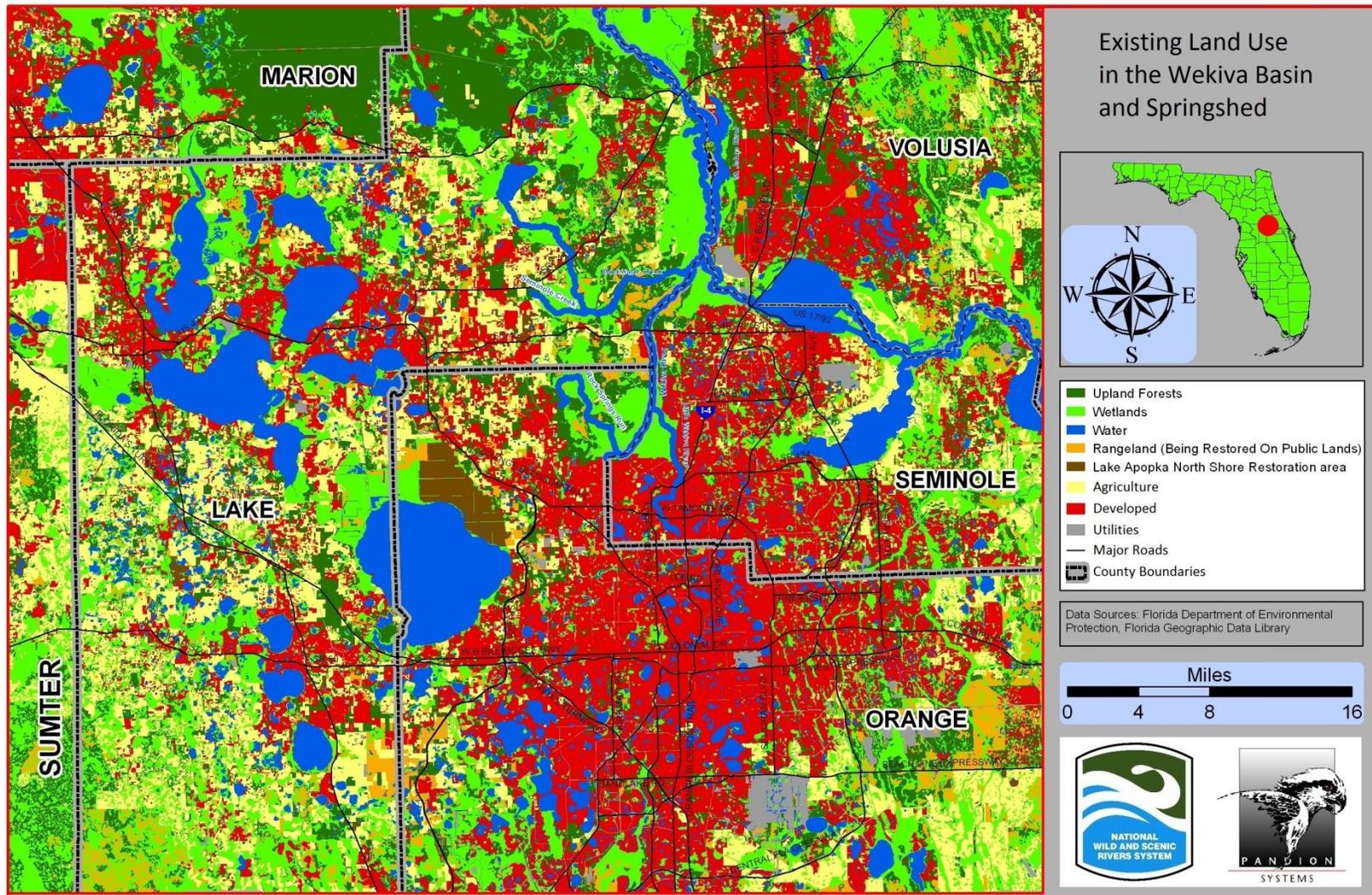
2.1.8. Demographics

All counties in the basin have experienced considerable population growth and urban expansion within recent decades, with the Orlando metropolitan area being a primary growth catalyst. Today over two million people live within 30 miles of the Wekiva River System. According to US Census figures for 2008, the largest percentage increase in population during the past two decades occurred in Lake County, where population rose from 152,104 in 1990 to 307,243 in 2008. This amounts to a 102 percent increase in less than 20 years. Rapid growth rates have also been experienced in both Seminole and Orange counties. During the same time period, Seminole County has seen a population increase of 43 percent from 287,529 to 410,854, and Orange County has seen a 58 percent increase from 677,491 to 1,072,801. Lake County remains the most rural although census numbers reveal that it, like both Seminole County and Orange County, is becoming more urbanized.

2.1.9. Land Ownership and Use

Much of the land adjacent to the Wekiva River System is in public ownership. Exceptions include some single family dwellings and a commercial outfitter downstream of Kelly Park on Rock Springs Run, residential development and commercial outfitters in Lake and Seminole Counties on the middle section of the Wekiva River, and agricultural land on Black Water Creek downstream of Lake Norris. Public lands include property owned by the state of Florida, the St. Johns River Water Management District, the Lake County Water Authority, and local governments. The northernmost extent of the Wekiva River Basin includes a small portion of the Ocala National Forest. Private lands within the Wekiva basin and springshed include a mix of residential, commercial, and agricultural properties. Development ranges from very low-density rural, predominantly in east Lake County and northwest Orange County, to high-density urban in the greater metropolitan area of Orange and Seminole counties. One private mitigation bank, permitted by the Florida Department of Environmental Protection, also operates within the basin. In addition, the Florida Department of Environmental Protection and St Johns River Water have purchased or been granted conservation easements to several privately owned parcels for habitat preservation or management of water resources. Existing land use is depicted in Figure 4.

Figure 4: Existing Land Use



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2.1.10. Public Land Acquisition and Management

More than 77,000 acres of land within the Wekiva basin and its environs have been purchased for conservation and are now managed by public agencies. Much of the Wekiva National Wild and Scenic River System lies within or adjacent to public conservation lands, which explains why it remains relatively undisturbed and could achieve a wild and scenic designation.

The Florida Department of Environmental Protection - Division of Recreation and Parks (also known as the Florida Park Service) manages approximately 41,000 acres of state conservation land, which includes Wekiwa Springs State Park, Lower Wekiva River Preserve State Park, and Rock Springs Run State Reserve. In addition, the Florida Department of Environmental Protection - Office of Coastal and Aquatic Managed Area (CAMA) has special management responsibility over 8000 acres of sovereign submerged land designated as the Wekiva River Aquatic Preserve. The Florida Department of Agriculture and Consumer Services - Florida Forest Service manages over 27,000 acres which comprise Seminole State Forest. These lands contribute to connectivity between Florida Park Service conservation lands and the Ocala National Forest. The St. Johns River Water Management District holds title to approximately 10,000 acres in the basin, including the Wekiva River Buffer Conservation Area, a portion of the Blackwater Creek drainage basin managed by DACS as part of Seminole State Forest, and the Lake Norris Conservation Area, which the district manages in cooperation with the Lake County Water Authority. Other lands in the Wekiva area managed by the Lake County Water Authority include Lake Tracy Preserve, Wolfbranch Sink Preserve, and Bear Track Preserve.

Various lands have also been acquired for conservation and nature-based recreation within the basin by counties and municipalities. County property containing portions of the wild and scenic river system include Kelly Park, 237 acres managed by Orange County surrounding Rock Springs, and Wilson's Land Park, 19 acres managed by Seminole County on the Wekiva River. In addition Lake County, Orange County, FDEP, and the St Johns River Water Management District collaborated in the acquisition and management of parcels for conservation located near the future Wekiva Parkway. The Ocala National Forest is managed by the U.S. Forest Service.



Recorded public and private conservation lands within the Wekiva-Ocala ecological corridor and depicted in Figure 5. A summary of public conservation lands are listed in Table 1. Public lands located along the Wekiva River System are discussed in greater detail under state agency responsibilities in Section 2.2.1 and under public recreation lands described in Section 4.2.1.

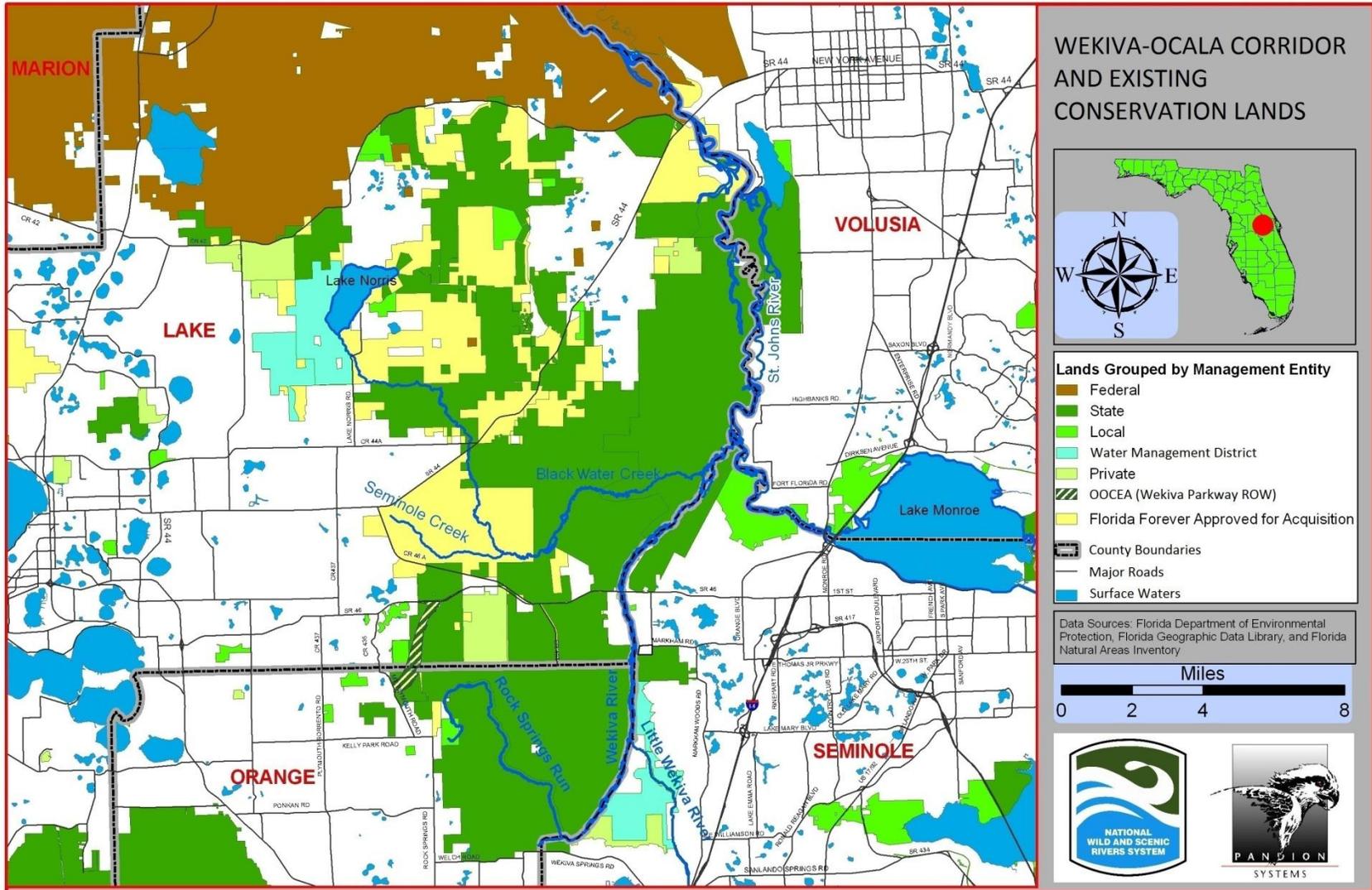
2.1.11. Private Land Conservation and Management

Several conservation easements are held by the state of Florida on private lands, which are committed to conservation but owned and managed privately. The Florida Department of Environmental Protection has purchased easements to 1600 acres of private land within the Wekiva-Ocala Greenway project of Lake County (Maxwell and Holman parcels). Additionally, FDEP obtained an easement through the permitting process for a 1600 acre mitigation bank (Wekiva Mitigation Bank) adjacent to Rock Springs Run State Reserve. The St. Johns River Water Management District in total has acquired conservation easements to over 2300 acres of private land in the Wekiva basin.

A private conservation organization which has been instrumental to land protection efforts in the Wekiva basin and elsewhere is The Nature Conservancy. Recently the Conservancy purchased 631 acres of forested wetlands (Hollywood Pines) abutting Lower Wekiva River State Park Preserve on the St Johns River in Lake County to support habitat connectivity in the Wekiva-Ocala Greenway. In addition, Audubon of Florida owns a 649 acre tract (Sabal Point Sanctuary) adjacent to the Wekiva River between river mile 9 and river mile 10 in Seminole County. The parcel is held for conservation purposes and managed in conjunction with adjacent water management district lands.

Recorded public and private conservation lands within the Wekiva-Ocala ecological corridor and depicted in Figure 5.

Figure 5: Public and Private Conservation Lands



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Table 1. Public Conservation Lands in the Wekiva River Basin Area

Management Agency	Area Managed *
Florida Department of Environmental Protection (FDEP) Florida Division of Recreation and Parks Wekiwa Springs State Park Rock Springs Run State Reserve Lower Wekiva River Preserve State Park Coastal and Aquatic Managed Areas (CAMA) Wekiva River Aquatic Preserve	40,980 acres + Wekiva River Aquatic Preserve 9,492 acres ** 14,083 acres 17,405 acres *** Approximately 8,000 acres of sovereign submerged lands located waterward of ordinary high water on all of the Wekiva River, 3 miles of the Little Wekiva River, 1 mile of Rock Springs Run, and the lower 3 miles of Black Water Creek (may include portions of other lands listed)
Florida Department of Agriculture and Consumer Services (FDACS) Florida Division of Forestry (FDOF) Seminole State Forest	27,102 acres (includes 2,939 acres owned by SJRWMD)
St. Johns River Water Management District (SJRWMD) Lake Norris Conservation Area (with Lake County Water Authority) Wekiva River Buffer Conservation Area	6,734 acres 3,660 acres 3,074 acres
Lake County Water Authority (LCWA) Lake Tracy Preserve Bear Track Preserve Wolfbranch Sink	784 acres 445 acres 185 acres 154 acres
Lake County Ellis Acres Reserve/Akron Meadows Northeast Scrub Preserve Mt. Plymouth Lakes South Pine Lakes Reserve Part of Neighborhood Lakes	999 acres 417 acres 60 acres 184 acres 128 acres 210 acres **** (ownership shared with SJRWMD)
Orange County Kelly Park Lake Lucie Conservation Area (Fazio parcel) Sandhill Preserve (Strite parcel) Part of Pine Plantation Apopka Blue Sink (City of Apopka)	560 acres 237 acres 160 acres 83 acres 40 acres ***** 40 acres
Seminole County Wilson's Landing Park	19 acres 19 acres
TOTAL	77,178 acres + Wekiva River Aquatic Preserve

NOTES:

* Federal public lands and private conservation lands are not listed.

** This also includes portions of parcels acquired pursuant to the Wekiwa Parkway and Protection Act (Neighborhood Lakes and Pine Plantation) managed by FDEP as part of Wekiwa Springs State Park. Portions of Neighborhood Lakes managed by FDEP include 538 acres in state ownership, 316 acres owned jointly by SJRWMD and Orange County, and 521 acres owned by the Orlando-Orange County Expressway Authority (OOCEA). OOCEA lands not required for the Wekiwa Parkway will be transferred to the state for conservation. Portions of Pine Plantation managed by FDEP include 345 acres in state ownership. Additionally, FDEP manages 36 acres as part of Wekiwa Springs State Park that was acquired by the state with Pine Plantation.

*** This also includes Katie's Landing, 6 acres managed for river access in cooperation with Seminole County.

****Lake County manages 210 acre of Neighborhood Lakes that it owns jointly with SJRWMD.

*****Orange County manages 40 acres of Pine Plantation that was acquired by OOCEA and transferred to the county.

2.2. Summary of Existing Protection

In addition to the Wild and Scenic River designation, the following summarizes existing protections available for the Wekiva River System from federal and state authorities. A brief description is provided below.

2.2.1. Federal Agencies and Programs

National Park Service

The National Park Service (NPS) has oversight of Partnership Wild and Scenic Rivers to help communities preserve and manage their own river-related resources by bringing together state, county, and community interests to preserve the ORVs for which the rivers were designated. Specifically the NPS allocates funds for managing the Wekiva Wild and Scenic River and all other partnership rivers throughout the country. In addition, the NPS is responsible for reviewing any and all federally-assisted water resources projects, pursuant to Section 7 of the Wild and Scenic Rivers Act, that could affect a Wild and Scenic River, particularly its free-flow condition and its ORVs.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) is charged with regulating waters of the United States. By definition these waters include coastal and navigable inland waters, lakes, rivers and streams; other intrastate lakes, rivers and streams (including intermittent streams); and mudflats, sandflats, wetlands, sloughs, wet meadows, and certain impoundments.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) must be consulted if a federally protected species may be impacted by an activity within its jurisdiction. USFWS staff prepare an independent biological opinion, and an activity may not be authorized unless it is determined that the project is not likely to jeopardize the continued existence of the species or result in the destruction of the habitat of the species.

2.2.2. State Agencies and Programs

Florida Department of Environmental Protection

All of the Wild and Scenic River segments of the Wekiva River System are waters of the state of Florida. The Florida Department of Environmental Protection (FDEP) has programs regulating drinking water facilities, wastewater discharges (domestic and industrial), landfills (solid waste), facilities generating hazardous waste, and operations creating air discharges. Dredging, filling and/or construction activities in wetlands associated with private, single-family residences, domestic or industrial wastewater facilities, or landfills also are regulated by the Department. In addition, FDEP sets water quality standards for the different categories of surface waters in the state. These standards are found in Chapter 62-302, Florida Administrative Code.

In addition to its regulator programs, the Florida Department of Environmental Protection has acquired several protective conservation easements in the Wekiva area. This includes the easement to a mitigation bank adjacent to Rock Springs Run State Reserve, as well as easements purchased by FDEP to approximately 1600 acres northwest of Lake Norris.

Florida Division of Recreation and Parks (Florida Parks Service)

Under FDEP, the Florida Division of Recreation and Parks (also known as the Florida Park Service or FPS) operates three state parks around the Wekiva Wild and Scenic River System. These are Wekiwa Springs State Park comprising almost 9500 acres, Rock Springs Run State Reserve containing over 14,000 acres, and Lower Wekiva River Preserve State Park totaling approximately 17,400 acres. The total acreage of these three parks is nearly 41,000 acres, combined under one management plan as the Wekiva River Basin State Parks.

The FPS mission is to provide resource-based recreation while preserving, interpreting, and restoring natural and cultural resources. There are 19 distinct natural community types in both uplands and wetlands categories within the boundaries of the Wekiva River Basin State Parks. A number of imperiled species inhabit these communities and significant work has been done to protect known habitat. In managing these species and their habitats, FPS staff use various tools and techniques, ranging from prescribed fire to active exotic species removal. Several historic and cultural sites have been located, cataloged, and protected in all three parks, including an old cemetery and numerous middens found through the parks and along the river system.

Wekiva River Aquatic Preserve

Florida's Aquatic preserves are administrated by FDEP's Office of Coastal and Aquatic Managed Areas as part of a network that includes forty-one aquatic preserves, including the Wekiva River Aquatic Preserve. The Wekiva River Aquatic Preserve provides an overlay of environmental protection measures along the Wekiva River System and its immediate surroundings, including part of the St. Johns River. Figure 6 depicts boundaries of the Wekiva River Aquatic Preserve.

The four long-term goals of the Aquatic Preserve program are to: (1) protect and enhance the ecological integrity of the aquatic preserves; (2) restore areas to their natural condition; (3) encourage sustainable use and foster active stewardship by engaging local communities in the protection of the aquatic preserves; and (4) improve management effectiveness through a process based on sound science, consistent evaluation, and continual reassessment.

Wekiva River Aquatic Preserve staff are responsible for over 8,000 acres of sovereign submerged lands which include the entire Wekiva River, the lower one mile reach of Rock Springs Run, approximately three miles of the Little Wekiva River, three miles of lower Blackwater Creek, and 20 miles of the St. Johns River from Interstate 4 in Sanford to State Road 44, just west of Deland and Lake Beresford.

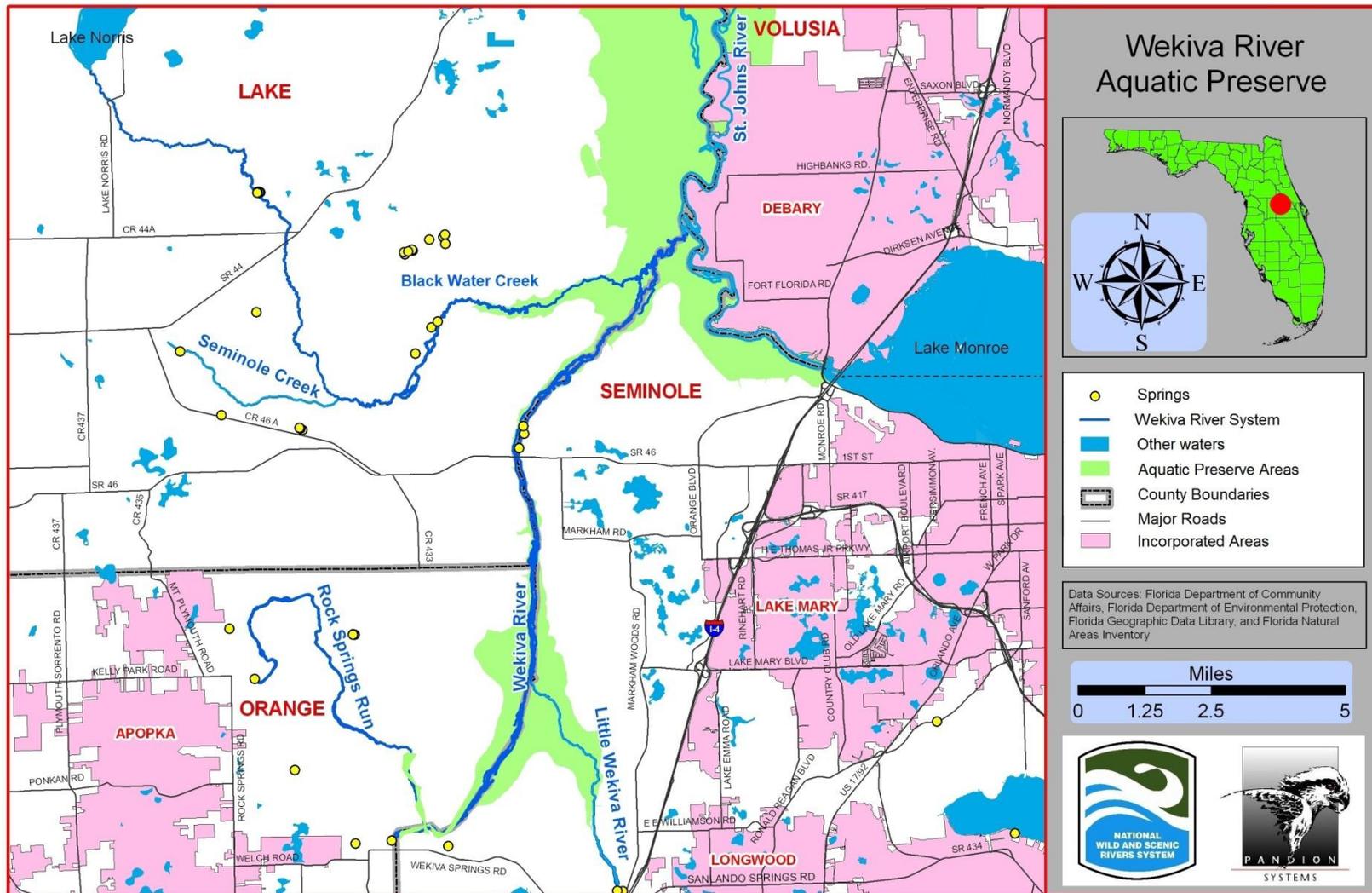
Resource management activities conducted by staff include interagency coordination, evaluation of projects that may impact the aquatic preserve, exotic plant control, education programs, monitoring of wetland birds and other wildlife including listed species, fostering stakeholder participation in protecting the preserve, community assistance, restoration projects, and participation on various technical advisory committees.

Title to submerged lands is held by the Board of Trustee of the Internal Improvement Trust Fund (the Trustees). The Governor and Cabinet, sitting as the Trustees, act as guardians for the people of the State of Florida and regulate the use of these public lands. Management authority for aquatic preserves is provided in Chapters 258 and 253, Florida Statutes. Administrative rules directly applicable to uses allowed in aquatic preserves are found in Chapter 18-20, Florida Administrative Code.



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Figure 6: Wekiva River Aquatic Preserve



(Approximate municipal boundaries before 2010)

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Florida Department of Agriculture and Consumer Services

The Florida Department of Agriculture and Consumer Services (DACS) - Florida Forest Service manages more than 27,000 acres of state land in east Lake County. Known as Seminole State Forest, these lands provide essential connectivity in the Wekiva basin, extending north of Rock Springs Run State Reserve to the Ocala National Forest. Although title to most of Seminole State Forest is held by the state of Florida, 2,939 acres surrounding Black Water Creek are owned by the St Johns River Water Management District.

Seminole State Forest is managed by the Florida Forest Service with the goal of protecting and maintaining the native biological diversity of the many ecosystems that comprise the state forest, while integrating public use of the resources. Multiple-use management promotes recreation, timber, protection of wildlife including designated species, environmental education, and other values that benefit Florida residents and visitors. Land management activities generally contribute to preserving the natural ecosystem around much of Black Water Creek. Hunting is allowed by permit from the Fish and Wildlife Conservation Commission within parts of Seminole State Forest designated as wildlife management areas. Boating on Blackwater creek is also managed through a permit system.

St. Johns River Water Management District

The Wekiva basin is entirely within the jurisdictional boundaries of the St. Johns River Water Management District (SJRWMD), which oversees numerous activities to ensure the sustainable use and protection of water resources on both designated and undesignated segments.



The district holds title to several parcels in the basin. This includes the 3660 acre Lake Norris Conservation Area which it manages in cooperation with the Lake County Water Authority, as well as 2939 acres adjacent to Black Water Creek, which is managed by the Florida Forest Service as part of Seminole State Forest. The district also owns and manages 3074 acres of wetlands and floodplain known as the Wekiva River Buffer Conservation Area, located along the Wekiva River and between the Wekiva and Little

Wekiva rivers. (In conjunction with this, the district manages an adjacent 634 acre parcel for Audubon of Florida.) Finally, the district shares title with Orange County and Lake County to parcels acquired for conservation near the Wekiva Parkway. In addition to its land holdings, the SJRWMD has acquired protective conservation easements over various privately-owned parcels throughout the basin.

The SJRWMD has two primary regulatory programs, the Consumptive Use Permit (CUP) program and the Environmental Resource Permit (ERP) program.

Part II of Chapter 373, F.S., authorizes the Water Management Districts to require permits for the consumptive use of groundwater and surface water. The SJRWMD requires a CUP applicant to establish that a proposed withdrawal of water meets a three-pronged statutory test: (1) the use must be reasonable-beneficial; (2) the use must not interfere with existing legal uses; and (3) the use must be consistent with the public interest. Chapter 40C-2, F.A.C., and the Applicant's Handbook, Consumptive Uses of Water incorporated by reference in rules 40C-2.101, F.A.C., contain the criteria necessary to demonstrate that a use meets the three-pronged statutory test.

Part IV of Chapter 373, F.S., authorizes the Water Management Districts and FDEP to require environmental resource permits for the construction and operation of surface water management systems (a term encompassing most land development activities) whether in uplands or wetlands. Criteria that an applicant must meet are contained in Chapter 40C-4, F.A.C. Additionally, where any regulated activity is located in, on, or over wetlands or other surface waters, the ERP applicant must establish that the activity is not contrary to the public interest, or, if within an Outstanding Florida Water, that the activity will be clearly in the public interest. Public interest criteria for activities affecting surface water and wetlands are contained in Section 373.414, F.S.

The SJRWMD has adopted special ERP basin criteria for the Wekiva River Hydrologic Basin in Chapter 40C-41, F.A.C. A permit applicant proposing a project in this basin must meet the criteria in both chapters 40C-4 and 40C-41, F.A.C.

Sections 373.042 and 373.0421, Florida Statutes, in Part I of Chapter 373 authorize the water management districts to establish minimum flows and levels (MFLs) of surface waters and ground waters. These MFLs are implemented through the consumptive use and environmental resource permitting program. The district has established minimum groundwater levels and minimum annual spring flows for Messant Spring, Palm Spring, Rock Spring, Sanlando Spring, Seminole Spring, Starbuck Spring, and Wekiwa Spring. Surface water levels and flows have been established for the Wekiva River and Black Water Creek. Section 373.709, Florida Statutes in Part VII of Chapter 373 requires the water management districts to develop regional water supply plans to ensure that existing and future water demands are met and water resources and related natural systems are sustained. The planning period is 20 years, with plans required to be updated at least every five years. MFLs are constraints in planning for sustainable water supplies.

Lake County Water Authority

The Lake County Water Authority (LCWA) is a special agency created by the Florida legislature in 1953 for the following purposes: (1) controlling and conserving the freshwater resources of Lake County; (2) fostering and improving the tourist business in the county by improvements to streams, lakes and canals in the county; (3) providing recreational facilities for the tourists, citizens and taxpayers of the county by a more efficient use of the streams, lakes and canals in the county; (4) improving the fish and aquatic wildlife of the county by improving the streams, lakes and canals in the county; and (5) protecting the freshwater resources of Lake County through assisting local governments in the treating of stormwater runoff by conserving freshwater to improve the streams, lakes and canals in the county. As part of this effort, the Lake

County Water Authority manages nearly 800 acres that it has acquired for conservation in the Wekiva basin, including Lake Tracy Preserve, Wolfbranch Sink Preserve, and Bear Track Preserve. The LCWA also works cooperatively with the St Johns River Water Management District to manage and provide recreational access to Lake Norris Conservation Area.

Florida Fish and Wildlife Conservation Commission

The Florida Fish and Wildlife Conservation Commission (FWC) manages the state’s fish and wildlife resources, including more than 575 species of terrestrial wildlife and 700 species of saltwater and freshwater fish. Among its several functions, FWC issues licenses for hunting and fishing, administers permit programs for incidental take and relocation, regulates captive breeding and possession of wildlife, and performs law enforcement. In addition, the FWC Invasive Plan Management Section is the lead agency for aquatic plant management in Florida. FWC biologists are engaged in various activities relating to wildlife and habitat conservation, including research, management, and education.

Florida Department of Health

The Florida Department of Health (FDOH) administers several programs to promote public health in coordination with county health departments, including but not limited to those related to disease control, family health care services, and sanitation. Pursuant to the Wekiva Parkway and Protection Act, the FDOH in coordination with FDEP is charged with evaluating standards for the onsite wastewater disposal systems to achieve nitrogen reductions protective of groundwater quality within the Wekiva Study Area. Pursuant to the Act, the FDOH is authorized to adopt rules as appropriate to reduce nutrient loads, considering measures such as the use of performance-based onsite systems and establishment of a program for septic tank inspection and maintenance. This, however, has not occurred. At the direction of the Florida legislature, additional studies are being pursued by FDOH to further assess the contribution of septic systems to nutrient loading.

2.2.3. Special Legislation

Wekiva River Protection Act

The Wekiva River Protection Act of 1988 was an initial step toward achieving comprehensive protection of the Wekiva River System and its environs. The 1988 legislation required that Lake, Orange, and Seminole counties adopt comprehensive plan policies and land development regulations that apply to the designated Wekiva River Protection Area (See Figure 7) described in the statute. These policies and regulations were intended to better protect hydrology, water quality, habitats, and aquatic/wetland dependent wildlife species associated with the Wekiva River System. New policies and regulations included protecting rural character, limiting development densities, creating river corridor and wetland setbacks, and establishing protection zones. In addition, agencies such as the SJRWMD were required to create additional regulatory standards to better protect the Wekiva River System as defined in the 1988 act (Wekiva River, Little Wekiva River, Black Water Creek, Rock Springs Run, Sulphur Run, and Seminole Creek). Development of Regional Impact thresholds within the Wekiva River Protection Area were also reduced so that development plans of a smaller size would require detailed analysis and review.



The 1988 Wekiva River Protection Act mainly addressed surface water influences on the river system. At the time the legislation was passed, groundwater influences on the Wekiva River System were not as well understood as they are at present. The extent of the groundwater basin that contributes to spring flow within the Wekiva River System has only been well defined relatively recently. This groundwater basin, also known as the Wekiva Springshed (Figure 4), extends considerably west and south of the Wekiva River Protection Area. Until recently, the Wekiva springshed lacked the protective regulations that were put into place for the Wekiva River Protection Area since it is located largely outside of the geographic area defined by the 1988 Act.

Wekiva Parkway and Protection Act

In 2004, the Florida legislature enacted a second piece of legislation titled the Wekiva Parkway and Protection Act. This new legislation provided guiding principles for the development of the Wekiva Parkway, a limited-access facility completing the Orlando beltway and connecting Apopka to Sanford. The Act includes requirements for structures to enhance wildlife movement and habitat connectivity, and identifies four particular properties to be protected by acquisition or conservation easement in the vicinity of the proposed parkway. The proposed route of the Wekiva Parkway, proposed bridging and the status additional lands identified in the Act for conservation are depicted in Figure 8. To ensure greater protection of water resources, the Act designated a larger Wekiva Study Area (Figure 7) that included much of the groundwater contributing area to the west and south of the original Wekiva River Protection Area.

The Act called for numerous actions and studies on the part of local governments and state agencies. These activities are overseen by the Wekiva River Basin Commission, which was created as part of the legislation. Pursuant to the Wekiva Parkway and Protection Act, local government responsibilities included the adoption of comprehensive plan policies and land development regulations to optimize open space and promote a pattern of development protective of recharge areas, karst features, and natural habitat. Strategies identified in the Act to accomplish this included clustering, greenway plans, land acquisition, conservation easements, low density development, and best management practices. The Act also encouraged local governments to coordinate water supply plans, reuse plans, wastewater treatment, and the replacement of conventional septic systems with performance-based technology where necessary. In addition, the 2004 legislation required the FDEP and the Department of Health (FDOH) to initiate rule-making to implement stricter standards that reduce nitrate loading from wastewater treatment plants and individual onsite systems. (Stricter standards have been implemented by the FDEP to reduce nutrient loading from wastewater treatment plants; however, additional studies are being pursued by the FDOH to further assess the contribution of nutrient loading from septic systems.) The Act also called upon the St Johns River Water Management District to pursue rule-making that expands the applicability of protective recharge criteria within the Wekiva Study Area, combine certain consumptive use and environmental resource permitting processes, and consider reducing the volume threshold for consumptive use permits. (The St. Johns River Water Management District amended its rule for lawn and landscape irrigation to require more water conserving measures below the 100,000 gallon per day threshold, pursuant to 40C-2.042, F.A.C. This applies to the Wekiva area and throughout the district.)

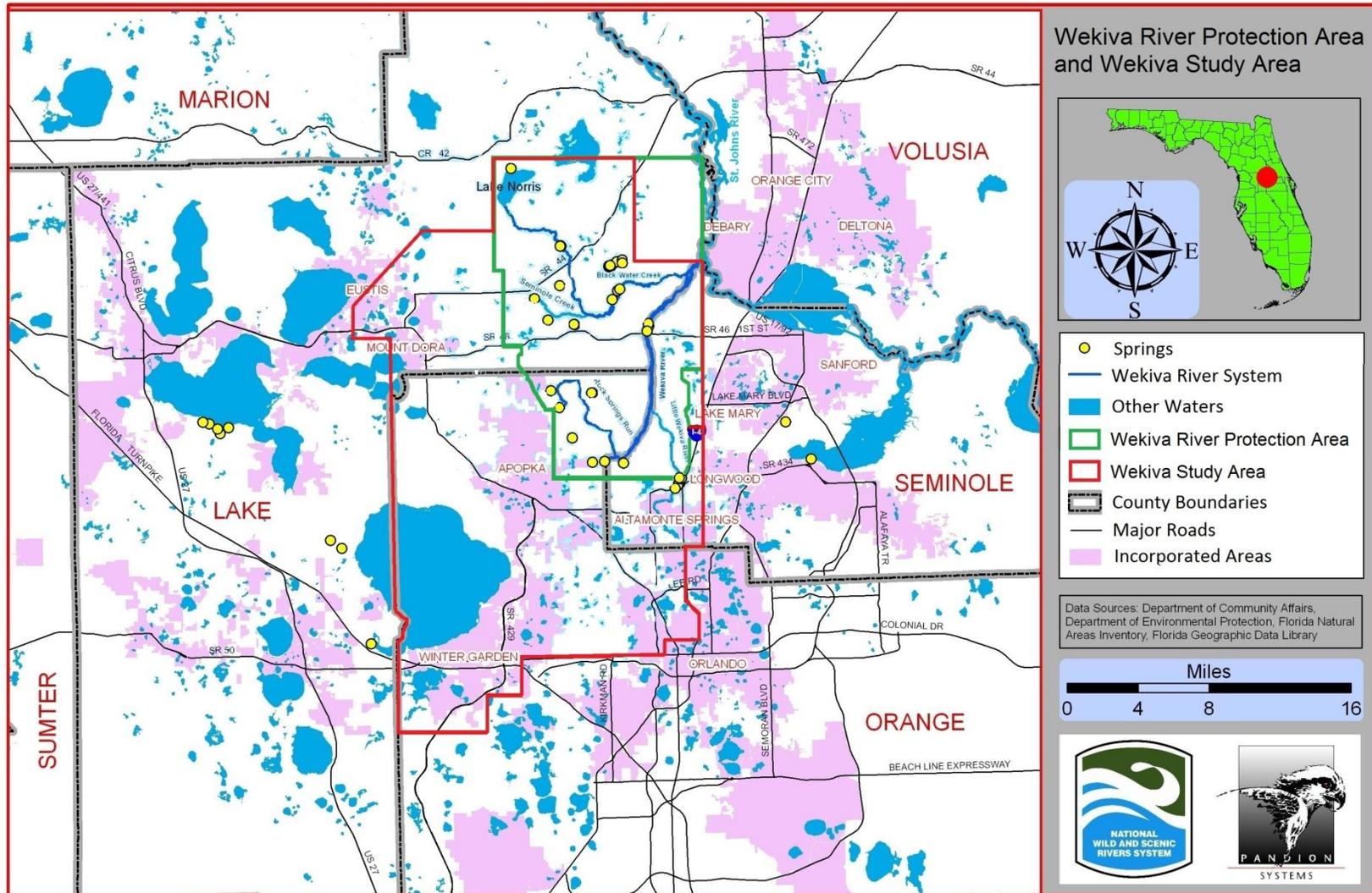


Significant to Wekiva water quality concerns is a requirement in the act that the SJRWMD develop Pollutant Load Reduction Goals (PLRGs) for the Wekiva Study Area. PLRGs are the precursors to Total Maximum Daily Loads (TMDLs) which require reductions in pollutant loadings to a water body that are needed to meet water quality goals. The first two steps of the PLRG process are to determine the nature of a water body's impairment and then identify the pollutants that are causing impairment. These steps led to the conclusion that nitrate and total phosphorus in the Wekiva River and Rock Springs Run should be reduced (Mattson et al. 2006).

The act requires the FDEP to adopt TMDLs for the Wekiva River and Rock Springs Run. This first required that these water bodies be added to the Impaired Waters List, which was completed in January 2007. Development of the TMDLs utilizes the findings published in the PLRG study to create a regulatory requirement for external nutrient and other pollutant loads. These loads can be targeted for future reduction in the Basin Management Action Plan (BMAP) that outlines how the adopted TMDLs will be implemented. TMDLs for nitrate and total phosphorus were adopted by the FDEP in June 2008.

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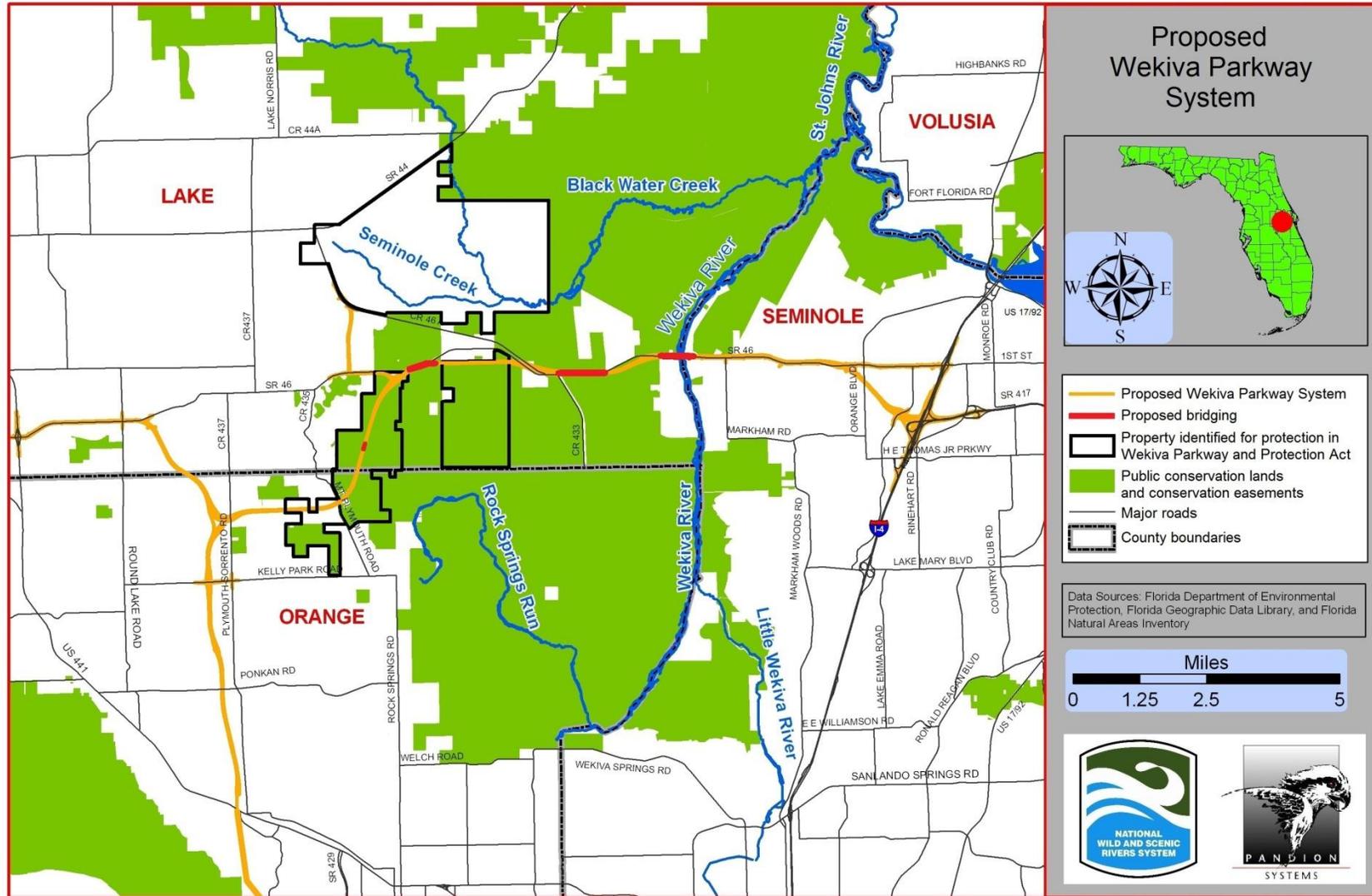
Figure 7: Wekiva River Protection Area and Wekiva Study Area



(Approximate municipal boundaries before 2010)

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Figure 8: Proposed Wekiva Parkway System



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Table 2. Timeline of Milestone Events in Wekiva River Basin 1960 – present

1965	Wekiwa Springs State Park land acquired
1975	Aquatic Preserve Act Establishment of the Wekiva River Aquatic Preserve (AP)
1976	Lower Wekiva River Preserve State Park land acquired
1983	Rock Springs Run State Reserve land acquired
1987	Adoption of Wekiva River Aquatic Preserve Management Plan
1988	Wekiva River Task Force established Wekiva River Protection Act (WRPA) passed Wekiva River designated as an Outstanding Florida Water Wekiva River Buffer Conservation Area established (SJRWMD)
Late 1980s	Project APRICOT (A Prototype Realistic Innovative Community of Today) initiated by the City of Altamonte Springs
1990	Seminole State Forest (Carter Tract) land acquired
1996	Congress authorizes study of the Wekiva River, Rock Springs Run, Blackwater Creek, and Seminole Creek for possible inclusion in the National Wild and Scenic River System. Harper Ranch property acquired by SJRWMD to form the lake Norris Conservation Area
1997	Fisch parcel acquired by SJRWMD (managed as part of Seminole State Forest)
2000	Congress designates the Wekiva River, Wekiwa Springs Run, Rock Springs Run, and Blackwater Creek as a National Wild and Scenic River System
2002	Wekiva River Basin Area Task Force (WBATF) established Lake Norris property acquired by SJRWMD and added to Lake Norris Conservation Area
2003	WBATF Final Report submitted to state legislature Wekiva River Basin Coordinating Committee (WRBCC) established
2004	WRBCC final report submitted to state legislature Wekiva Parkway and Protection Act (WPPA) passed Wekiva River Basin Commission formed as required by the WPPA
2005	Wekiva Mitigation Bank protected (WPPA parcel)
2008	Neighborhood Lakes property acquired by BTIITF, SJRWMD, OOCEA, Lake County and Orange County (WPPA parcel) Pine Plantation property acquired by BTIITF, OOCEA, and Orange County (WPPA parcel)
2010	Wekiva Parkway alignment approved
2011	Hollywood Pines property acquired by The Nature Conservancy (Wekiva-Ocala corridor)

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3. Wild and Scenic River System



“It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations.”

- National Wild and Scenic Rivers Act, October 2, 1968.

Every river designated under the National Wild and Scenic Rivers Act is a living landscape that must be uniquely managed to protect the public's enjoyment of its heritage resources for present and future generations. The Act purposefully strives to balance river development with permanent protection for the country's most outstanding free-flowing rivers. To accomplish this, the Act prohibits the Federal Energy Regulatory Commission (FERC) from licensing the construction of hydroelectric facilities on rivers that have been designated as components of the National System, or which have been authorized by Congress for study as potential additions. Further, the Act prohibits other federal agencies from assisting in the construction of any water resources project that would have a direct and adverse effect on the free flow conditions or ORVs of a designated river or congressionally authorized study river.

The National Wild and Scenic Rivers Act specifically:

- Prohibits dams and other federally assisted water resources projects that would adversely affect river values;
- Protects outstanding natural, cultural, or recreational values;
- Ensures water quality is maintained; and
- Requires the creation of a comprehensive management plan that addresses resource protection, development of lands and facilities, user capacities, and other management practices necessary to achieve purposes of the Act.

3.1. Classification of the Wild and Scenic River System

The Wild and Scenic Rivers Act states that in order for a river to be eligible for designation it must be “free-flowing” and must possess one or more “outstandingly remarkable” scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values. The designated waters within the Wekiva River System were found to be free flowing and possess five outstandingly remarkable values. These include:

- Scenic
- Recreation
- Wildlife and Habitat
- Historic and Cultural Resources
- Water Quality and Quantity

The Wild and Scenic Rivers Act also requires that river segments be classified as *wild*, *scenic*, or *recreational*, depending on the river segment’s degree of natural character and use. These classifications are defined as follows:

Wild river segments - Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

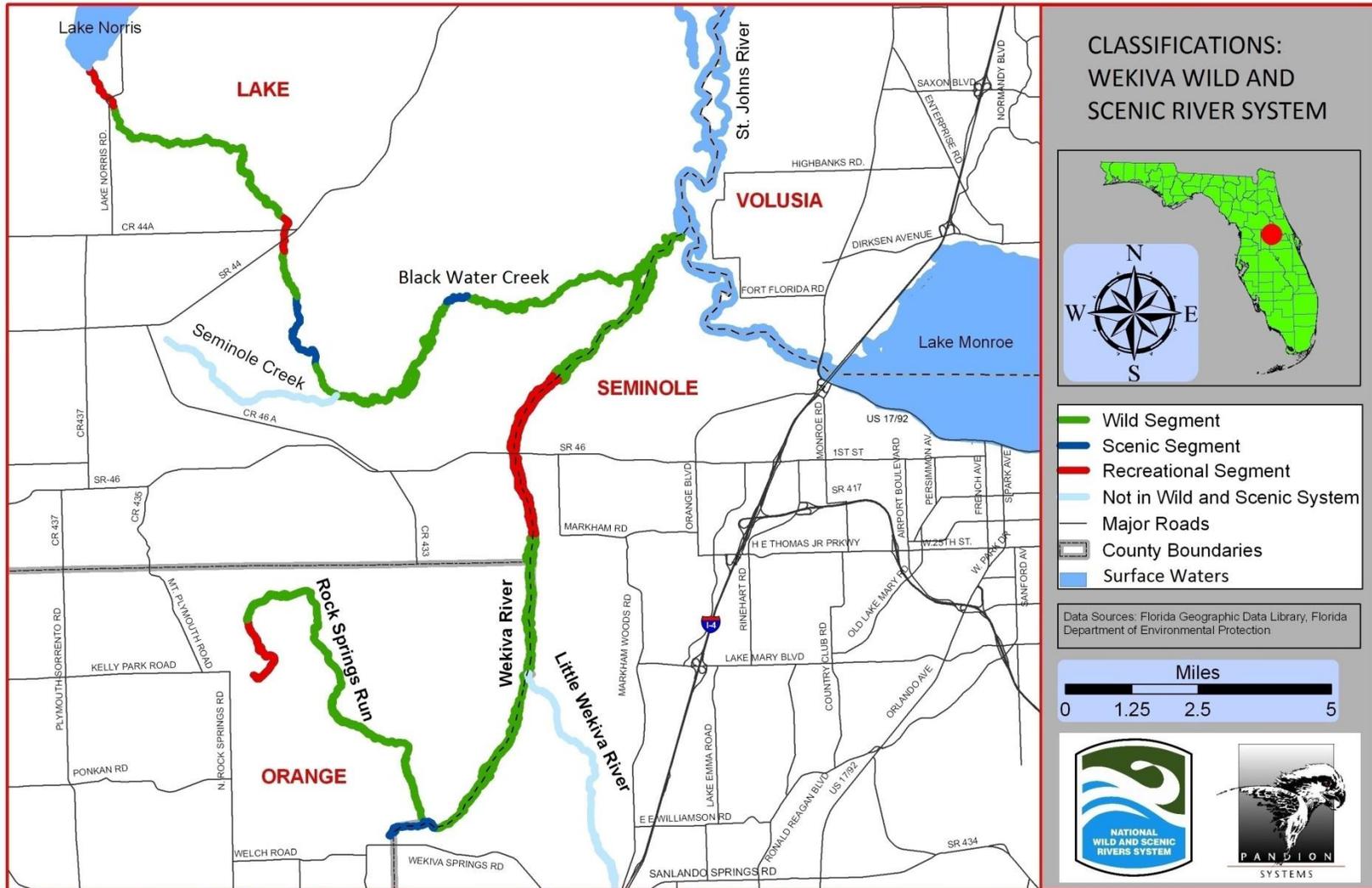


Scenic river segments - Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Recreational river segments - Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

The designation of segments within the Wekiva Wild and Scenic River System are identified in the National Wild and Scenic River Act, as amended in 2000. These are shown on Figure 9. For the river system as a whole there are 31.3 miles of wild segments, 2.1 miles of scenic segments and 8.2 miles of recreational segments. The Wekiva River has 10.3 miles designated as wild and 4.6 designated as recreational. The upper 1.9 miles of Rock Springs Run is designated recreational while the lower 6.9 miles is designated wild. Black Water Creek has 14.1 miles designated as wild, 2.1 miles designated as scenic and 1.7 miles designated recreational. Different river segments were described in some detail in the 1999 Wild and Scenic River Study document. A large portion of the landscape within the Wekiva River basin is protected, with over 77,000 acres in public ownership (Table 1). As a result, much of the designated Wekiva National Wild and Scenic River System lie within the boundaries of or adjacent to publicly owned land.

Figure 9: Classification of Wekiva River System Segments



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4. Management and Protection of Outstandingly Remarkable Values

Five Outstandingly Remarkable Values (ORVs) worthy of special protection and management have been identified for the Wekiva River System. These are:

- Scenic
- Recreation
- Wildlife and Habitat
- Historic and Cultural Resources
- Water Quality and Quantity

The following five subsections of the management plan provide information on each of the five identified ORVs. Each section is organized as follows:

Assessment

- Scope – A brief description is provided of the value and what is to be managed.
- Background – A narrative description of the value is provided, followed by a description of the issues that need to be addressed in order to manage the value effectively.
- Key Issues and Resources – A list of the key issues and resources that represent management challenges associated with the value is provided.
- Inventory of Current Conditions – Criteria, current conditions, management authority, and current actions are provided.

Goals and Objectives

For each value there are two or more goals for management. Each goal has a series of objectives that, if achieved, will contribute to accomplishment of the goal.

Action Program

Each objective has one to five actions presented in tabular format. For each objective, a priority has been identified; and for or each action step, responsible entities have been identified along with expected duration (once or ongoing). The action program for each objective should be considered a tool to guide the completion of that objective, not an absolute set of instructions. Priorities are subject to change based on direction of the AMC and available resources. Similarly, the entities assigned to a particular action could vary based on the future interest, direction or resources of participants. For several actions, both the AMC as well as individual agencies or organizations on the AMC are named, suggesting that although the entire AMC may be involved, certain members would likely play a more prominent role in implementing the particular action step. Furthermore, with respect to duration, it may be appropriate to repeat certain actions identified as “once” if conditions change. It should be noted that although not named in the plan, local Soil and Water Conservation Districts could also play a beneficial role, particular in helping to implemented objectives and actions relating to water resources.

Implementation of the Action Program for each objective will depend largely on the availability of funds. Funding is discussed further in the Section 6, titled Plan Implementation.

4.1. Scenic

4.1.1. Assessment

Scope

Scenic values encompass the landscape within direct view of the river and existing recreation sites and facilities that are directly related to the river. Invasive and exotic species, particularly plants, will also be considered within this value if their presence could cause significant damage to the view-shed of wild and scenic portions of the river.

Background

The Wekiva River System is an exceptionally scenic resource, providing ample opportunities to explore, study, and appreciate nature. Many segments of the river systems are in near-pristine condition, offering the chance to experience an unspoiled part of natural Florida. The crystal clear waters of the springs and spring runs; the tannic dark water of tributaries; and the mosaic of natural communities surrounding the river system all contribute to this unique resource. With a growing population and the expanding urbanization of central



Florida, the amount and quality of open lands and natural scenery in Lake, Seminole, and Orange counties are decreasing. Thus, as time goes on, the scenic value of the Wekiva River System will become even more important.

The scenery as one journeys down the various reaches of the Wekiva River System matches the scenery that would be expected in each segment's classification. The wild segments are in their natural state with mostly native vegetation along the banks. The landscapes are primarily floodplain swamp and hydric hammock on Rock Springs Run and the upper Wekiva River. On Wekiwa Springs Run and the lower Wekiva River, a mix of upland and wetland vegetation types predominate close to the river until the river system enters the floodplain of the St. Johns River about one mile from the confluence. Occasionally parts of Rock Springs Run are blocked by downed trees from storms. Although inconvenient for boating, the downed trees can lend a sense of wilderness to the river reach and improve aquatic habitat. It should be noted, however, that downed trees can be a significant hazard to beginning paddlers. The Aquatic Preserve and Invasive Plant Management Section of FWC spend considerable time removing navigational hazards throughout the Wekiva River System.

Invasive and exotic plant species can adversely impact the scenic value of the river system, potentially preventing the water surface from even being visible. Wild taro (*Colocasia esculenta*) can be abundant along certain reaches of Rock Springs Run and the lower Wekiva River. Water

hyacinth (*Eichhornia crassipes*), water lettuce (*Pistia stratiotes*), and hydrilla (*Hydrilla verticillata*) are also present. Excessive algae growth, which can result from elevated nutrient loading, has been increasingly observed coating native eel grass beds within the river system and rocks near the springs.

The Wekiva River Aquatic Preserve and FWC Invasive Plant Management Section (IPMS) have action plans in place to control exotics. IPMS coordinates and contracts with private companies to manage exotic aquatic plants in the Wekiva River System and maintain navigability. The Aquatic Preserve staff focus primarily on a variety of exotic species that the contractor does not treat such as Chinese tallow, para grass, wild taro, and torpedo grass. Aquatic Preserve records indicate approximately 40 acres of exotics are treated each year. One staff member works almost full-time on exotics control and also conducts special herbicide treatments for hydrilla in Wekiva Lagoon. Although this work keeps exotics in check, all of these exotics are prolific and it is extremely difficult to eliminate them. Aquatic Preserve staff coordinate with IPMS to control the proliferation of nuisance cattails (*Typha sp.*), a native plant that may impede navigation in some areas of the river system if not managed. Nuisance cattails formerly present along one section of Rock Springs Run and along one section of the Wekiva River near Katie's Landing have been reduced significantly and are currently under maintenance control.

Private shoreline development in the form of residences, boat launch facilities, docks, and decks have negatively affected scenic values of the river system, particularly within the recreational segments. There is considerable development along the Wekiva River in Seminole County within a mile of the SR 46 Bridge in either direction, as well as along the river in Lake County south the bridge.

Motorized boats, particularly on the Wekiva River, can create visual, auditory and even olfactory disturbance for paddlers. Personal watercraft (e.g. jet skis) use may be increasing and if so, could create more impacts. Some bank erosion and damage to vegetation has also been caused by paddlers who beach their canoe or kayak, and/stop along the shoreline to rest or picnic. This may be in part because there are few places along the river system specifically designated for this.

Low flying airplanes, primarily commercial passenger jets banking overhead on approach to the Sanford Airport are a relatively recent phenomenon. Noise and visual disturbance associated with low flying aircraft diminish the values of scenic and particularly wild segments of the river system.

The visual impact of the State Road 46 bridge in the center of a recreational segment of the Wekiva River, is also a disturbance to the scenic values. Plans are in place for a new bridge over the Wekiva River as part of the integrated Wekiva Parkway/SR46 design. The new bridge will have a higher structure spanning more of the riparian corridor.

Vandalism, soil compaction, and bank erosion occurs in varying degrees on Shell Island and other shell middens along the Wekiva River are intrusive and can damage significant cultural resources; these activities can also remind visitors of the outside world; potentially detracting from a wilderness experience. Similarly, litter along the river system, along the shoreline, and at the bottom of the river channel can detract from the scenic value of the river system. The most

common litter items are beer and soda cans, typically found during high use seasons. Other items frequently encountered include plastic bags and cups and styrofoam (cups, bait cups, coolers). Fishing line and tackle is occasionally found in the river or entangled in vegetation along the shore, or overhanging the water. Given the number of canoeists and boaters on the Wekiva River System, litter clean-up presents a constant challenge for resource managers. Aquatic Preserve staff conducts at least 12 clean-ups per year with volunteers and often pick up debris during regular work activities.

Black Water Creek provides the potential for a peaceful, scenic experience with predominantly native riparian and floodplain vegetation. Its narrow and sinuous route through the Seminole State Forest, Lower Wekiva River Preserve, and St. Johns River Water Management District lands provides for a challenging and excellent backcountry paddle. Not all of Black Water Creek is navigable, depending on water level and downed trees or other vegetation that may inhibit passage. Roadway bridges traverse Black Water Creek at Sand Road, SR44, CR44A, and Lake Norris Road. The bridges over SR44 and CR44A are located very close together, thus magnifying the adverse impact upon scenic qualities where these two roads cross the creek.

The scenic value of the river system is diminished on busy recreation days when many boaters, canoeists, kayakers, and/or tubers populate the Wekiva River, Wekiwa Springs Run, and Rock Springs Run. Adverse visual impacts of numerous watercraft in the viewshed and noise disturbances from loud boats and individuals are common on heavily used river segments on such days. Furthermore excessive use can cause damage to native vegetation such as eelgrass beds and natural shorelines. These impacts can be expected to increase as population and recreation demand grows, suggesting the need for a system-wide user capacity assessment and future capacity control measures.



Key Issues and Resources

Maintenance of a River Corridor for Native Vegetation

- Wild taro (*Colocasia esculenta*) can become abundant along certain reaches of Rock Springs Run despite control efforts. If wild taro were to become dominant, it would crowd out more diverse natives and diminish the scenic value.
- Cattail (*Typha latifolia*) has required aggressive treatment on about one mile of the middle section of Rock Springs Run to prevent blocking of the channel. Treatment has also been required on the Wekiva River near Katie's Landing, north of the SR 46 Bridge.
- Excessive growth of algae, hydrilla, and other invasive aquatic species could be caused by elevated nitrate levels within the Wekiva basin and springshed. Algae is often seen coating native eel grass beds within the river system and rocks near the springs.
- Clearance of shoreline vegetation associated with development is evident along the Wekiva River in the recreational segment north and south of the SR 46 Bridge. A number of older homes and structures along the river were built before state and local regulations went into effect. Newer homes and other structures are supposed to comply with regulations requiring setbacks and riparian habitat protection. Consistent enforcement is necessary to ensure that both scenic values and riparian habitat are protected. Additional requirements or guidelines to address scenic qualities and restore impacted shorelines should be considered.
- Vegetation and downed trees occasionally block Rock Springs Run and frequently block Black Water Creek. IPMS contractors, AP staff and a local vendor conduct frequent snagging on Rock Springs Run. IPMS contractors and AP staff periodically remove downed trees and limbs on Black Water Creek.

Visual Disturbance

- Litter, including sunken litter on the bottom of the river channel, is a recurring problem in some areas of the Wekiva River System. AP staff and volunteers conduct frequent clean-ups.
- Boat docks and decks present in the recreational segments of the river system, particularly those constructed prior to the implementation of current regulations, displace shoreline vegetation and impact scenic value. The wild and scenic segments of the river system are generally free of these visual disturbances.
- Vandalism to middens, vegetation trampling, and use of Shell Island as a "restroom" represents a visual disturbance. (This issue is also addressed in the historic and cultural resources and recreation sections.)
- Use of motorized watercraft on the Wekiva River System creates the possibility of shoreline wake impacts that may cause erosion, disturb habitat and native vegetation and impair water quality. Motorized watercraft presents the possibility of damage to submerged aquatic vegetation such as eelgrass (*Vallisneria americana*).

Noise Disturbance

- The existing State Road 46 bridge over the Wekiva River creates both a visual and noise disturbance. The river segment here is classified as recreational.
- The planned Wekiva Parkway/SR46 bridge over the Wekiva River may add to the intrusiveness of human impact on the river. The higher speeds of vehicles, particularly trucks, crossing the bridge of this new major highway could create additional visual and noise disturbance in this segment of the river.
- Bridges on SR44, CR44A, and Lake Norris Road over Black Water Creek create visual and noise disturbances. The Lake Norris Road bridge has recently been widened.
- Motorized boats create noise disturbance for paddlers. Currently large boats only access the Wekiva River by coming upstream from the St. Johns River. Downed trees on Rock Springs Run and much of Black Water Creek make them non-navigable for most larger-sized motorized boats.
- Personal watercraft (jet skis) that use the river system can create user conflicts by disturbing paddlers, anglers, birders, and others trying to enjoy the river in its pristine state.



Table 3. Inventory of Current Conditions for Scenic Values

Criterion	Current Conditions	Management Authority	Current Actions
<i>Maintenance of Native Vegetation</i>			
Native vegetation in river corridor	Very good in wild and scenic segments with some exotics in places	FPS, CAMA, IPMS FDOF, SJRWMD	Regular exotics removal efforts. Good land mgmt of surrounding lands.
Native vegetation in river channel	Very good with some exotics in places	CAMA, BIPM, FDOF, SJRWMD	Regular exotics removal efforts part of intensive program. Very good results for Hydrilla.
Cattail invading parts of the Wekiva River and Rock Springs Run	Currently under control with aggressive management	FPS, IPMS, CAMA	IPMS initiate action when advised by FPS or CAMA. (Cattail proliferation can also be reduced by nutrient reduction.)
Algae proliferation	Visible coating of eelgrass beds in some areas and on rocks around the springs	FDEP, LG	TMDLs adopted. Nutrient reductions proposed in draft BMAP.
Downed tree removal - Rock Springs Run	Debris from storm events frequently clogs channel and is somewhat hazardous to less experienced boaters	FPS, IPMS	Minimal removal of downed trees to create narrow passages for canoes and kayaks as per written policy.
Navigability of Black Water Creek	Very good; some exotics observed. Narrow creek channel, vegetation, and downed trees create need for occasional portaging.	FDOF, SJRWMD (upper reaches) IPMS, CAMA (lower reaches)	Minimal removal of downed trees to allow canoe and kayak access.
<i>Limit Visual Disturbance</i>			
Litter in channel	Litter present along portions of the river system. Sunken litter (mostly cans) is a reoccurring problem on Wekiva River. Some floating litter.	CAMA	AP conducts about 12 clean-ups per year with volunteers. Also conducts regular cleanup of surface and shoreline litter during other management activities on river system. Periodic sunken litter cleanup by divers and snorkelers. Volunteer Adopt-a-River program has been reestablished. LCWA has cleaned up litter in Black Water Creek near Lake Norris.
Midden vandalism	Shell Island has visible vandalism. Other areas are less visible.	Rollins College (Shell Island), FPS, CAMA	FPS frequently monitors midden sites on park property. CAMA monitors river midden sites and coordinates with Rollins College on Shell Island.
Clearance of shoreline vegetation for development	Several houses are built right on the river or have excessively removed shoreline vegetation.	Seminole County Lake County Orange County	Setback codes in place for new development

Criterion	Current Conditions	Management Authority	Current Actions
<i>Limit Noise Disturbance</i>			
Existing SR46 Bridge over Wekiva River	Creates noise and visual impacts	FDOT	None
New Wekiva Parkway Bridge over Wekiva River	Could increase noise and visual impacts	FDOT, OOCEA	Project Development and Environmental (PD&E) study underway
Motorized boats, mostly small engines	Common on Wekiva River particularly on busy weekends and holidays	FPS, FWC	Enforcement of manatee speed zone on Lower Wekiva River
Sand Road, SR44, CR44A, and Lake Norris Road crossings over Black Water Creek	Creates noise and visual impacts	FDOT, Lake County	Lake Norris Road bridge recently widened
Personal watercraft	Access the river mostly from private lands along river.	FPS, FWC	None
Aircraft flight lanes	Flyovers by commercial jets are frequent enough to be a disturbance.	Sanford Airport Authority, FAA	None

4.1.2. Goals and Objectives

The following objectives are prioritized in the Action Program. An effort to implement one or more of the objectives may be part of a program already in place.

Scenic – Goal 1:

Maintain and enhance healthy native plant and animal communities in the Wekiva River System.

Objectives

- A. Continue to monitor and control nuisance and invasive exotic vegetation within the Wekiva River System using the category I and II lists produced by the Florida Invasive Pest Plant Council as a guide. Species that require attention include, but are not limited to, hydrilla, water hyacinth, water lettuce, wild taro, elephant ear, para grass, Chinese tallow, East Indian hygrophila, and cattail.
- B. Assess the impacts associated with the proliferation of invasive exotic fishes such as, but not limited to, armored catfish within the Wekiva River System and develop actions for expanding monitoring and control strategies.
- C. Monitor and control invasive exotic invertebrates within the Wekiva River System, including but not limited to channeled apple snails if they become established, and develop actions for expanding monitoring and control strategies.
- D. Expand current partnerships with private businesses and concessionaires who operate on the river system or within the Wekiva basin parks to ensure that their activities are protective of Wild and Scenic River values and to provide unified, supporting messages to their clients about the wild and scenic status of the Wekiva River System and regulations and guidelines for its use.

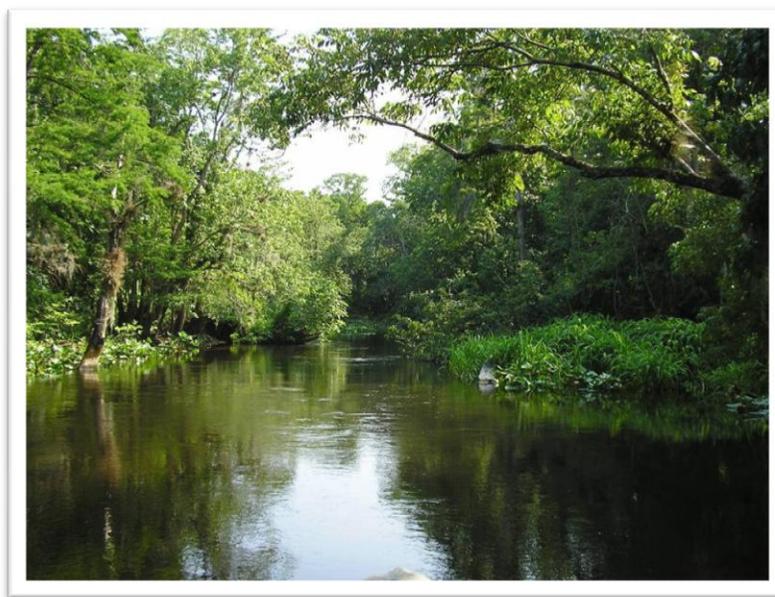
Scenic – Goal 2:

Maintain and enhance the wild and scenic character of the Wekiva River System by limiting the intrusion of the visual and auditory aspects of human development and activity.

Objectives

- A. In order to minimize visual disturbance, continue to enforce development regulations for private waterfront properties and businesses relating to land clearing, preservation of native vegetation, signs, and river-based structures including but not limited to docks and launch areas within the Wekiva River System corridors. If necessary, improve government regulations regarding these activities and structures.

- B. Support continued prohibition of access by gasoline-powered motorized watercraft to Rock Springs Run and the additional prohibition of access by gasoline-powered motorized watercraft to Black Water Creek, except for authorized service vessels.
- C. Ensure that the new road bridge proposed for the Wekiva Parkway, as well as any related construction, is designed to limit its visual and auditory intrusion on the Wekiva River.
- D. Continue to implement and strengthen development regulations and practices for preservation of native vegetation, land clearing, structures, and plantings at publicly owned recreation areas within the Wekiva River System.
- E. Establish regulations limiting the intrusion of artificial light to protect dark skies within the river corridor of the Wekiva River System.
- F. Create rules and enforcement mechanisms to regulate noise pollution within the Wekiva River System appropriate to the wild, scenic, or recreational designations of the different river segments.
- G. Redesign the junction of State Road 44 and County Road 44A to limit visual and auditory intrusions on Black Water Creek so that only one bridge crosses the creek at this location.
- H. Continue to implement and strengthen the existing Adopt-a-River monitoring, control, and removal plan for litter along and within the Wekiva River System.
- I. Except for the Wekiva Parkway, work to ensure that no new roads for motor vehicle traffic are constructed across waters of the Wekiva River System, and ensure that any trails for bicycle or pedestrian use are limited in scale to minimize visual intrusion and are located within existing disturbed areas to prevent adverse impacts on native vegetation, shorelines, and riparian corridors.



4.1.3. Action Program

Key to the Action Program Table:

- Priority – Priority of the Objective is High, Medium, or Low
- Responsibility – A list of acronyms is provided at the beginning of the plan
- Duration – Duration of the Action is either One time (discreet action) or Ongoing (continuous action)

NOTE: The agencies’ ability to carry out these activities will be dependent on the availability of funds and participant priorities.

Scenic – Goal 1: Maintain and enhance healthy native plant and animal communities in the Wekiva River System		
Objective	Priority	
A. Continue to monitor and control nuisance and invasive exotic vegetation within the Wekiva River System using the category I and II lists produced by the Florida Invasive Pest Plant Council as a guide. Species that require attention include, but are not limited to, hydrilla, water hyacinth, water lettuce, wild taro, elephant ear, para grass, Chinese tallow, East Indian hygrophila, and cattail.	High	
Actions	Responsibility	Duration
i. Implement as shown under Goal 3 for Wildlife and Habitat.	IPMS, CAMA, FPS	Ongoing
Objective	Priority	
B. Assess the impacts associated with the proliferation of invasive exotic fishes such as, but not limited to, armored catfish within the Wekiva River System and develop actions for expanding monitoring and control strategies.	High	
Actions	Responsibility	Duration
i. Implement as shown under Goal 3 for Wildlife and Habitat.	CAMA, FPS	Ongoing
Objective	Priority	
C. Monitor and control invasive exotic invertebrates within the Wekiva River System, including but not limited to channeled apple snails if they become established, and develop actions for expanding monitoring and control strategies.	High	
Actions	Responsibility	Duration
i. Implement as shown under Goal 3 for Wildlife and Habitat.	CAMA, FPS	Ongoing
Objective	Priority	
D. Expand current partnerships with private businesses and concessionaires who operate on the river system or within the Wekiva basin parks to ensure that their activities are protective of Wild and Scenic River values and to provide unified, supporting messages to their clients about the wild and scenic status of the Wekiva River System and regulations and guidelines for its use.	High	

Actions	Responsibility	Duration
i. Develop a set of unified messages that reinforce the wild and scenic status of the river system.	AMC, FPS,	Once
ii. Compile a list and description of all regulations and guidelines for public distribution relating to recreational use of the river system that includes the location of resting, picnic, and camping facilities, and appropriate put-in and pull-out areas.	AMC, FPS	Once
iii. Provide materials as needed to help concessionaires educate their customers about proper and sustainable use of the river system.	AMC, FPS	Ongoing
iv. Work with private business and concessionaires to improve operational practices, including but not limited to shoreline protection, wake control, and litter.	AMC, FPS, NGCOs	Ongoing
v. Assess the need to train private businesses and concessionaires about river stewardship and develop a program if needed.	AMC, FPS	Ongoing
Scenic – Goal 2: Maintain and enhance the wild and scenic character of the Wekiva River System by limiting the intrusion of the visual and auditory aspects of human development and activity.		
Objective	Priority	
A. In order to minimize visual disturbance, continue to enforce development regulations for private waterfront properties and businesses relating to land clearing, preservation of native vegetation, signs, and river-based structures including but not limited to docks and launch areas within the Wekiva River System corridors. If necessary, improve government regulations regarding these activities and structures.	High	
Actions	Responsibility	Duration
i. Work with county governments and the SJRWMD to clearly identify the current relevant regulations.	AMC, LG,WMD	Once
ii. Encourage a regime of strict interpretation and enforcement of these regulations for new developments in the river corridor.	AMC, LG,WMD	Ongoing
iii. Develop a checklist for assessing the current state of properties in the river corridor for all parameters listed.	AMC, LG,WMD	Once
iv. Use checklists to assess properties in the river corridor.	AMC, LG,WMD	Ongoing
v. Develop a plan for communication with residents and recreational users to remedy problem areas.	AMC, LG,WMD	Ongoing
Objective	Priority	
B. Support continued prohibition of access by gasoline-powered motorized watercraft to Rock Springs Run and the additional prohibition of access by gasoline-powered motorized watercraft to Black Water Creek, except for authorized service vessels.	High	
Actions	Responsibility	Duration
i. Support revisions to management plans to achieve this objective.	AMC, FPS, FFS	Ongoing

ii. Encourage patrols by off-duty law enforcement officers. (These patrols could have multiple law enforcement purposes across the entire system.)	AMC, FPS, FFS, FWC	Ongoing
Objective	Priority	
C. Ensure that the new road bridge proposed for the Wekiva Parkway, as well as any related construction, is designed to limit its visual and auditory intrusion on the Wekiva River.	High	
Actions	Responsibility	Duration
i. Coordinate closely with the agencies responsible for designing and building the bridge throughout the process, including but not limited to the Orlando Orange County Expressway Authority and Florida Department of Transportation; coordinate with the Wekiva River Basin Commission and the Wekiva Coalition.	AMC, FDOT, OOCEA	Ongoing
ii. Ensure that light intrusion is minimized.	AMC, FDOT, OOCEA	Ongoing
Objective	Priority	
D. Continue to implement and strengthen development regulations and practices for preservation of native vegetation, land clearing, structures, and plantings at publicly owned recreation areas within the Wekiva River System.	Medium	
Actions	Responsibility	Duration
i. Assess current regulations and practices and their implementation at all public recreation areas.	AMC, FPS, FFS, LG	Once
ii. Develop plans to remedy any problem areas.	FPS, FFS, LG	Once
iii. Put remedies into action according to plans.	FPS, FFS, LG	Ongoing
Objective	Priority	
E. Establish regulations limiting the intrusion of artificial light to protect dark skies within the river corridor of the Wekiva River System.	Medium	
Actions	Responsibility	Duration
i. Coordinate with Seminole, Orange, and Lake County governments to establish these regulations.	AMC, LG	Once
ii. Once regulations are established, coordinate with these entities, as well as the Florida Park Service and the Florida Fish and Wildlife Conservation Commission, on enforcement.	AMC, LG, FWC, FPS	Ongoing
Objective	Priority	
F. Create rules and enforcement mechanisms to regulate noise pollution within the Wekiva River System appropriate to the wild, scenic, or recreational designations of the different river segments.	Medium	
Actions	Responsibility	Duration
i. Establish decibel levels of acceptable noise in the three river segments.	AMC, CAMA FPS, FFS, LG	Once
ii. Include assessment of noise levels in the recreation impact monitoring and management plan.	AMC, CAMA, FPS, FFS, LG	Once

iii. Based upon this assessment, establish, post and enforce noise regulations and river use guidelines.	CAMA, FPS, FFS, LG	Ongoing
Objective	Priority	
G. Redesign the junction of State Road 44 and County Road 44A to limit its visual and auditory intrusions on Black Water Creek so that only one bridge crosses the creek at this location.	Low	
Actions	Responsibility	Duration
i. Coordinate with the Florida Department of Transportation and Lake County to raise this issue and encourage a new design.	AMC, FDOT	Ongoing
ii. Schedule and implement reconstruction.	FDOT, Lake County	Ongoing
Objective	Priority	
H. Continue to implement and strengthen the existing Adopt-a-River monitoring, control, and removal plan for litter along and within the Wekiva River System.	Medium	
Actions	Responsibility	Duration
i. Continue and assess the effectiveness of current litter collection efforts.	AMC, FPS, CAMA	Ongoing
ii. Support and as beneficial expand Adopt-a-River Volunteer programs, such as the Seminole County Environmental Restoration Volunteers (SERV).	AMC, FPS, CAMA, NGCOs	Ongoing
iii. Build messages about litter control into the river use regulations and guidelines as specified in Objective D above.	AMC, FPS, CAMA	Once
Objective	Priority	
I. Except for the Wekiva Parkway, work to ensure that no new roads for motor vehicle traffic are constructed across waters of the Wekiva River System, and ensure that any trails for bicycle or pedestrian use are limited in scale to minimize visual intrusion and are located within existing disturbed areas to prevent adverse impacts on native vegetation, shorelines, and riparian corridors.	Medium	
Actions	Responsibility	Duration
i. Monitor the status of proposed state and local road projects and engage in planning efforts as necessary to meet this objective.	AMC, CAMA, FPS, FFS, LG, FDOT, OOCEA	Ongoing
ii. Coordinate with OOCEA, FDOT, FPS, CAMA, FDEP Office of Greenways and Trails, Florida Trails Association, NPS, and local governments regarding the location and design of trails; ensure compliance with Wild and Scenic criteria.	AMC, NPS, CAMA, FPS, FFS, LG, FDOT, OOCEA, NGCOs	Ongoing

4.2. Recreation

4.2.1. Assessment

Scope

The Wekiva River basin currently supports both river and land-based recreation. River-based recreation includes all activities that happen within or directly adjacent to the river and its tributaries. Only river-based recreation will be considered in this plan, except where land-based recreational activities directly overlap with river based recreation and/or impact the river system in some way.

For the purpose of this document, access points for recreation are defined as areas where people can access the river system from public or private lands. Rest stops are places where people recreating stop their boats and temporarily get out. Takeouts are places where people remove their boats from the water or complete their trip and exit the river system. Access points, rest stops, and takeouts are either designated or nondesignated, and can be on public or private land.

Background

The Wekiva River, Wekiwa Springs Run, Rock Springs Run, and Black Water Creek serve as a major nature-based recreational resource for central Florida, and particularly for the large Orlando metropolitan area. Recreation activities in the Wekiva basin include canoeing/kayaking, bank fishing, boat fishing from motor and nonmotorized boats, personal watercraft use, picnicking, camping (primitive, developed, and horse), tubing, swimming, snorkeling, wildlife watching, hiking, horseback riding, and hunting. The Wekiva River/Rock Springs Run Canoe Trail is officially designated as part of Florida's statewide system of greenways and trails.

The recreational opportunities on various waterways of the Wekiva Wild and Scenic River System are described below. See Figure 10 for the locations of designated facilities associated with river-based recreation in the Wekiva River System.

Wekiva River and Wekiwa Springs Run

The Wekiva River and Wekiwa Springs Run comprise one of the few remaining near-pristine riverine systems in central Florida and their natural springs have been enjoyed by people since Native Americans first occupied this area. Today people come to the river and run to enjoy the opportunities provided by their cool, clear waters and diverse ecosystems. Access is from public lands (state and county), private businesses/boating operations, private residential property, and the St. Johns River. Designated public access along the Wekiva River includes Wilson's



Landing County Park and Katie's Landing, with Wekiwa Springs State Park providing public access on Wekiwa Springs Run. Private canoe/kayak facilities that offer access along the Wekiva

River are currently Wekiva Island and Wekiva Falls Resort. A private canoe/kayak concessionaire also operates within Wekiwa Springs State Park.

Public Lands along the Wekiva River

Wekiwa Springs State Park is located at the headwaters of the Wekiva River and offers a glimpse of what central Florida looked like when Timucuan Indians fished and hunted along the river banks long ago. The nearly 9500 acre park receives over 215,000 visitors a year, and more than 55,000 campers a year. The main springs area is the most used area in the park, particularly during the peak season. Recreational opportunities at Wekiwa Springs State Park include swimming, hiking, biking, horseback riding, snorkeling, wildlife watching, tubing, picnicking, camping, and canoeing/kayaking. Wekiwa Springs State Park Nature Adventures is the park’s canoe concessionaire that rents approximately 200 boats per day on weekends and 60 boats per day on weekdays during the busiest season (March to November). A concession stand provides refreshments. Picnic areas and shelters are provided in the areas around Wekiwa Springs and Sand Lake. A playground is located in the spring picnic area, along with a volleyball area and horseshoe pit. A museum and visitor center houses exhibits on natural and cultural history. The park has 9 miles of equestrian trails, 8 miles of biking trails, and 13.5 miles of trails for hiking. Wekiwa Springs State Park also provides 60 full-facility campsites (water, electricity, fire pit, picnic table, and restroom/showers), along with a primitive camping area. Primitive camping opportunities provided along Rock Springs Run within Wekiwa Springs State Park include two canoe camping sites (Otter Camp and Big Buck Camp).

Lower Wekiva River Preserve State Park spans about six miles of the St. Johns River, the lower four miles of the Wekiva River, as well as the lower reaches of Black Water Creek. This system of blackwater streams and wetlands provides habitat for black bears (*Ursus americanus floridanus*), river otters (*Lutra Canadensis*), American alligators (*Alligator mississippiensis*), and wood storks (*Mycteria americana*). Recreation activities within the approximately 17400 acre state park include canoeing/kayaking, horseback riding, primitive horse camping, hiking, biking, and wildlife watching. Canoeists and kayakers can travel through the park along the St. Johns River, the Wekiva River, and Black Water Creek; however, due to the extensive floodplain, the park’s only designated launch/takeout site is at Katie’s Landing. Visitors can use the self guided 2.5 mile nature trail at the south end of the park to get an overview of the park or they can travel some of the 18 miles of multi-use trails on foot, horseback, or bike in the northern portion of the park. The Lower Wekiva River Preserve State Park also offers primitive horse camping opportunities in designated areas of the northern portion of the park. Horse stalls and corrals are available. Camping reservations are made via Wekiwa Springs State Park.



Katie's Landing is a public canoe/kayak launch site located just north of SR 46, and is managed as part of Lower Wekiva River Preserve State Park. The site began as a fish camp, canoe operation, and private campground in the late 1940s and was sold to the state in December 2001. The Florida Department of Environmental Protection will continue to manage Katie's Landing as a canoe/kayak launch and takeout site and provide parking, restrooms, and a picnic facility. In the future, the concessionaire at Wekiwa Springs State Park may offer a shuttle service to pick up patrons who rent canoes and kayaks at the state park upstream. Swimming and motorized boat launching is not permitted due to the surrounding shallow waters and fragile eelgrass beds.

Wilson's Landing is a 19-acre Seminole County facility developed in 2004 that includes a small pavilion, a pier on the Wekiva River, restrooms, and paved parking. Wilson's Landing has also functioned as an unofficial launch and takeout site for canoes and kayaks.

Rock Spring Run State Reserve includes a large stretch of the Wekiva River, which runs along its eastern boundary. Rock Springs Run State Reserve is described in the recreation summary for Rock Springs Run.

Private Concessionaires along the Wekiva River

Wekiwa Springs State Park Nature Adventures is a private concessionaire that operates out of Wekiwa Springs State Park. Guided tours as well as canoe and kayak rentals are available. Visitors launch from the spring and can paddle down the Wekiwa Springs Run about one mile to the Wekiva River or farther. In the future, paddlers may have the option of continuing on to Katie's Landing and be returned to the park by the concessionaire.

Wekiva Island is a privately owned facility that offers an opportunity for motorboat, canoe, and kayak launching in addition to bait, tackle, and food sales. Limited motorboat storage is available. This private facility also rents canoes and kayaks, and is used as a takeout point for boats that are rented from Kings Landing along Rock Springs Run.

Wekiva Falls Resort, along the Wekiva River, offers powered motorboat tours of the river (seating capacity of more than 20 people per boat) as well as canoe and kayak rentals. Resort guests can also use the marina to launch their boats. Wekiva Falls Resort has more than 800 recreational vehicle (RV) sites, along with laundry, showers, a fishing and camping supply store, picnic sites, and a beach for swimming surrounding a large artesian well that flows to the Wekiva River.

Wekiva River Haven is a privately owned facility located downstream of Katie's Landing and has closed in recent years. Before closure, this facility rented small motorboats and catered primarily to anglers by offering bait, food, and other supplies. The future use and management of this property is unknown.

Rock Springs Run

Rock Springs Run's diverse scenery, unique plant communities, and excellent paddling opportunities make it a popular recreation destination. The run twists and turns for eight miles as it winds its way to the Wekiva River through a variety of habitats including pine flatwoods, marsh land, and subtropical and dense hardwood forests. A few private homes and cabins can be seen for the first quarter mile of the run, but the remainder of the run is undeveloped and generally pristine as it flows through public land. Rock Springs and the upper parts of Rock Springs Run can be accessed at Kelly Park. Canoeists



and kayakers can access the Rock Springs Run at Kings Landing, a private outfitter about a half mile downstream from Kelly Park, or from the Wekiva River farther downstream. Navigating Rock Springs Run can be a challenge for beginning paddlers because of fallen trees and submerged vegetation in the run. Three primitive campsites along the run can be reserved through Wekiwa Springs State Park.

Public Lands along Rock Springs Run

Kelly Park, Orange County's highest use park, is home to the headwaters of Rock Springs Run. Rock Springs bubbles up from a cleft in a limestone outcropping and feeds the runs as its flow to the Wekiva River. The 237 acre park is a popular getaway for local residents and visitors alike, and it is managed by the Orange County Parks and Recreation Division (a branch of the Community and Environmental Services Department). The park receives about 300,000 visitors per year. During the summer the park often reaches capacity, causing many potential visitors to be refused entry. Recreational activities in Kelly Park include swimming, snorkeling, tubing, picnicking, hiking, biking, volleyball, wildlife watching, and camping. (25 full-facility campsites and a primitive camping area are available.) Many visitors rent or bring inner tubes and put them in at Rock Springs. Visitors then tube down the one-mile run to the main swimming area. The 20 to 30 minute trip winds through limestone outcroppings and natural pools that attract many swimmers during warm months. An extensive series of boardwalks allows access to different areas of the park while lessening impacts to the shoreline.

Rock Springs Run State Reserve spans the shoreline of both Rock Springs Run and the Wekiva River. Sand pine scrub, pine flatwoods, swamps, and miles of pristine shoreline make this reserve encompassing over 14,000 acres a refuge of natural beauty. Although there is no boat launches on the Wekiva River or Rock Springs Run within the reserve, boaters can travel through the reserve on both waterways after accessing the river system at a designated launch site upstream or downstream. Reserve visitors can also enjoy bicycling, hiking, horseback riding, canoe camping, horse camping, wildlife watching, and hunting. The reserve provides

more than 15 miles of multiuse trails for hiking, biking, and equestrian use. Primitive camping opportunities include two canoe camping areas (Indian Mound Camp on Rock Springs Run and Buffalo Tram Camp of the Wekiva River). Guided trail rides and horse rentals are available. The Florida Park Service also recently contracted with a concessionaire to operate a Wekiva River launch access in the reserve. As with Seminole State Forest, hunting is allowed in part of Rock Springs Run State Reserve designated as a wildlife management area at selected times during hunting season. No camping or horseback riding is allowed during scheduled hunting days.

Private Concessionaires along Rock Springs Run

Kings Landing is a private canoe livery located on the western end of Rock Springs Run, just downstream from Kelly Park. The business currently rents approximately 100 canoes per month, with an anticipation of increased use in the future. Kings Landing has been in existence for decades, but was shut down for several months after the 2004 and 2005 hurricanes caused widespread damage and blockage of the run. The business was purchased in 2007 by its current owner who has renovated the facility. Canoe renters from Kings Landing have an eight mile run down Rock Springs Run to Wekiva Island at the upper reach of the Wekiva River. The Wekiva Island operator provides a takeout ramp and space for vehicle parking and canoe storage for Kings Landing customers.



Wekiwa Springs State Park includes a large stretch of Rock Springs Run, which runs along its northern border. Wekiwa Springs State Park is described in the recreation summary for the Wekiva River and Wekiwa Springs Run.

Black Water Creek

Black Water Creek flows out of Lake Norris and runs through SJRWMD lands, Seminole State Forest, a large forested private property, and Lower Wekiva River Preserve on its way to the Wekiva River. As its name implies, Black Water Creek is a beautiful dark stream, the result of tannic conditions in the water. Although several miles long, the creek is much less accessible than other parts of the river system. Black Water Creek has only one public canoe facility at Lake Norris Conservation Area and a few minimally developed launch sites downstream in Seminole State Forest. Dense vegetation and downed trees make boating on Black Water Creek challenging, but this limited access and undeveloped surroundings provide solitude for backcountry paddling. The creek is not navigable between Lake Norris Road and the confluence of Seminole Creek. (Signs have been installed along the creek south of Lake Norris Road, north of CR44A and south of SR44 to warn the public of this condition.) The portion of Black Water Creek within Seminole State Forest east of the confluence with Seminole Creek and continuing

to the Wekiva River is periodically cleared to allow passage of small watercraft. Access to this section is typically from the Black Water Creek Day Use area in Seminole State Forest. Small nonmotorized boats are also sometimes able to access the lower reach of Black Water Creek from its confluence with the Wekiva River.

Public Lands along Black Water Creek

Seminole State Forest includes more than 27,000 acres and is managed by the Florida Forest Service (a branch of the Florida Department of Agriculture and Consumer Services). This ecologically diverse forest contains 13 different natural communities – almost all of the naturally occurring vegetative communities found in Central Florida. Recreation opportunities in the forest include hiking, picnicking, camping, fishing, wildlife watching, biking, and hunting. Forest access is available from SR 44 and SR 46; however a state forest use permit is required for drive-in access. Day use entrance fees are collected at self-service pay stations near the entrance gates. Seminole State Forest provides three designated river access points suitable for nonmotorized boats along Black Water Creek. Two of the access points are from campsites and one is a day use launch site. There are no boat access points on the Wekiva River. More than 20 miles of multiuse trails are available for hiking, biking, and equestrian use. Seminole State Forest also provides one primitive canoe campsite on Black Water Creek (Moccasin Springs Camp), four primitive campsites along hiking trails, and two large primitive group campsites in open fields. As with Rock Springs Run State Reserve, hunting is allowed in part of Seminole State Forest designated as a wildlife management area at selected times during hunting season.

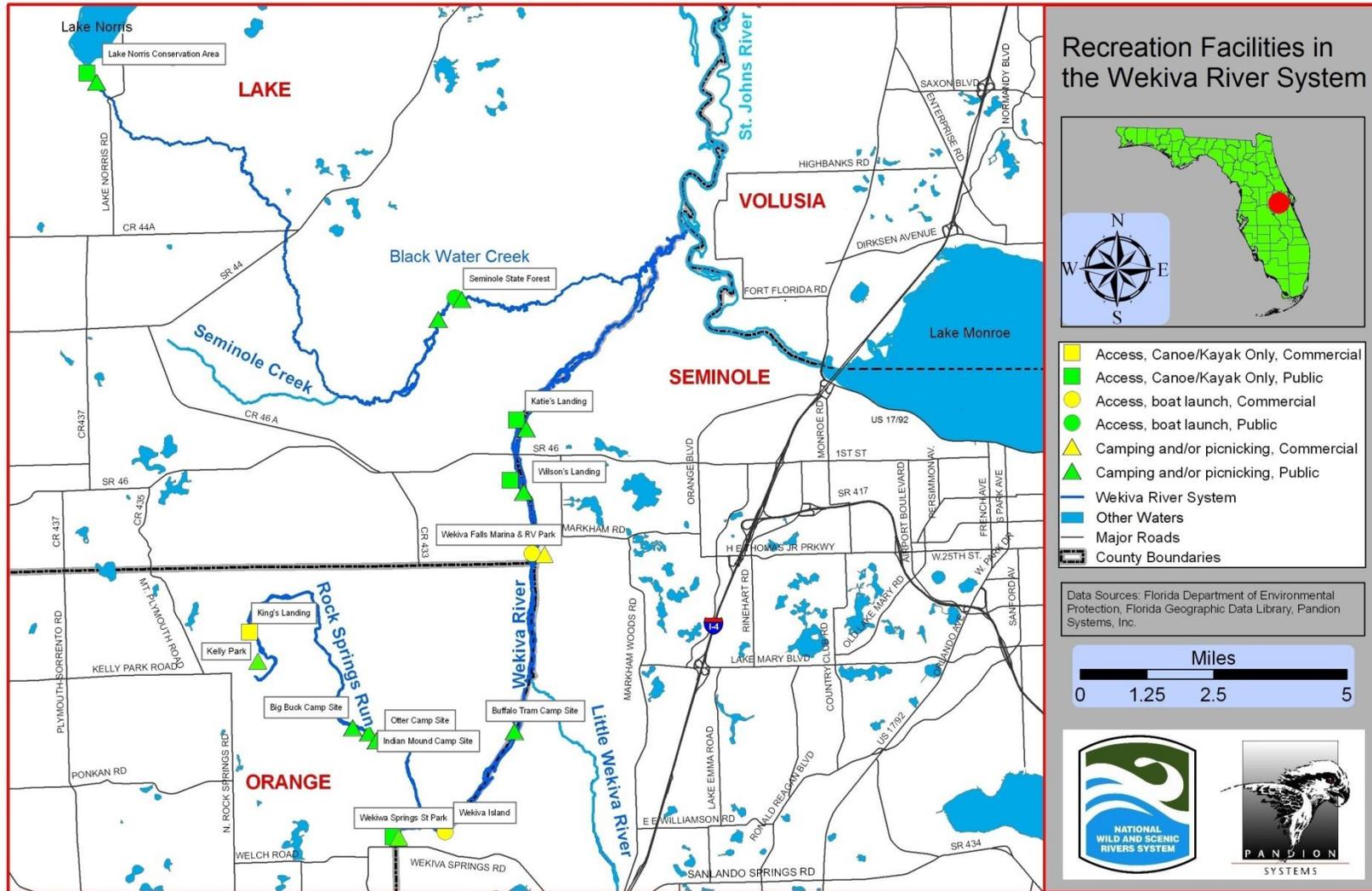
Lake Norris Conservation Area was purchased by the St. Johns River Water Management District to protect the extensive hardwood swamp on the western shore of the lake and the shoreline of Black Water Creek. Lake Norris is a spectacular blackwater lake that supports a variety of bird life, including abundant osprey. The upland portion of the conservation area consists of improved pasture, scrub, and a small amount of planted pine. Available recreation activities include hiking, wildlife viewing, primitive camping, fishing, horseback riding, bicycling, and canoeing. Canoes are available for public use through the Lake County Water Authority, which helps manage the conservation area.

Lower Wekiva River Preserve State Park includes a significant stretch of Black Water Creek. Lower Wekiva River Preserve State Park is described in the recreational summary for the Wekiva River and Wekiwa Springs Run.

Private Concessionaires along Black Water Creek

There are no private concessionaires on Black Water Creek.

Figure 10: Recreation Facilities in the Wekiva River System



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Key Issues and Resources

- Recreation demand – There is no coordinated system to determine and regulate increasing demands and potentially competing recreational uses of different sections of the river. As use increases, conflicts between users and impacts to the river may increase.
- Recreation impacts – Aquatic Preserve staff monitor Rock Springs Run and the Wekiva River yearly as part of the annual aquatic plant survey and during regularly scheduled resource management activities. Recurring litter and impacts to cultural sites have been observed. However, there are no established criteria for determining when social and ecological impacts exceed appropriate levels.
- Non-designated rest stops and camping sites – Although the river, creek, and runs are mostly accessed via designated entry points, visitors get out of their boats and canoes/kayaks and using non-designated areas along the water for picnicking, camping, and resting. Some areas are used heavily as party spots for various groups.
- Limited camping sites – Camp sites along the river are limited (6 total). Rock Springs Run has three locations that are reserved via permit from Wekiwa Springs State Park. The Wekiva River has one designated camp site and Black Water Creek has two designated sites. The number of non-designated camping sites that are currently used by the public is an indication that if more designated sites were available they would most likely be used.
- Limited rest stops/picnicking sites – Pull out areas along the water are limited. The only designated places currently available are at camp sites or at parks and marinas. There are no separately designated picnic or rest areas for boaters and they currently use non-designated sites for these activities.
- Navigational hazards – Navigation hazards are a recurring problem and are removed as soon as possible. Immediately after storm events, however, there may 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.
- Vandalism and erosion of middens – Non-designated access to several of the middens has led to degradation of the resource. Looters have dug up pottery and other artifacts using hand tools in terrestrial areas and boat props in water areas at middens. Large group gatherings and parties have damaged vegetation on the middens and have contributed to erosion of midden banks leading to the river system. In addition, litter is often left behind, that park and AP staff or volunteers must clean up.
- Motorized boat traffic - Motorized boats with larger engines, particularly on the Wekiva River, have the potential to disturb and compete with more passive recreational activities of paddlers, such as nature appreciation and wildlife observation. Use of motorized watercraft on the Wekiva River also has the potential to cause disturbance to submerged vegetation such as eelgrass beds and create shoreline wake impacts that cause erosion. Excessive motorboat noise can cause wildlife disturbance while gasoline fumes and fuel leakage (especially from two-stroke engines) cause impacts to air and water quality.
- Personal watercraft – It is likely that personal watercraft (jet skis) use will increase along the river corridor. Jet skis are known to contribute to social conflicts and environmental damage. The ability of jet skis to access very shallow water allows them to come into contact with fragile benthic vegetation and wildlife habitat. The result of these interactions can be vegetation damage, flushing of nesting or resting birds, and other wildlife disturbance. The noise from these crafts cause wildlife disturbance as well as disturbance of other people on

the waterway. Gasoline fumes and fuel leakage (especially from single-stroke engines) impact air and water quality. The availability, small size, and speed of these watercraft make them attractive to young or inexperienced drivers and lead to serious safety concerns.

- Emergency access availability – As use of the area increases, emergency access planning and response becomes an increasingly important issue. Traditionally the FDEP does not plan camping facilities or other facilities in areas that are not accessible by roads. However, unauthorized recreation is occurring on some islands and middens within the waterways and these recreation sites pose concerns regarding emergency access and assistance.
- Lack of restroom facilities – Due to the natural characteristics of the river system, sanitary facilities are presently located only at launch and take-out sites. Consideration could be given to providing limited sanitary facilities at other appropriate locations.
- Public and private access – Every home along the Wekiva River System has riparian rights under Florida statute for access to the water. In addition, private parks and boat ramps provide access to visitors. Public access points such as Kelly Park have restrictions on numbers of tube and boat rentals allowed. Volume is restricted according to the individual site management plans, which may not take into account the volume of users from other access points along the water.

Eelgrass (*Vallisneria americana*)

Eelgrass, often referred to as tape grass, is an important native plant in Florida that forms a dominant member of a plant community known as “submerged aquatic vegetation” (SAV). This community is among the most productive and biologically diverse ecosystems on the planet and includes various species of seagrasses found in different marine environments. Many plants and animals within a spring ecosystem depend on healthy beds of eelgrass. These include insects as well as a variety of fish and snails. Larger predatory fish such as bass are attracted to eelgrass to search for smaller prey. The bluenose shiner, a rare fish documented in the Wekiva River, favors eelgrass beds. Eelgrass is also a food source for the manatee.

A primary threat to eelgrass is the invasion of the exotic plant species including *Hydrilla* and Brazilian Elodea. These plants were brought into South Florida for aquariums and were eventually released into nearby water bodies. In Florida’s freshwaters, they grow quickly and replace native plants including eelgrass. *Hydrilla* can easily be spread by boats that carry pieces of the plant entangled in their propellers or stuck to their hulls from one area to another. Chemical herbicides and labor intensive hand removal are primary weapons against these invaders. Another threat occurs when algae overgrow eelgrass habitats. Algae growth can be magnified by increased nutrient levels such as nitrogen and phosphorus in the water column. These are chemicals which occur naturally in very low concentrations; however, various human factors, such as fertilizers, septic systems and wastewater disposal, can increase the concentration of nitrogen and phosphorus to levels that promote the excessive growth of algae and other exotics that compete with native vegetation and damage biodiversity of the river system.

Eelgrass beds are fragile and can easily be damaged by boating and anchoring, so it is important to be careful with watercraft in the vicinity of eelgrass. Boat propellers, anchors, jet ski engines, and in shallow areas canoe paddles can chop or churn up eelgrass areas, causing the plant to lose its flowering upper portion or become uprooted. Eelgrass uses flowers and rhizomes (underground stems) to reseed and expand. Although it can easily be damaged by foot or boat traffic, research conducted at Silver Glen Spring found that eelgrass protected from boat impacts for even a few weeks will rapidly grow and produce flowers.

For more information: <http://www.srwmd.state.fl.us/index.asp?NID=268>
<http://www.asmfc.org/submerged.htm>



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Table 4. Inventory of Current Conditions for Recreation Values

NOTE: This table considers activities occurring on or immediately adjacent to the Wekiva River System. It does not address all recreational activities that occur throughout the basin.

Recreation Value	Availability	Current Conditions	Management Authority	Current Actions
<i>Wekiva River</i>				
Non-motorized boating	Access via concession sites, private boat ramps, and private homes.	Very good canoe and kayak opportunities along the river. Evidence of boaters using non-designated sites as rest, party, and picnic areas. Also evidence of looting at archaeological sites. Underwater log hazards make navigation difficult at times.	FPS, CAMA	Litter in river is cleaned up by FPS and CAMA staff and volunteers. Trees and other vegetation that block travel paths are managed as needed.
Motorized boating	Access via concession sites, private boat ramps, and private homes.	Very good boating opportunities. Jet skis at times create potential conflicts with passive recreational activities of paddlers. Environmental impacts relating to noise, turbidity wakes, and air/water quality. There are no speed restrictions except in manatee zones. Evidence of boaters using non-designated sites as rest, party, and picnic areas. Also evidence of looting at easily accessible archaeological sites. Underwater log hazards make navigation dangerous and difficult at times.	FPS, CAMA	Litter in river is cleaned up by FPS and CAMA staff and volunteers. Trees and other vegetation that block travel paths are managed as needed. Navigational hazards are removed according to established policy.
Motorized tour boating	Occurs at Wekiva Falls Marina.	When available, pontoon boats provide river tours. These operators must be licensed by the USCG.	CAMA, USCG	None
Hiking	Occurs on all public lands.	Very good main trails and backcountry hiking opportunities.	FPS, FFS	None

Recreation Value	Availability	Current Conditions	Management Authority	Current Actions
Camping	One primitive campsite available on river for booking through FPS, and one non-reservation site near river along Florida National Scenic Trail	Primitive camping opportunities as well as developed camping opportunities. Some potential for erosion at primitive camping river access sites. Evidence of camping at non-designated sites.	FPS, CAMA, FFS	Litter at non-designated camp sites is cleaned up by CAMA and FPS staff and volunteers during regular visits.
Fishing	Occurs	No major impacts occurring. Some potential for erosion at popular bank sites.	FPS, FFS, FWC, CAMA, LG	None
Horseback riding	Occurs on designated trails away from river corridor	Very good horseback riding opportunities. There is no direct access to the Wekiva River from trails. Primitive horse camping available. Trails are regularly monitored for wear and erosion.	FPS, FFS, LG	FPS and FFS monitor trails regularly.
Off-road bicycling	Occurs on designated trails away from river corridor.	Very good biking opportunities.	FPS, FFS, LG	None
Wildlife observation	Occurs within all areas	Excellent wildlife viewing opportunities.	FPS, FFS, LG	None
<i>Rock Springs Run</i>				
Non-motorized boating and tubing	Access via concession sites, Kelly Park (tubing only), and private homes.	Tubing mostly occurs in spring run of Kelly Park. Very good canoe and kayak opportunities along the run. Evidence of boaters using non-designated sites as rest and picnic areas. Vegetation and downed trees in and along the run make navigation difficult at times, typically after storm events.	FPS, Orange County	Litter in run is cleaned up by FPS and AP park staff and volunteers. Trees and other vegetation that block travel paths are managed according to established policy.
Motorized Boating	Access prohibited within park property. Sign at mouth of Run says no motorized access.	Access sometimes occurs due to lack of ability to keep boats out. There are no physical barriers other than natural obstructions, such as downed logs throughout the run.	FPS	Sign prohibiting access.
Hiking	Occurs on all public lands	Very good trail and backcountry hiking opportunities.	FPS, Orange County	None

Recreation Value	Availability	Current Conditions	Management Authority	Current Actions
Camping	Three campsites available on river through Wekiwa Springs State Park. Evidence of camping occurring at non-designated sites.	Very nice group primitive camping opportunities. Some potential for erosion at river access sites.	FPS, Orange County	Designated camp sites are maintained by FPS staff. Litter at non-designated camp sites is cleaned up by FPS and AP park staff and volunteers.
Fishing	Occurs	No major impacts occurring. Some potential for erosion at popular bank sites.	FPS, FWC	None
Horseback Riding	Occurs on designated trails away from river corridor. Guided rentals available at Rock Springs Run State Reserve.	Very good horseback riding opportunities. There is no direct access to the river from trails. Primitive horse camping available. Trails are regularly monitored for erosion.	FPS	Trails used by concessionaire are monitored by concessionaires. Other trails are monitored regularly by FPS staff.
Off road bicycling	Occurs on designated trails away from river corridor.	Very good biking opportunities.	FPS	None
Wildlife observation	Occurs within all areas.	Excellent wildlife viewing opportunities.	FPS, LG	None
Hunting	Occurs during season on the Wildlife Management Area of Rock Springs Run State Reserve.	Deer, hog, and small game hunting occur seasonally.	FPS, FWC	Limited to designated areas. Quota permits and controls are in effect.
<i>Black Water Creek</i>				
Non-motorized boating	3 access points in Seminole State Forest. Access from Lake Norris Conservation Area.	Excellent canoe and kayaking opportunities in Black Water Creek. Narrow creek, vegetation and downed trees make navigation difficult at times.	FFS, CAMA, SJRWMD, LCWA	Access permitted only at designated sites; litter in upper reach of the creek has been cleaned up by the LCWA and volunteers
Motorized boating	Access available from Wekiwa River, however only electric motors permitted to launch from the state forest.	Narrow creek, vegetation and downed trees tend to limit motorized boat access.	FFS, CAMA, IPMS, SJRWMD	Periodic removal of fallen trees to provide access for small boats in lower reaches

Recreation Value	Availability	Current Conditions	Management Authority	Current Actions
Hiking	Occurs throughout adjacent public lands.	Very good back country hiking opportunities.	FFS, SJRWMD	Trails opened in Seminole State Forest during all hunts.
Camping	Occurs at two sites in Seminole State Forest. Group camp site at Lake Norris Conservation Area.	Very good group and individual primitive camping opportunities. Some potential for erosion at river access sites.	FFS, SJRWMD, LCWA	Monitored. All reservation camps closed during scheduled hunts on Seminole State Forest. Camping permitted along Florida Trail year round.
Fishing	Occurs.	No major impacts occurring. Some potential for erosion at popular bank sites.	FFS, SJRWMD, FWC, LCWA	Monitored and drive-in access is regulated by permit at Seminole State Forest. Not monitored if access is not from drive-in or if access is from elsewhere.
Horseback riding	Occurs on designated trails away from the river corridor.	Very good horseback riding opportunities. Horse trail crosses Black Water Creek over a concrete bridge. Horse access to Black Water Creek is not permitted. Trails are regularly monitored for wear and erosion.	FFS, SJRWMD	Trails closed in Seminole State Forest during all hunts except for small game hunt in January.
Off road bicycling	Occurs on designated trails away from river corridor.	Very good biking opportunities.	FFS, SJRWMD	None
Wildlife observation	Occurs within all areas.	Excellent wildlife viewing opportunities.	FFS, SJRWMD, LCWA, LG	None
Hunting	Occurs during season on the Wildlife Management Area of Seminole State Forest.	Deer, turkey, hog, and small game hunting occur seasonally.	FFS, FWC	Limited to designated areas. Quota permits and controls are in effect.

Table 5. Inventory of Current Conditions for Recreation Access Points

Recreation Access Point	Ownership/ Management	Recreation Opportunities Available	Current Status or Management Issues
<i>Wekiva River</i>			
Wekiwa Springs State Park	FPS	Hiking, wildlife viewing, canoe camping, full facility camping, group camping, fishing, horseback riding, bicycling, and canoeing. Canoes available for rent. Concessions available for food, supplies, and rentals.	Public land. State Park fee required for entry. Additional fee for camping and rentals.
Lower Wekiva River Preserve State Park	FPS	Hiking, wildlife viewing, primitive camping, horse camping, fishing, horseback riding, bicycling, and canoeing.	No river access from the Preserve, except Katie’s Landing.
Seminole State Forest	FFS	Hiking, wildlife viewing, camping, fishing, horseback riding, bicycling, and canoeing. Hunting within designated Wildlife Management Area.	No designated access to Wekiva River from the Forest. (Access to the river occurs along the SR46 bridge right-of-way and forest property.) Hunting allowed by permit during hunting season.
Katie’s Landing	FPS	Currently open as an access point for canoes and kayaks, and take out point from Wekiwa Springs State Park. Swimming and motorboat access prohibited due to shallow depth and presence eelgrass.	Currently open with access for paddlers. Seminole County is working with FPS regarding future use and access.
Wilson’s Landing	Seminole County	Picnicking, hiking, wildlife watching.	Public access
Wekiva Island	Private	Canoe and motorized boat launch, canoe pickup for Kings Landing, food and supply concession, picnicking.	Private marina
Wekiva Falls Marina and RV Park	Private	Boat tours of the river, canoe rental, RV camping, laundry, food and supply concession.	Private marina and RV park
Wekiva River Haven	Private	Formerly small engine boat rentals, food and supply concession; currently closed	Formerly a private boat rental; currently closed

Recreation Access Point	Ownership/ Management	Recreation Opportunities Available	Current Status or Management Issues
<i>Rock Springs Run</i>			
Rock Springs Run State Reserve	FPS	Hiking, wildlife viewing, camping, fishing, horseback riding, bicycling. Hunting within designated Wildlife Management Area.	Public land. Fee required for entry. No boat launch. Hunting allowed by permit during hunting season.
Kelly Park	Orange County	Hiking, wildlife viewing, tubing, fishing, horseback riding, bicycling, and canoeing.	County park, high use. Fee required for entry.
Kings Landing	Private	Canoe rentals	Private canoe rental business. New ownership as of 2007. Owner is working with state and Orange County regarding future use and access.
<i>Black Water Creek</i>			
Lake Norris Conservation Area	SJRWMD, LCWA	Hiking, wildlife viewing, camping, fishing, horseback riding, bicycling and canoeing. Canoes available from LCWA.	Public land. Managed jointly by SJRWMD and LCWA.
Seminole State Forest	FFS	Hiking, wildlife viewing, camping, fishing, horseback riding, bicycling, and canoeing. Hunting within designated Wildlife Management Area.	Public land. Walk- in access available. State Forest Use Permit is required for drive-in access. Hunting allowed by permit during hunting season.

4.2.2. Goals and Objectives

The following objectives are prioritized in the Action Program. An effort to implement one or more of the objectives may be part of a program already in place.

Recreation – Goal 1:

Provide opportunities for recreation on the Wekiva River System that are compatible with the area’s natural and cultural features and management objectives.

Objectives

- A. Conduct a Recreation Assessment to determine who is currently using the river, how use is projected to change, determining levels of use, and what uses and levels of use are compatible with each river segment.
- B. Create a Facilities Master Plan that indicates what facilities should be provided to support the uses determined to be appropriate by the Recreation Assessment.
- C. If necessary to protect and secure public access, pursue the public acquisition of established privately operated recreation sites on the Wekiva River System to maintain long-term access for passive recreation in accord with the findings of the Recreation Assessment.
- D. If necessary to protect and secure public access, pursue the public acquisition of new sites for river access based upon the findings of the Recreation Assessment and Facilities Master Plan.

Recreation – Goal 2:

Ensure that river recreation minimizes environmental impacts and user conflicts and is compatible with the preservation of natural and cultural qualities of a National Wild and Scenic River.

Objectives

- A. Create a recreation impact Monitoring and Management Plan that identifies Limits of Acceptable Change (thresholds) and management actions for ecological and social impacts from recreation.
- B. Expand current partnerships with private businesses and concessionaires who operate on the river system or within the Wekiva basin parks to ensure that their activities are protective of Wild and Scenic River values, and to provide unified, supporting messages to their clients about the wild and scenic status of the Wekiva River System and the regulations and guidelines for its use.
- C. Support continued prohibition of access by gasoline-powered motorized watercraft to Rock Springs Run and the additional prohibition of access by gasoline-power motorized watercraft to Black Water Creek, except for authorized service vessels.

4.2.3. Action Program

Key to the Action Program Table:

- Priority – Priority of the Objective is High, Medium, or Low
- Responsibility – A list of acronyms is provided at the beginning of the plan
- Duration – Duration of the Action is either Once (discreet action) or Ongoing (continuous action)

NOTE: The ability to carry out these activities will be dependent on the availability of funds and participant priorities.

Recreation – Goal 1: Provide opportunities for recreation on the Wekiva River System that are compatible with the area’s natural and cultural features and management objectives.		
Objective	Priority	
A. Conduct a Recreation Assessment to determine who is currently using the river, how use is projected to change, determining level of use, and what uses and levels of use are compatible with each river segment.	High	
Actions to be completed as part of the Recreation Assessment	Responsibility	Duration
i. Conduct a survey of current users of the Wekiva River, Wekiwa Springs Run, Rock Springs Run, and Black Water Creek, as well as the adjacent section of the St. Johns River.	AMC	Once
ii. Research the trends in current and potential use of the Wekiva River System using boat registrations for Seminole, Lake, and Orange counties, as well as visitor information from public and private access points along the river system.	AMC	Once
iii. Conduct compatibility and carrying capacity studies to determine what types of use and what level of use (including amount, speeds, size of watercraft, etc.) would be appropriate for the river system.	AMC	Once
iv. Determine what types of use should and should not be allowed along the Wekiva River System.	AMC	Once
v. Determine where different types of recreation should occur, including where any access points or recreation sites should be created or removed (e.g., see the design guidelines in appendix B of the Wekiva Wild and Scenic River Environmental Assessment).	AMC	Once
Objective	Priority	
B. Create a Facilities Master Plan that indicates what facilities should be provided to support the uses determined to be appropriate by the Recreation Assessment.	High	
Actions to be completed as part of the Facilities Master Plan	Responsibility	Duration
i. Determine which facilities should be provided to support the conclusions of the Recreation Assessment including: public access areas (including canoe/kayak put-in/takeout), camping areas, picnic areas, parking, restrooms, and boat rentals.	AMC, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once

ii. Create a map of the location and type of facilities needed.	AMC, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once
iii. Determine a cost estimate and priority for each element of the Facilities Master Plan.	AMC, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once
iv. Seek funding and sponsorship opportunities for proposed facilities.	AMC, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
Objective	Priority	
C. If necessary to protect and secure public access, pursue the public acquisition of established privately operated recreation sites on the Wekiva River System to maintain long-term access for passive recreation in accord with the findings of the Recreation Assessment.	High	
Actions	Responsibility	Duration
i. Monitor the status of commercial properties with existing access along the river system. If an existing privately operated access site comes up for sale, consider purchasing the property to maintain sufficient public access to the Wekiva River System.	AMC, FPS, CAMA, FFS, SJRWMD, LG, NGCOs	Ongoing
ii. Revise management plans or develop new plans as appropriate for additional properties.	FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
D. If necessary to protect and secure public access, pursue the public acquisition of new sites for river access based upon the findings of the Recreation Assessment and Facilities Master Plan.	Medium	
Actions	Responsibility	Duration
i. Based upon findings of the Recreation Assessment, and in accord with the maintenance of all Wild and Scenic values, determine potential sites for public access not currently in public ownership.	AMC, FPS, CAMA, FFS, SJRWMD, LG, NGCOs	Once
ii. If one of these targeted sites becomes available, consider acquisition for purposes of maintaining or improving river access.	AMC, FPS, FFS, SJRWMD, LCWA, LG	Ongoing
iii. Revise management plans or develop new plans as appropriate for additional properties.	FPS, FFS, SJRWMD, LG	Ongoing
Recreation – Goal 2: Ensure that river recreation minimizes environmental impacts and user conflicts and is compatible with the preservation of natural and cultural qualities of a National Wild and Scenic River.		
Objective	Priority	

A. Create a recreation impact Monitoring and Management Plan that identifies Limits of Acceptable Change (thresholds) and management actions for ecological and social impacts from recreation.	High	
Actions to be completed as part of the Monitoring and Management Plan	Responsibility	Duration
i. Determine which resources should be monitored and protected within the Wekiva River System.	AMC	Once
ii. Determine where resources that should be monitored and protected are located and map these resources.	AMC	Once
iii. For each resource to be monitored and protected, determine the Limit of Acceptable Change, level of impact, or user capacity that is acceptable for that resource.	AMC	Once
iv. Create a monitoring program to keep track of resources and determine if, when, and how they have been altered by recreation activities or other impacts.	AMC	Once
v. Create an action program that lays out the steps that will be taken if a resource has been degraded beyond an acceptable level.	AMC	Once
vi. Determine who will implement the steps needed to address resource impacts.	AMC	Ongoing
Objective	Priority	
B. Expand current partnerships with private businesses and concessionaires who operate on the river system or within the Wekiva basin parks to ensure their activities are protective of Wild and Scenic River values, and to provide unified, supporting messages to their clients about the wild and scenic status of the Wekiva River System and the regulations and guidelines for its use.	High	
Actions	Responsibility	Duration
i. Develop a set of unified messages that reinforce the wild and scenic status of the river system.	AMC	Once
ii. Develop a set of unified regulations and guidelines for public distribution relating to recreational use of the river system that includes the location of resting, picnic, and camping facilities, and appropriate put-in and pull-out areas.	AMC	Once
iii. Provide materials as needed to help concessionaires educate their customers about proper and sustainable use of the river system.	AMC	Ongoing
iv. Work with private business and concessionaires to improve operational practices, including but not limited to shoreline protection, wake control, and litter.	AMC	Ongoing
v. Assess the need to train private businesses and concessionaires about river stewardship and develop a program if needed.	AMC	Ongoing
Objective	Priority	
C. Support continued prohibition of access by gasoline-powered motorized watercraft to Rock Springs Run and the additional prohibition of access by gasoline-powered, motorized watercraft to Black Water Creek, except for authorized service vessels.	Medium	
Actions	Responsibility	Duration

i.	Work with state agencies to prohibit gasoline-powered motorized watercraft on Black Water Creek.	AMC, FFS, CAMA, FWCLE, FDEPLE	Ongoing
ii.	Assess existing enforcement of rules associated with motorized watercraft on Black Water Creek and Rock Springs Run, and modify as necessary.	AMC, FPS, FFS, CAMA, DEPLE, FWCLE	Once
iii.	Encourage patrols by off-duty law enforcement officers. (These patrols could have multiple law enforcement purposes across the entire system.)	DEPLE, FWCLE, LG	Ongoing
iv.	Include guidelines for monitoring and addressing motorized watercraft use along the river in the Monitoring and Management Plan.	AMC, FPS, CAMA, FFS	Once
v.	Ensure that concessionaires that rent motorized watercraft within the Wekiva River System (and the St. Johns River) alert their customers about limits on motorized boat access in these areas.	AMC, FPS, CAMA, FFS, FDEPLE, FWCLE, LG	Ongoing

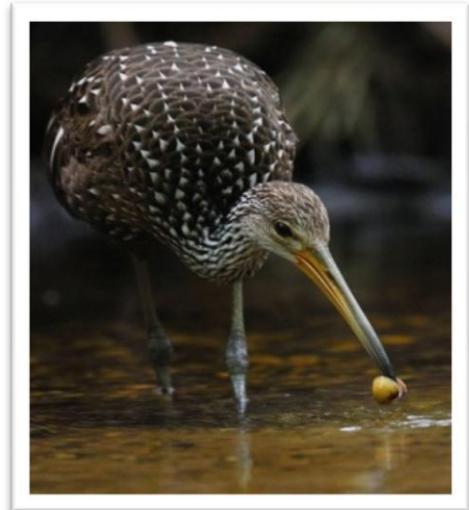
4.3. Wildlife and Habitat

4.3.1. Assessment

Scope

The complex hydrology of the Wekiva River basin and area's climate combine to create favorable conditions for a variety of natural communities. These support a biologically diverse collection of upland, wetland, and aquatic species, including several that are listed at the state or federal level as endangered, threatened, or species of special concern.

Consistent with the National Wild and Scenic River designation, wildlife considered in this management plan will be limited to those species whose lives are directly linked to the river system. The Florida black bear (*Ursus americanus floridanus*) is included for its regional importance as an umbrella species and its regular use of the floodplain swamps along the Wekiva River System. The most relevant area of the basin to be considered in this plan, relative to wildlife and habitat, is the 100 year floodplain and the Wekiva River Riparian Habitat Protection Zone. Invasive exotic species, where they represent a threat to the continued existence of native species, will be considered within this value. Figure 11 depicts natural communities within public conservation lands of the Wekiva basin.



It should be noted that during the completion of this management plan, the Florida Fish and Wildlife Conservation Commission (FWC) decided to revise its state methodology for designating species as endangered, threatened, or species of special concern. As a result, the status of several species identified in this environmental assessment will change. In the future, FWC will recognize federally listed species as “federally-designated endangered” and “federally-designated threatened”. Species uniquely identified by FWC as being at risk of extinction will be identified as “state-designated threatened”. The state species of special concern category will be maintained until all species in it are reviewed and either identified as state-designated threatened or removed from the list. Species removed from the state list will continue to be managed by FWC according to management plan that have or will be developed.

Background

The Wekiva River System watershed is a mosaic of upland, wetland, and aquatic habitats at the southern end of an important wildlife corridor that connects the Wekiva basin to the Ocala National Forest. An extensive floodplain of hardwood forest, as much as three miles wide, provides habitat for several species designated as endangered, threatened, or species of special concern. The Wekiva basin is located at a transitional area between temperate and sub-tropical climatic zones. The species overlaps result in one of the richest floral compositions in Florida (NPS 1999). Unusual plant species found in the Wekiva basin include red buckeye, chinquapin, and Carolina basswood, species more commonly associated with Appalachia. This richness

extends also to plant communities, with fourteen different native plant communities identified in the Wekiva basin:

- | | |
|------------------------------|------------------------------|
| wet flatwoods | scrub |
| baygall | spring-run stream |
| mesic flatwoods | upland hardwood forest and |
| floodplain swamp | blackwater stream |
| scrubby flatwoods | upland mixed forest |
| hydric hammock | aquatic and terrestrial cave |
| sandhills | xeric hammock |
| flatwoods/prairie/marsh lake | |

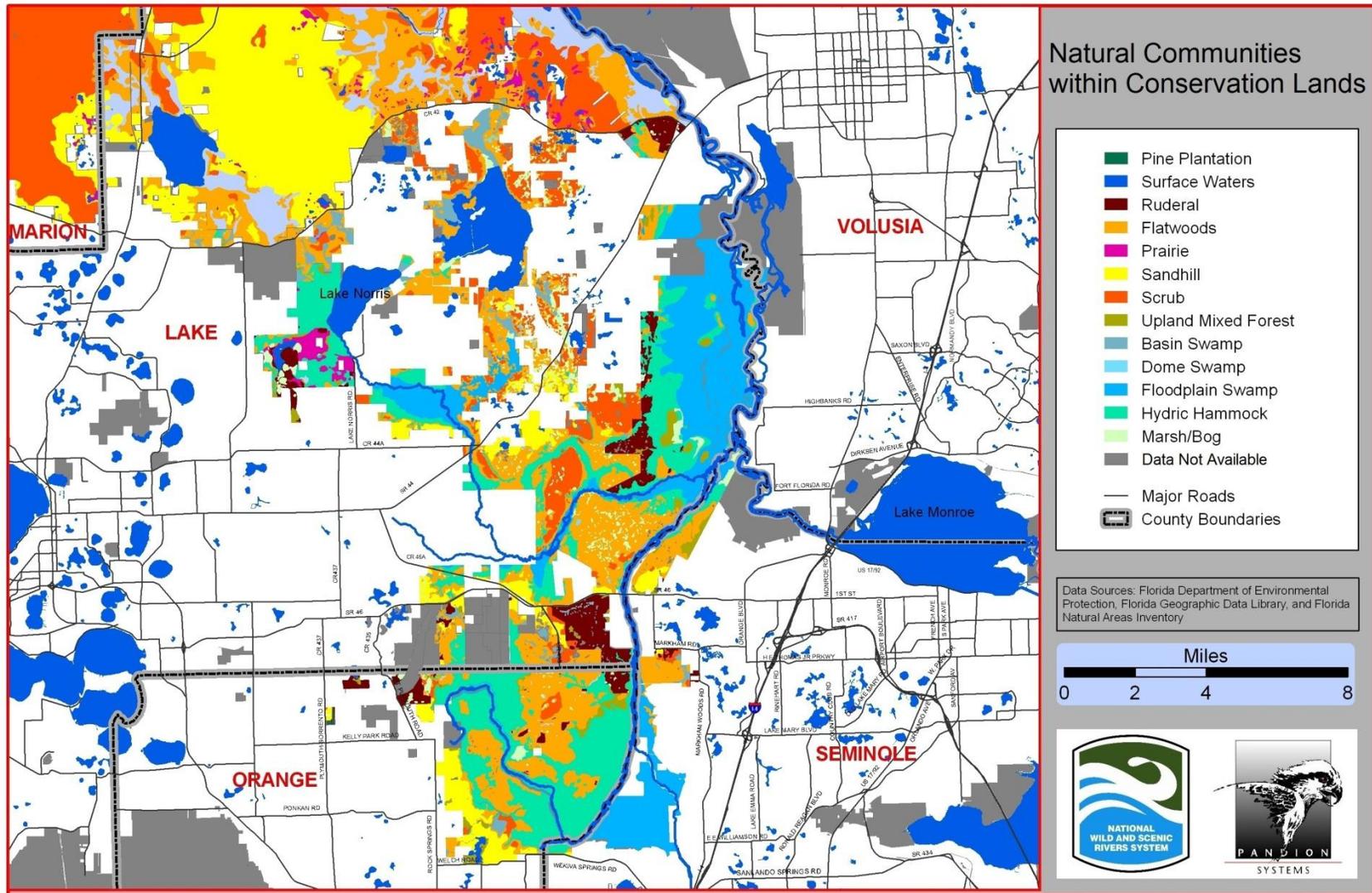
This diverse array of natural communities is home to a wide variety of wildlife species. For example, one of the state’s largest populations of Florida black bear, currently listed by the state of Florida as a threatened species, uses the protected riparian corridor and surrounding habitat to move between the Ocala National Forest and large patches of conservation lands that comprise the Wekiva-Ocala Greenway in Orange, Seminole and Lake counties. The wood stork (*Mycteria americana*), a federally endangered species, nests in cypress trees within the Wekiva River Aquatic Preserve and is often observed foraging in the river shallows. The bald eagle (*Haliaeetus leucocephalus*), protected under the federal Bald and Golden Eagle Protection Act, can also be seen along the river system. The little blue heron (*Egretta Caerulea*), tri-colored heron (*Egretta tricolor*), and limpkin (*Aramus guarauna*) are state species of special concern.

The river system also provides food and habitat for the river otter (*Lutra canadensis*) and American alligator (*Alligator mississippiensis*). West Indian manatees (*Trichechus manatus*), state and federally listed as endangered, have been observed within the lower reaches of the Wekiva River and more recently in upstream locations.

Two aquatic invertebrates unique to the Wekiva River are the Wekiwa Springs hydrobe (*Aphaostracon monas*) and the Wekiwa siltsnail (*Cincinnatia wekiwae*) (NPS 1999), found in and around the spring area of Wekiwa Springs State Park. In addition, the Orlando cave crayfish (*Procambarus acherontis*) is restricted to groundwater sites associated with six or seven spring cave systems of the lower Wekiva River basin (FDEP 2005).

A list of plant and animal species in the Wekiva basin area designated as endangered, threatened, or species of special concern is included in Appendix C.

Figure 11: Natural Communities within Conservation Lands



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Key Issues and Resources

Listed Species

Mammals

- Florida black bear (*Ursus americanus floridanus*) – The Florida black bear is a species of regional importance that uses the Wekiva basin, and is currently listed as threatened by the state. Florida black bears occupy a diversity of habitats including upland forests, wetlands, and floodplains. They also frequent the riparian corridor. The Florida black bear is considered an umbrella species because successful protection of its habitat will benefit not only the bear, but many other species within the basin that collectively constitute a healthy ecosystem. The bears in the Wekiva basin are considered part of the larger Ocala bear population, one of eight recognized bear populations in Florida. The Ocala population is medium in size relative to the state's other populations, yet it has the highest roadkill mortality rate. Between 1976 and 2002, 503 out of the 1340 bears killed on Florida roads were from the Ocala population. Bear-human conflicts are on the rise statewide, primarily on private properties adjacent to or near conservation lands. There has not been a documented incident of a black bear harming a person in Florida; however humans have substantial impacts on bears. The Ocala bear population led in the number of human/bear conflict reports from 1978 to 2002 (3027). These conflicts include bears breaking into food storage areas, ransacking garbage, and occasionally attacking livestock. A chronic problem within neighborhoods located near bear habitat is that individual bears routinely seek out garbage from dumpsters or garbage that is left in unsecured containers outside of residences. The act of intentionally feeding a bear in Florida is illegal, yet enforcement is nearly impossible. If a bear has been fed or learns to consider developed areas as reliable food sources, consequences to the bear can be tragic. When a human/bear conflict becomes significant, the Florida Fish and Wildlife Conservation Commission may be contacted by a resident who expects that the particular bear will be trapped and relocated. Trapping and relocating bears (usually to the Ocala National Forest) was attempted in the past; however those efforts were time-consuming and often unsuccessful. Therefore today FWC staff frequently resorts to euthanasia. A multifaceted approach is currently used to address bear conflicts within and around the Wekiva basin park system. Bear-proof dumpsters and trash receptacles for the parks have been purchased with funds contributed by Defenders of Wildlife or through regular state agency budgets. Additional bear-proof receptacles have been donated by the U.S. Forest Service. Educational materials regarding bear/human conflicts include materials designed by the Florida Fish and Wildlife Conservation Commission, a presentation on bears developed by state park staff, and printed materials provided to residents of nearby subdivisions.
- West Indian Manatee (*Trichechus manatus*) – Manatees are occasional visitors to the lower Wekiva River but typically do not venture far upriver. For the past several years, however, manatees have been observed at Wekiwa Springs, Wekiva Island, and other upstream locations. Although the St. Johns River has been designated as critical habitat for this federally endangered species, no waters of the Wekiva Wild and Scenic River System are so designated. More boat traffic entering the Wekiva River from the St. Johns River could expose manatees to increased propeller-caused injuries and disturbance, especially given the narrow and shallow dimensions of the Wekiva River.

Florida Black Bear (*Ursus americanus floridanus*)

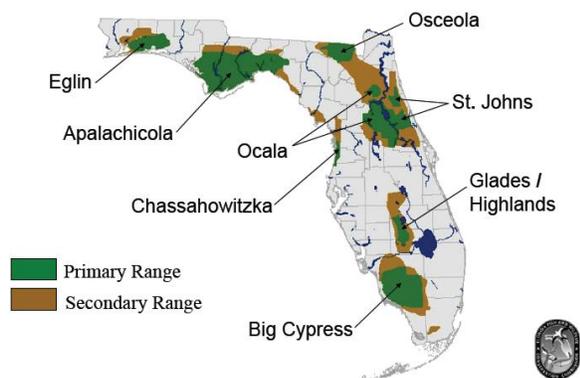
The black bear found in Florida is one of three subspecies recognized in the southeastern portion of the United States and is listed as threatened in Florida. It is believed that at one time there were as many as 12,000 black bears living throughout Florida but biologists estimate that only about 1,500 black bears still remain. This subspecies is characterized by having a highly arched forehead and long, narrow braincase. Black bears prefer to live in forested areas with dense understory vegetation, so the Wekiva basin’s forested swamps and adjoining uplands are ideal habitat. Access to a variety of habitats that can provide an assortment of foods is beneficial. Black bears eat mainly acorns, nuts, berries, and other vegetation as well as insects. Meat makes up only a small percentage of their diet. Because Florida has such diverse habitat types, and bears eat locally and seasonally abundant food items, their diet varies in different parts of the state.

The black bear’s decline has been largely caused by habitat loss and fragmentation, although populations in Baker and Columbia counties as well as the Apalachicola National Forest appear to be doing well. Bear biologists believe that a healthy bear population needs 500,000 to one million acres of habitat to thrive. The Wekiva basin population represents the southern arm of a population that extends up into the Ocala National Forest and connects to the Osceola Forest in the north. (See map below). For the population to remain healthy, it is important that bears can freely move throughout this range which frequently causes them to cross highways. As a result, road kills represent a major problem to bear populations in areas where highways cut through their habitat. Since hunting of the Florida black bear was made illegal in 1994, nearly 90% of known bear mortalities have been caused by vehicles. Efforts to reduce vehicle-bear collisions include warning signs, slower posted speed limits, and wildlife underpasses.

For more information: <http://www.myfwc.com/bear/>



Black Bear Populations in Florida (2004)



Birds

- Bald Eagle (*Haliaeetus leucocephalus*) - Formerly listed as threatened under the federal Endangered Species Act, the bald eagle was removed in June 2007 because of significant gains in its population. The bald eagle, however, remains protected under the federal Bald and Golden Eagle Protection Act. Bald eagles are frequently seen along the Wekiva River System preying on fish. There are eight known bald eagle nest sites located within the Wekiva River Protection Area. Annual nest surveys flights are conducted by FWC.
- Wood Stork (*Mycteria americana*) – The Wood Stork rookery in the northeastern area of the basin has been unoccupied since at least 1999, probably because of unsuitable water levels in the basin that negatively impact nesting success. Wood stork nesting success depends on two primary factors - the availability of adequate food sources at the onset of the nesting season and the presence of sufficient water to support alligators that patrol the waters and consume raccoons, the primary nest predator of wood storks. Wood storks forage in shallow (6” to 10”) waters of marshes, swamps, ditches, canals, and lakes where fish are concentrated. Below normal rainfall and the resulting lack of adequate local food resources may have prevented nesting in recent years.
- Limpkin (*Aramus guarauna*) – The limpkin is currently listed as a state species of special concern. Monthly surveys of limpkins and other bird species have been conducted by Aquatic Preserve staff and volunteers in recent years. When compared to surveys conducted by the AP in 1992 and 2002, the recent surveys indicate a stable population of limpkins in the Wekiva basin. The channeled apple snail, or golden snail (*Pomacea canaliculata*), a large invasive exotic, has been found in nearby Lake Brantley and could potentially infest the Wekiva River. It is unknown what effects these exotic snails may have on the limpkin’s main food source, native apple snails (*Pomacea paludosa*) or their habitat, and ultimately on limpkins themselves. Channeled apple snails feed on eelgrass and are serious pests in a number of other countries.

Fish

- Bluenose shiner (*Pteronotropis welaka*) – The bluenose shiner has been reported to occur within the Wekiva River System and a limited number of sites in the panhandle of Florida. However, its population numbers are not well known in either region. It is currently listed as a Species of Greatest Conservation Need by the FWC. One specimen of this rare minnow species was collected during a fish and macro-invertebrate study of the Wekiva River in 1999. The authors of the report noted that it was found in eelgrass habitat, an important habitat for a number of aquatic species.

Invertebrates

- Orlando cave crayfish (*Procambarus acherontis*), Wekiwa Springs hydrobe (*Aphaostracon monas*), and Wekiwa siltsnail (*Cincinnatia wekiwae*) – These species are endemic to the Wekiva basin and are designated as species of Greatest Conservation Need by the FWC because of their geographically narrow distribution and because the status and trend of their populations are unknown (FWC 2007). They are candidates for state listing as species of special concern, awaiting further information on their current status. The Wekiwa Springs

hydrobe and Wekiwa siltsnail were discovered in the 1970s in and near the main spring area of Wekiwa Springs State Park, on vegetation and in sand within the spring boil and in the very upper reaches of the spring run. The Orlando cave crayfish is restricted to groundwater sites associated with six or seven spring cave systems of the lower Wekiwa River basin (FDEP 2005). This species has been recorded inside Wekiwa Springs State Park and is seen periodically in the spring at the mouth of the underwater cavern. A survey of the Wekiwa Springs State Park during May 2002 did not find the Orlando cave crayfish. A survey in 1997 also failed to detect any of the three species, and the report cited the need to sample specifically for these species within the caves and springheads. Water quality and quantity and overall condition of the springs are probably the most important issues regarding the conservation of these invertebrates.

Invasive Species and Exotic Species

- Invasive aquatic plants – Invasive aquatic plants, listed as Category I or II by the Florida Exotic Pest Plant Council, such as wild taro (*Colocasia esculenta*), hydrilla (*Hydrilla verticillata*), water lettuce (*Pistia stratiotes*), and water hyacinth (*Eichhornia crassipes*), may adversely affect aquatic habitats. East Indian hygrophila (*Hygrophila hydrosperma*), an exotic invasive aquatic plant, is established in the Little Wekiwa River, but is not yet widespread in the basin. The Wekiwa River Aquatic Preserve and the FWC Invasive Plant Management Section (IPMS) manage these exotic aquatic plants with periodic herbicide treatments. Wild taro is especially difficult to control, requiring multiple treatments each season. Wild taro grows along stream banks and forms large floating mats that can impede navigation. Floating mats are generally not treated with herbicide because of their potential to break up into smaller pieces and spread to new sites downstream. Aquatic preserve staff also control the proliferation of nuisance cattail, a native emergent aquatic plant that may impede navigation in some areas of the river system if not managed,
- Armored catfish (*Pterygoplichthys disjunctivus*) and brown hopolo (*Hoplosternum littorale*) – Armored catfish have been seen in large numbers in Wekiwa Springs. These fish feed on algae attached to rocks, logs, vegetation, and even manatees which are clearly agitated by them. Armored catfish excreta is likely contributing to increased nutrient levels that may further exacerbate algal blooms and weed infestations. State park staff observations indicate that these fish are increasing erosion of shorelines by burrowing to create spawning cavities. Since 2003, AP staff and volunteers have removed many armored catfish from the Wekiwa Springs area. This removal is conducted over most of the year and as often as weekly during winter cold spells when the fish tend to concentrate near the spring.
- Brown hopolo (*Hoplosternum littorale*) - Brown hopolo were confirmed in Rock Springs Run in 2005, These exotic fish typically thrive in weedy areas with low oxygen levels. Currently the brown hopolo is not being targeted for control because further research is needed to assess the impact of this fish on the Wekiwa River System.
- Channeled apple snail (*Pomacea canaliculata*) – The channeled apple snail is an invasive exotic snail from South America that is found in Lake Brantley, near the Wekiwa River. Although a great potential exists for invasion, this species has not yet been observed in the

Wekiva River System. The channeled apple snail is much larger than the native apple snail that limpkins depend upon for food. This species has been documented to feed on eelgrass and other native aquatic vegetation. The impacts from these snails on native apple snails and native plants, invertebrates, and fishes are unknown and difficult to predict. It is known that channeled apple snails feed on eelgrass and are serious pests in a number of countries. Limpkins are known to feed on channeled apple snails in other aquatic systems.

Armored Catfish (*Pterygoplichthys multiradiatus*, *Pterygoplichthys disjunctivus*, *Hypostomus sp*)

Armored catfish is a common name given to several species of exotic fish that have spread into Florida's waterways as a by-product of the tropical fish industry. They grow to between 20 and 30 inches in length, and have very large heads and large pointed fins. Populations appear to be expanding throughout the state. Armored catfish are known to feed on algae, insects and detritus. They may also eat other fish and have even been known to consume wood. The negative impacts associated with this group of exotic fish are not yet fully understood, but they do appear to degrade aquatic habitats through uprooting aquatic plants, thereby competing with native fish for space. They also dig into banks to create tunnels. This behavior is thought to cause erosion and therefore increase turbidity (suspended material in the water). Armored catfish also pose a threat to wading birds which try to eat them and may get injured by their protective spines.

Florida is one of the largest producers of tropical fish, with roughly 200 tropical fish farms statewide. The majority of these farms are located within Hillsborough and Polk counties. An estimated 12-15,000 tropical fish are exported out of Tampa International Airport weekly. Armored catfish are just one of the problem exotic fish affecting Florida's waters. It is likely that fish enthusiasts sometimes release fish into local waterways when they outgrow aquariums. Once introduced to the warm, food-rich waters of Florida many adapt well and thrive. Armored catfish have been documented in numerous areas and control efforts are underway. The Aquatic Nuisance Species Research Program of the US Army Corps of Engineers suggest that the only way to "effectively control" various catfish species is through a combination of innovative barriers, management techniques, and public awareness programs.

For more information: <http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=768>



Habitat Connectivity

- Importance of Wekiva-Ocala Greenway – The Wekiva basin is recognized as the southern part of a contiguous landscape of ecologically connected habitat extending from Wekiwa Springs State Park northward through the waterways, wetlands, and uplands of the Wekiva and St Johns River basin, and into the Ocala National Forest. The overall health the Wekiva basin ecosystem and the biodiversity of natural communities and wildlife that are contained within it are inextricably linked to this larger conservation landscape. Establishing a secure and contiguous corridor of public conservation lands within this area has been a focus of attention of the Florida Forever Wekiva-Ocala Greenway Project and past land acquisition programs. Protecting wildlife and habitat values of the federal Wekiva Wild & Scenic River program over the long term will depend largely on successful completion of this state land acquisition effort. Figure 5 depicts the Wekiva-Ocala Greenway Project and conservation corridor.
- Road mortality – Roads in the Wekiva basin have the highest rate of bear mortality in the state. One-hundred bears, the highest rate among all counties, were killed in vehicle collisions in Lake County between 1976 and 1995. SR 46 and SR 19 in Lake County were identified as having the highest rate of roadkills during that time period. Wekiva River State Park staff conducted a study of wildlife use and roadkills near the original SR 46 wildlife underpass from November 2001 to August 2003, including deployment of cameras, installation and maintenance of vegetation to guide wildlife to the underpass, and conducting track counts near those locations. Wildlife underpasses on SR 46 and other roads have been shown to decrease roadkill of bears and other wildlife; however animals, including bear, still die on roads in the basin. To accommodate the safe passage of wildlife, plans for the Wekiva Parkway include elevating sections of the new parkway system and relocating the junction of SR 46 and CR 46A outside of the primary ecological corridor. Figure 8 depicts the proposed route of the Wekiva Parkway.
- Habitat fragmentation –Habitat fragmentation is the result of large blocks of contiguous landscape being broken into smaller patches, often separated by roads and subdivisions. Although much of the Wekiva basin is in public conservation, it is not all contiguous. Critical corridors for wildlife movement contain unprotected parcels in private ownership, leaving them vulnerable to fragmentation. Roads and development contribute to habitat fragmentation that particularly affects wide-ranging mammals like the Florida black bear. Birds can also be affected by fragmentation if patches of required habitat are not located within sufficient proximity to each other to allow 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—may lose functionality. Fragmentation also makes it difficult to maintain natural communities and manage habitat for wildlife use through actions such as prescribed fire. The ultimate results of fragmentation are diminished biodiversity and a loss of usable habitat for wildlife.

Prescribed Fire

- Prescribed fire is an important tool for maintaining a healthy ecosystem. Although fire is often associated with the management of upland systems, it also plays a role in the management of wetlands and other natural communities, including ecotones, that provide important habitat. Fire is a natural component of Florida's ecology, so without it natural communities may become overgrown, less diverse, or transition to other habitat types. Some plant species even require fire as part of their reproductive life cycle. A regular regimen of burning that mirrors the frequency of fires that occurred naturally before European settlement can significantly contribute to the health of natural systems. Prescribed fire also reduces vegetative fuel loads, which decreases the risk of very intense, uncontrolled wildfires that can be devastating to both natural systems and private property. Management plans for the Wekiva state park system and Seminole State Forest call for prescribed fire; however, the ability to actually carry out these programs can be hindered by budgetary or staff limitations. In some areas, the ability to conduct prescribed burns has been made difficult by residential or commercial development next to or within habitats that require fire, creating access and safety issues. Also residents and businesses often do not appreciate the importance of prescribed fire or the dangers of fire suppression. As a result, in some areas land managers have had to resort to less effective and more costly mechanical means of reducing fuel loads.

Nutrient Load impacts on Biodiversity (See also Water Quality and Quantity Value)

- Nutrient loading is included here as an issue to the extent that it impacts wildlife and habitat values. Aquatic species and rare invertebrates associated with spring vents are particularly sensitive to water quality and an imbalance in nutrient content. In addition, invasive aquatic species, including algae, thrive on higher nutrient levels in the water. The proliferation of algae and other invasive species can have many adverse biological effects on individual aquatic wildlife species and natural communities. The natural background level of nitrates within Florida springs is typically 0.2 mg/L or less. The Florida Springs Task Force, in its November 2000 report, identified 1.0 mg/L as a threshold at which normal spring biological functions are degraded. Springs in the Wekiva River system have already exceeded this level. The recently adopted TMDLs identify specific target reductions for the Wekiva River system to be 0.065 mg/l for Total Phosphorus and 0.286 mg/l for nitrates. Increased quantities of invasive aquatic species and algae growth within springs, spring runs, and the river channel are symptomatic of a growing problem within the Wekiva River System.

Recreational Impacts on Wildlife and Habitat (See also Recreational Value)

- Recreation is included here as an issue to the extent that it impacts wildlife and habitat values. Certain forms of recreation, such as the use of jet skis and motorboats may be incompatible with the protection of habitat and wildlife, depending on the location or extent of their use. For example, motorized watercraft can create noise or wakes that disturb wildlife, and boat propellers can damage eelgrass beds or harm manatees. Even nonmotorized boating can have substantial effects on wildlife habitat if the amount of human use is excessive or the timing or location of the use is inappropriate. Given the heavy recreational use of the Wekiva River System, these types of adverse impacts on wildlife and wildlife habitat already exist in some areas. Litter and discarded monofilament fishing line in the river or tangled in the tree canopy also pose a threat to wildlife. It should be noted that

nature-based recreation and ecotourism, when properly managed, can be an important asset to the protection of wildlife and habitat by building public awareness and appreciation for the Wekiva River System and National Wild & Scenic River program.

Table 6. Inventory of Current Conditions for Wildlife and Habitat by Listed Species

Criterion	Current Conditions	Management Authority	Current Actions
<i>Aquatic Invertebrates</i>			
Orlando cave crayfish (<i>Procambarus acherontis</i>)	Endemic to Wekiva basin. Population status is unknown.	FWC	None
Wekiwa Springs hydrobe (<i>Aphaostracon monas</i>)	Endemic to Wekiva basin. Population status is unknown.	FWC	None
Wekiwa siltsnail (<i>Cincinnatia wekiwae</i>)	Endemic to Wekiva basin. Population status is unknown.	FWC	None
<i>Birds</i>			
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Hunts fish in the river system. Eight nest sites in the Wekiva River Protection Area.	USFWS, FWC	Annual nest survey flights conducted by FWC.
Limpkin (<i>Aramus guarauna</i>)	Common and stable along the river. Water quality decline and exotics may reduce apple snail populations.	USFWS, FWC	Monthly surveys during nesting season by CAMA staff and volunteers.
Wood Stork (<i>Mycteria americana</i>)	Nesting colony area not used since 1999.	USFWS, FWC	Annual nesting colony survey flights by USFWS.
<i>Fish</i>			
Bluenose shiner (<i>Pteronotropis welaka</i>)	Unknown, but was found in 1997 by FWC biologists.	FWC	State listed as a Species of Greatest Conservation Need.
<i>Mammals</i>			
Florida black bear (<i>Ursus americanus floridanus</i>)	Population stable but potentially imperiled. Conflicts with adjacent residents on the rise. Vehicle mortality rate is the highest in Florida.	FWC	SR 46 wildlife underpasses and related UCF study. Bear-proof dumpsters and trash receptacles, bear awareness materials by FWC and FPS, nuisance bear control by FWC.
West Indian manatee (<i>Trichechus manatus</i>)	Uses the lower reaches of Wekiva River and occasionally observed upstream. Manatee potentially at risk from increased boat traffic.	USFWS, FWC	Boating speed restrictions in the aquatic preserve.

Table 7. Inventory of Current Conditions for Wildlife and Habitat by Topic

Criterion	Current Conditions	Managing/ Cooperating Agency	Current Actions Within Basin
<i>Natural Communities</i>			
Diversity	Fourteen distinct native plant communities within the Wekiva basin. Prescribed fire is difficult in some areas due to encroaching development. Indicators suggest that a decline in water quality is leading to an imbalance of aquatic vegetation and potential loss of biodiversity. Increased levels of exotics and algae growth observed.	FPS, FFS, FWC, CAMA, SJRWMD, LG, USFS	Prescribed fire is used to maintain upland and riparian habitats. Regular maintenance of the riverine channel by FPS and Aquatic preserve to control invasive plants. Algae studies have been conducted by FDEP and SJRWMD in the past and could occur in the future, but are not presently taking place.
Connectivity	Wekiva basin parks and Seminole State Forest are part of the Wekiva-Ocala ecological corridor. Connectivity through public lands and private conservation easements not yet complete.	FPS, FFS, FWC, CAMA, SJRWMD, LG, USFS	Land acquisition within Florida Forever Wekiva-Ocala Greenway project no longer actively taking place due to lack of state funding. Management and regulation of the riverine corridor and riparian habitat protection zones. Two wildlife underpasses on SR46; elevated sections of Wekiva Parkway are planned.

Criterion	Current Conditions	Managing/ Cooperating Agency	Current Actions Within Basin
<i>Native Species</i>			
Rare (invertebrate)	Status of Wekiwa siltsnail, Wekiwa Springs hydrobe and Orlando cave crayfish is unknown.	FWC, USFWS	Candidates for state (snails) or federal listing (crayfish).
Regionally Important	Florida black bear population appears to be stable, but the Ocala/Wekiva population has highest percentage of roadkills in the state. Habitat fragmentation remains threat to long-term survival of the species in the Wekiwa area.	FWC, FPS, FFS, SJRWMD, USFS	Underpasses on SR 46, monitoring at underpasses. Bear awareness materials distributed by FPS. Vegetation adjacent to existing underpass managed by FPS and FFS.
Indicator	Limpkin population appears stable along the river. Potential risk to native apple snail due to reduced water quality and introduction of the channeled apple snail.	FWC, CAMA	Monthly surveys during nesting season by CAMA staff and volunteers.
<i>Invasive Species</i>			
Animals	Armored catfish numbers may be increasing. Brown hopolo impact on river system is unknown. Channeled apple snails may become established.	FPS, CAMA, FWC	Armored catfish are removed from springs when they congregate.
Plants	Hydrilla, water hyacinth, and wild taro are established. Cattail proliferation in some areas. Algae growth also prolific in some areas.	IPMS, CAMA	Invasive exotic aquatic weeds are treated regularly for control. Cattail is treated periodically when it expands.

4.3.2. Goals and Objectives

The following objectives are prioritized in the Action Program. An effort to implement one or more of the objectives may be part of a program already in place.

Wildlife and Habitat – Goal 1:

Protect aquatic and aquatic-dependant organisms and their habitats throughout the Wekiva River System and its associated wetlands.

Objectives

- A. Coordinate with the St. Johns River Water Management District, Florida Department of Environmental Protection, and other interested or affected parties to ensure adequate water quantity and quality in the Wekiva River System to maintain a diversity of aquatic and aquatic-dependant species and habitats (see Water Quality and Quantity section).
- B. Conduct species-specific surveys followed by annual monitoring for aquatic invertebrates in the Wekiva basin springs, such as the Wekiwa Springs hydrobe, Wekiwa siltsnail, and Orlando cave crayfish, to establish baseline population levels and document population trends.
- C. Continue to monitor the condition of, and any changes to, submerged aquatic vegetation (SAV) beds, particularly eelgrass beds which are a distinctive component of the Wekiva River System and indicative of a healthy riverine system.
- D. Continue monthly bird surveys on the Wekiva River System and surrounding riverine systems and produce an annual report that assesses trends in bird populations.
- E. Assess 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.
- F. Establish annual monitoring programs for reptiles and amphibians.
- G. Expand efforts to promote bear awareness and take steps to decrease human-bear conflicts.

Wildlife and Habitat – Goal 2:

Maintain habitat quality, landscape diversity, and ecosystem connectivity within the Wekiva basin and associated ecosystems with an emphasis on the black bear as an umbrella species.

Objectives

- A. Support design and construction of the Wekiva Parkway and associated roadway modifications, consistent with purposes of the Wekiva Parkway and Protection Act and the National Wild and Scenic River Act, to enhance habitat connectivity and corridors for wildlife movement.
- B. Evaluate and where possible pursue corrective action to remove impediments to the movement of bears and other wildlife between the Wekiva basin and Ocala National Forest north of the Wekiva Parkway caused by roads and incompatible land uses. Address the potential impact of road construction on such wildlife movement through design for wildlife crossings and other mitigative measures.
- C. Discourage additional new road construction within the Wekiva basin and ecological corridors that could impede the normal movement of bears and other wildlife, and attempt to avoid the construction or expansion of new roads within public conservation land. Address the potential impact of road construction on such wildlife movement through design for wildlife crossings and other mitigative measures.
- D. Identify private lands that represent missing pieces within the Wekiva basin portfolio of public conservations lands and the Wekiva-Ocala Greenway project; prioritize and pursue such lands needed for preservation through acquisition and/or conservation easements.
- E. Identify private lands with critical and unique features (such as springs or other karst features) or under-represented habitats within the Wekiva basin and springshed; prioritize and pursue such lands from willing sellers for preservation through acquisition and/or conservation easements.
- F. Identify areas within the Wekiva River System floodplain with impacted hydrology and develop a plan to improve the hydrology of the associated riparian habitats.
- G. Continue and improve the implementation of prescribed fire on public conservation lands within the Wekiva basin area, including within ecotones (transition areas between different habitat types) and riparian zones.
- H. Work with agencies, local governments, and the private sector to encourage the designation of common open space for the protection of functional habitat corridors for wildlife movement in development plans within the Wekiva basin area.

Wildlife and Habitat – Goal 3:

Reduce the impacts of invasive species and exotic species on native species and habitats throughout the Wekiva River System and its associated wetlands.

Objectives

- A. Continue to monitor and control nuisance and invasive exotic vegetation within the Wekiva River System and its associated wetlands using the category I and II lists produced by the Florida Invasive Pest Plant Council as a guide. Species that require attention include, but are not limited to, hydrilla, water hyacinth, water lettuce, wild taro, para grass, Chinese tallow, East Indian hygrophila, and cattail.
- B. Assess the impacts associated with the proliferation of invasive exotic fishes such as, but not limited to, armored catfish within the Wekiva River System and develop actions for expanding monitoring and control strategies.
- C. Monitor and control invasive exotic invertebrates within the Wekiva River System and its associated wetlands, including but not limited to channeled apple snails (if they become established), and develop actions to expand monitoring and control strategies.



4.3.3. Action Program

Key to the Action Program Table:

- Priority – Priority of the Objective is High, Medium, or Low
- Responsibility – A list of acronyms is provided at the beginning of the plan
- Duration – Duration of the Action is either Once (discreet action) or Ongoing (continuous action)

NOTE: The ability to carry out these activities will be dependent on the availability of funds and participant priorities.

Wildlife and Habitat – Goal 1: Protect aquatic and aquatic-dependant organisms and their habitats throughout the Wekiva River System and its associated wetlands.		
Objective	Priority	
A. Coordinate with the St. Johns River Water Management District, Florida Department of Environmental Protection, and other interested or affected parties to ensure adequate water quantity and quality in the Wekiva River System to maintain a diversity of aquatic and aquatic-dependant species and habitats (see Water Quality and Quantity section).	High	
Actions	Responsibility	Duration
i. Implement all goals, objectives, and strategies as described in the Water Quality and Quantity section.	AMC, CAMA, FPS, FDEP, SJRWMD, FOWR, LG	Ongoing
Objective	Priority	
B. Conduct species-specific surveys followed by annual monitoring for aquatic invertebrates in the Wekiva basin springs, such as the Wekiwa Springs hydrobe, Wekiwa siltsnail, and Orlando cave crayfish, to establish baseline population levels and to document population trends.	High	
Actions	Responsibility	Duration
i. Contract with aquatic scientists to establish baseline populations and to develop monitoring protocols for aquatic invertebrates in the Wekiva basin, including but not limited to the Wekiwa Springs hydrobe, Wekiwa siltsnail, and Orlando cave crayfish.	FPS, CAMA, FWC, SJRWMD	Once
ii. Implement a monitoring program for aquatic invertebrates using the protocol.	FPS, CAMA, FWC, SJRWMD	Once
iii. Contract analysis of invertebrate sampling to document population trends.	FPS, CAMA, FWC, SJRWMD	Ongoing
Objective	Priority	

C. Continue to monitor the condition of, and any changes to, submerged aquatic vegetation (SAV) beds, particularly eelgrass beds which are a distinctive component of the Wekiva River System and indicative of a healthy riverine system.	High	
Actions	Responsibility	Duration
i. Consult with aquatic ecologists to determine an optimal status for eelgrass beds within the Wekiva River System and to develop a protocol for measuring and monitoring the health of eelgrass.	CAMA, FPS, SJRWMD	Ongoing
ii. If needed, based upon monitoring, establish a restoration program for eelgrass beds to reestablish the optimal condition, with a goal for time of completion.	CAMA, FPS	Ongoing
iii. Contract with fishery scientists to establish the baseline of the bluenose shiner population (a rare fish that favors eelgrass beds) within the Wekiva River System and to develop a monitoring protocol.	CAMA, FPS, FWC	Once
iv. Implement a monitoring program to track bluenose shiner populations as an additional indicator of eelgrass health and within guidelines of the monitoring protocol.	CAMA, FPS, FWC	Ongoing
Objective	Priority	
D. Continue monthly bird surveys on the Wekiva River System and surrounding riverine systems and produce an annual report that assesses trends in bird populations.	Medium	
Actions	Responsibility	Duration
i. Consult with statisticians and ornithologists for appropriate analysis of monthly bird survey data to assess population trends.	CAMA, FPS, FWC	Ongoing
ii. Continue monthly bird surveys using volunteers and a quarterly contracted survey.	CAMA, FPS, FWC, NGCOs	Ongoing
Objective	Priority	
E. Assess 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.	Medium	
Actions	Responsibility	Duration
i. Contract with marine mammalogists to study manatee behavior in and their use of the lower Wekiva River.	CAMA, FWC	Ongoing
Objective	Priority	
F. Establish annual monitoring programs for reptiles and amphibians.	Medium	
Actions	Responsibility	Duration
i. Consult with herpetologists to determine the most effective ways of monitoring the status of reptile and amphibian populations associated with the river system.	FPS, CAMA, FWC	Once
ii. Implement a monitoring program.	FPS, CAMA, FWC	Ongoing
Objective	Priority	
G. Expand efforts to promote bear awareness and take steps to decrease human-bear conflicts.	Medium	
Actions	Responsibility	Duration

i. Implement multimedia presentations for public lands visitors, homeowner associations, schools, and private organizations.	FPS, FFS, FWC, CAMA, LG, NGCOs	Ongoing
ii. Distribute printed material published by governmental agencies such as the Florida Fish and Wildlife Conservation Commission or non-profit conservation organizations.	FPS, FFS, FWC, CAMA, LG, NGCOs	Ongoing
iii. Encourage or require the use of bear-proof trash receptacles in those parts of the Wekiva basin area with frequent bear activity.	FPS, FFS, FWC, CAMA, LG, NGCOs	Ongoing
Wildlife and Habitat – Goal 2: Maintain habitat quality, landscape diversity, and ecosystem connectivity within the Wekiva basin and associated ecosystems with an emphasis on the black bear as an umbrella species.		
Objective	Priority	
A. Support design and construction of the Wekiva Parkway and associated roadway modifications, consistent with purposes of the Wekiva Parkway and Protection Act and the National Wild and Scenic River Act, to enhance habitat connectivity and corridors for wildlife movement.	High	
Actions	Responsibility	Duration
i. Promote cooperation among agencies, local governments, and conservation organizations to complete the Wekiva Parkway project in a timely manner.	AMC, NGCOs	Ongoing
ii. Ensure the bridging of ample sections of the Wekiva Parkway to provide for movement of bears and other wildlife.	CAMA, FPS, FFS, FWC, NGCOs, FDOT, OOCEA,	Ongoing
iii. Manage vegetation, fencing, and other features of the Wekiva Parkway to facilitate wildlife movement.	FPS, FFS, FDOT, OOCEA	Ongoing
iv. Monitor movement and behavior patterns of bears and other wildlife underneath bridged sections of the Wekiva parkway.	FPS, FFS, FDOT, OOCEA	Ongoing
Objective	Priority	
B. Evaluate and where possible pursue corrective action to remove impediments to the movement of bears and other wildlife between the Wekiva basin and Ocala National Forest north of the Wekiva Parkway caused by roads and incompatible land uses. Address the potential impact of road construction on such wildlife movement through design for wildlife crossings and other mitigative measures.	High	
Actions	Responsibility	Duration
i. Install wildlife underpasses under roadways that cross the Wekiva basin ecological corridor such as SR 44 and CR 42.	FDOT, LG, NGCOs	Ongoing

ii. Reconfigure roadways that present an unnecessary hindrance to wildlife movement, such as the junction of SR 44 and CR 44A at Black Water Creek.	FDOT, LG, NGCOs	Ongoing
iii. Pursue habitat restoration or enhancement projects where needed.	FPS, FFS, SJRWMD, LCWA, LG	Ongoing
iv. Remove barriers to wildlife movement such as structures, walls, or fences (except where necessary to guide wildlife to areas of safe passage).	FPS, FFS, SJRWMD, LCWA, LG, FDOT	Ongoing
Objective	Priority	
C. Discourage additional new road construction within the Wekiva basin and ecological corridors that could impede the normal movement of bears and other wildlife, and attempt to avoid the construction or expansion of new roads within public conservation land. Address the potential impact of road construction on such wildlife movement through design for wildlife crossings and other mitigative measures.	High	
Actions	Responsibility	Duration
i. Establish policies to discourage new road construction and maintenance activities that could impede the normal movement of bears and other wildlife, and to discourage the construction or expansion of new roads within public conservation land; ensure that any new road construction and maintenance activities do not impede normal movement of bears and other wildlife.	FPS, FFS, CAMA, SJRWMD, FDOT, OOCEA,	Ongoing
ii. Consolidate transportation improvements within existing roadways, provide alternatives that remove traffic from the basin and ecological corridors, and provide measures that mitigate the impact of roads on the movement of wildlife.	FDOT, OOCEA	Ongoing
Objective	Priority	
D. Identify private lands that represent missing pieces within the Wekiva basin portfolio of public conservation lands and the Wekiva-Ocala Greenway project; prioritize and pursue such lands needed for preservation through acquisition and/or conservation easements.	Medium	
Actions	Responsibility	
i. Pursue programs at the federal, state, and local level for the protection of conservation lands, including but not limited to (a) encouraging annual state legislative funding for Florida Forever and as appropriate its expansion, (b) the appropriation of special funding for key acquisitions and easements, (c) the expansion of local land acquisition and easements programs, and (d) partnerships with private conservation organizations.	AMC, CAMA, FPS, FFS, FDEP, SJRWMD, LG, FWC, TNC, NGCOs	Ongoing
Objective	Priority	

E. Identify private lands with critical and unique features (such as springs or other karst features) or under-represented habitats within the Wekiva basin and springshed; prioritize and pursue such lands from willing sellers for preservation through acquisition and/or conservation easements.	Medium	
Actions	Responsibility	Duration
i. Consult with local governments, environmental agencies and conservation organizations such as The Nature Conservancy and local land trusts for help in identifying and protecting critical and unique features within the Wekiva basin and springshed.	AMC, CAMA, FPS, FFS, FDEP, SJRWMD, LG, FWC, TNC, NGCOs	Ongoing
Objective	Priority	
F. Identify areas within the Wekiva River System floodplain with impacted hydrology and develop a plan to improve the hydrology of the associated riparian habitats.	Medium	
Actions	Responsibility	Duration
i. Consult with the St. Johns River Water Management District to determine if impacted areas have been identified and if a plan exists to restore hydrological function.	AMC, FDEP, SJRWMD, CAMA, LCWA	Once
ii. Support the development of a plan and its implementation if necessary.	AMC, FDEP, SJRWMD, CAMA, LCWA	Ongoing
Objective	Priority	
G. Continue and improve the implementation of prescribed fire on public conservation lands within the Wekiva basin area, including within ecotones (transition areas between different habitat types) and riparian zones.	Medium	
Actions	Responsibility	Duration
i. Continue and enhance interagency cooperation with prescribed fire planning and implementation.	FFS, FPS, SJRWMD, LCWA, LG, NGCOs	Ongoing
ii. Establish designated smoke corridors, with ordinances where needed, to facilitate the work of prescribed burns.	FFS, FPS, SJRWMD, LCWA, LG, NGCOs	Ongoing
iii. Educate residents about the importance of prescribed fire to maintain healthy ecosystems and reduce the risk of wildfires.	FFS, FPS, SJRWMD, LCWA, LF, NGCOs	Ongoing
Objective	Priority	

H. Work with agencies, local governments, and the private sector to encourage the designation of common open space for the protection of functional habitat corridors for wildlife movement in development plans within the Wekiva basin area.	Medium	
Actions	Responsibility	Duration
i. Support the establishment and implementation of city and county land development regulations, and landowner incentives, for open space preservation on new developments.	LG, FDEP, FWC, NGOs	Ongoing
Wildlife and Habitat – Goal 3: Reduce the impacts of invasive species and exotic species on native species and habitats throughout the Wekiva River System and its associated wetlands.		
Objective	Priority	
A. Continue to monitor and control nuisance and invasive exotic vegetation within the Wekiva River System and its associated wetlands using the category I and II lists produced by the Florida Invasive Pest Plant Council as a guide. Species that require attention include, but are not limited to, hydrilla, water hyacinth, water lettuce, wild taro, para grass, Chinese tallow, East Indian hygrophila, and cattail.	High	
Actions	Responsibility	Duration
i. Continue and expand current efforts to eradicate and/or control the spread of hydrilla, water hyacinth, water lettuce, wild taro, para grass and Chinese tallow.	CAMA, FPS, IPMS, FFS, SJRWMD, LCWA	Ongoing
ii. Continue to monitor and track trends for these and other invasive exotic species.	CAMA, FPS, IPMS, FFS, SJRWMD, LCWA	Ongoing
iii. Continue to monitor the spread of East Indian hygrophila currently found in the Little Wekiva River and develop a protocol to prevent its spread in the Wekiva River System as needed.	CAMA, FPS, IPMS, SJRWMD	Ongoing
iv. Continue to monitor for the occurrence of new invasive exotic species and institute control measures as needed.	CAMA, FPS, IPMS, FFS, SJRWMD, LCWA	Ongoing
v. Manage cattail to prevent expansion to new locations and to prevent large-scale invasions of in-stream or riparian habitats.	CAMA, FPS, IPMS, SJRWMD, LCWA	Ongoing
Objective	Priority	
B. Assess the impacts associated with the proliferation of invasive exotic fishes such as, but not limited to, armored catfish within the Wekiva River System and develop actions for expanding monitoring and control strategies.	Medium	
Actions	Responsibility	Duration
i. Contract with fishery biologists to assess any impacts of armored catfish on the Wekiva River System.	CAMA, FPS, FWC	Once

ii. Continue, and expand as feasible, current efforts to remove armored catfish.	CAMA, FPS, FWC	Ongoing
iii. Develop a protocol for monitoring and controlling exotic fishes.	CAMA, FPS, FWC	Once
iv. Implement a monitoring and control program for exotic fishes using the protocol.	CAMA, FPS, FWC	Ongoing
Objective	Priority	
C. Monitor and control invasive exotic invertebrates within the Wekiva River System and its associated wetlands, including but not limited to channeled apple snails (if they become established), and develop actions to expand monitoring and control strategies.	Medium	
Actions	Responsibility	Duration
i. Support research on the impacts of channeled apple snails on aquatic habitats, native apple snail populations and limpkin populations, and adjust control strategies as appropriate.	CAMA, FPS, FWC	Ongoing
ii. If control is warranted, establish a program to remove channeled apple snails and channeled apple snail egg clusters.	CAMA, FPS, FWC	Ongoing

4.4. Historic and Cultural

4.4.1. Assessment

Scope

This assessment takes into consideration the cultural and historic resources, both archaeological and historical, whose existence is related to the river system. Physical remains of these resources have been catalogued in the Florida Master Site File maintained by the Florida Division of Historical Resources (FDHR).

Background

For millennia, the Wekiva basin area has provided abundant natural resources for human occupation. The spring runs, river, hardwood hammocks, and dense forests offered food, water, shelter, and breeding sites for many forms of wildlife and provided excellent plant and animal foods for human inhabitants. Numerous archeological and history sites have been recorded in the general region. Remains of now extinct Pleistocene megafauna and large herd animals have been found with the distinctive fluted projectile points made by Paleo-Indians (11,000-8000 BC). The Early Archaic Period (8000–6000 BC) continued the tradition of hunters and gatherers but with increased populations. The most readily identifiable sites are the mounds and middens along riverbanks. These features are typically domestic refuse heaps of shell, stone tools, animal bone, ceramics, and other artifacts. A mound or midden may also contain human burials, ceremonial artifacts, and other grave items.

The first major occupation of the St. Johns River valley occurred during the Mount Taylor Period (6000–2000 BC), as evidenced by large freshwater shell middens; burials in a wet environment; and stemmed, broad-bladed projectile points. The Orange Period (2000–500 BC) marked the appearance of ceramics, an apparent increase in population size, sociopolitical complexity, and territorial range. The St. Johns Period (500 BC– AD1565) showed a continued preference for mound building, but the later part of the period was also marked by profound changes in Native American life, including European influences. European artifacts are occasionally found in St. Johns Period burial mounds and middens (Milanich and Fairbanks 1980; Milanich 1994). Most of the sites in the Wekiva River basin date from the Orange and St. Johns II periods (ca. 2500 BC to post AD 800) (Weisman 1993).

Although central Florida was not occupied by Europeans during most of the Spanish-British period, Hernando DeSoto's Florida expedition (1539-1540) marked the beginning of a steep decline in Native American populations in the state. During the next 150 years, Timucuan Indians were forced to migrate or succumbed to European diseases. Other tribes fled to north Florida from invasions of their homelands in Georgia and Alabama in the 1700s. The Seminole Indians, who primarily descended from these cultures, used the Wekiva River headwaters for hunting and traveled the river as a route to the St. Johns River during the early 1800s.

By the 1820s, central Florida was also in use by early European-American settlers, and the Wekiva River and spring appear on several military maps. There was a minor military road running from Fort Mellan (Sanford) to Fort Mason (Eustis), which passed through the spring area. Early maps show little of the Wekiva area other than a trading post and trapping area.

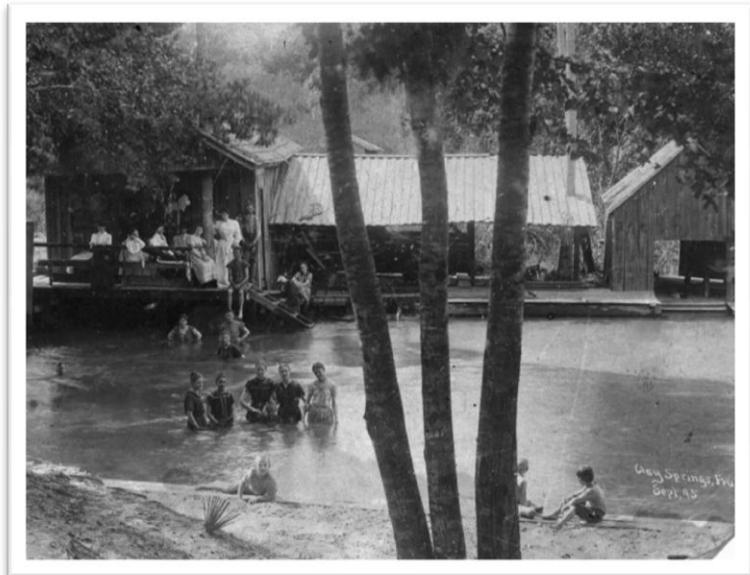
In 1842 at the close of the Seminole War, Congress passed the Armed Occupation Act giving 160 acres to any man who would live on the property and cultivate at least 5 acres. By the mid-1800s the Wekiwa basin was used by settlers for farming and milling lumber and grain. The area around Rock Springs and Wekiwa Springs became a focal point for early settlers. The town of Clay Springs was started around Wekiwa Springs. The spring outlet served as a landing spot for suppliers.

Cotton farming and cypress logging were major crops near Rock Springs Run, which was dammed to power a sawmill and gristmill. Another sawmill was built on the upper Wekiwa River and a gristmill operated at Wekiwa Springs until the Civil War. A mound indicating the site of the dam for this mill still remains along Mill Creek. During the Civil War a Federal Company camp was located at Rock Springs.

In 1865, after the Civil War ended, another homesteading act encouraged settlers into the area. During this time, steamships and barges used Wekiwa Springs as a loading and unloading point. The town of Clay Springs supported a wharf and warehouse for cargo steamers navigating the St. Johns River to the Wekiwa River from the town of Mellonville (now Sanford). Around 1875 the settlement of Markham was established and supported by the railroad system and Wekiwa River. Three sites are connected with this time period in the Markham Woods area, including an African-American cemetery and church.

The South Florida Railroad broke ground in 1880 to connect Sanford, Lake Mary, Longwood, and Altamonte Springs with Jacksonville. Shortly thereafter the Sanford-Lake Eustis rail line was built with connections in Sorrento, Mount Dora, Eustis, and the former Town of Ethel (in what is now Rock Springs Run State Reserve). The wooden bridge that crossed the Wekiwa River (near what is today Lake Markham Road) eventually burned down and much of the original rail bed was removed. Portions of this railroad network have since been converted into a bike trail as part of the Seminole County Rails to Trails program.

The tourism industry also arrived in the 1880s when Wekiwa Springs was still known as Clay Springs. In 1906 the name of Clay Springs was changed to Wekiwa Springs. Facilities at Wekiwa Springs included a hotel, a sanitarium, cabins, a picnic area, bathhouses, and a rail toboggan ride. The hotel and other recreational facilities operated until the Great Depression, after which the buildings either burned or were dismantled.



By the late 1800s, the making of turpentine was also an important economic activity in the area. Many catfaced pines and clay turpentine pots can still be found. The logging of cypress in the bottomlands of the Wekiwa and St. Johns rivers also began at this time.

Construction of the first major roads in Lake County began in 1915. Prior to that time, rivers served as a significant form of transportation with steam and paddlewheel boats. The economic base of the region during the first part of the 20th century was primarily cattle and ranching along with farming, citrus groves, lumber, and turpentine. From 1900 to 1940 agriculture was a major portion of the economy in Seminole County, with vegetables transported all over the country by rail. Timber logging became widespread in the region by the late 1930s.

Some old logging (or tram) roads and railroad grades still exist. One elevated grade occurs in the sandhill community at Wekiwa Springs State Park, and runs north-south through the entire unit. This grade was constructed in the late 1850s for a passenger railway from Eustis to Orlando that never came to fruition, but it was used to support the timber industry at Wekiwa Springs. Some of the old tramways are still visible, while others built through the floodplain swamp and hydric hammock communities have revegetated with hardwoods. Evidence of old logging equipment and portions of the railroad tramway still remain on public lands in some areas.

In 1941 the Apopka Sportsman's Club purchased land in the Wekiwa Springs area from the Wilson Cypress Company for hunting, fishing, and other recreational uses. In 1969 the state purchased the property from the sportsman's club for Wekiwa Springs State Park, which opened in 1970. Agriculture in the basin shifted largely to silviculture, grazing, and nurseries during the later part of the 20th century. Since the opening of Walt Disney World in 1971 much of central Florida, including the Wekiwa basin, has experienced significant growth which continues today.



The Value of Archaeological Sites (Adapted from FDHR 2005)

Clues to past events and previous ways of life remain in backyards, pastures, forests, hammocks, and streambeds across the Wekiva basin. Pre-European archaeological sites (before A.D. 1500) offer clues to Native American hunting and cooking methods, social organization and family life, artistic and religious expression, and past environments. Archaeological evidence of later cultures, more like our own, also exists. Early European exploration and settlement and Florida's territorial and statehood growth left their own unique signatures on and under the ground – creating a Florida landscape that is a mosaic of different natural and historical events.

Some 90 different archaeological sites of various periods are known to exist in the Wekiva basin. It is likely that many more will remain buried until they are accidentally uncovered or found during archaeological surveys. Artifacts and other cultural remains located together at a site represent single activities or events that can be better understood through careful excavation and analysis. An artifact may be of aesthetic interest in its own right; however its greatest value – the information about its user that can be learned from its context – may be lost if the artifact is removed from its original location. The specific characteristics of a well-managed site vary according to location and involve documentation, stabilization, monitoring, interpretation, and preservation.

While archaeological sites are of scientific interest, revealing new information about the past, they also have social value, providing opportunities for recreation, reflection, and education. Archaeological site management helps protect these windows into history.

For more information: <http://www.flheritage.com/archaeology/education/culturalmgmt>

Key Issues and Resources

Numerous previously recorded and documented historic and cultural resources have been catalogued in the Florida Master Site File maintained by the Florida Division of Historical Resources. Most previously recorded sites in the area have been on state lands. However, only small portions of land in the Wekiva basin have been adequately surveyed for cultural resources. Therefore, it is likely that there are other unrecorded historic and cultural sites present.

Small test pits have been excavated in several of the mounds revealing pottery fragments, animal bones, and shells. Several points and pottery fragments have been found by swimmers and divers in and around the main spring outlet at Wekiwa Springs State Park. In many areas along Rock Springs Run and the Wekiva River, midden sites are found on the accessible dry land, and some sites are used extensively as resting and picnic locations by boaters and canoeists, leading to degradation.

At present, there are 54 known archeological sites on public lands in the Wekiva basin area. Fifty of these sites occur within the aquatic preserve or state parks and include an underwater shipwreck, 32 middens, a prehistoric village site, 4 pre-ceramic lithic waste scatter sites, 3 African American sites including a cemetery and church, an artifact scatter site, 4 isolated finds, a cemetery from the Ethel settlement, a



burial mound, a logging tramway, and a refuse site with the remains of a windmill. The other four sites are in the Wekiva River Buffer Conservation Area (a site of unknown type), Seminole State Forest (a limited surface scatter of pottery from a probable camp site), and Kelly Park (evidence of pre-Columbian settlement and an early homestead site). Tramways constructed for logging during the late 19th century and early 20th century severely altered hydrological regimes over vast areas within the Wekiva basin. To restore hydrology, culverts have been installed along various tramways. Several miles of tramway have been removed in Rock Springs Run State Reserve and Lower Wekiva River Preserve State Park. Tramways have also been breached (partially removed) in Seminole State Forest as mitigation projects.

On private lands in the vicinity of the Wekiva River, there are 36 known archeological sites including: 7 middens, 3 prehistoric habitations, 1 lithic waste scatter, 15 artifact scatter sites, 5 isolated finds, a burial mound, a site with the remains of a windmill, an American homestead site (19th Century), a site with the remains of a sawmill (including segments of railroad grade and historic road), and an American site (20th century of unknown type).

Threats / Issues

- Natural degradation (erosion, slumpage, animal burrowing, tree fall)
- Vandalism/looting/pilfering (9 middens in state parks)
- Digging/shell mining (2 middens in state parks)
- Past archeological excavations (1 midden in state parks)
- Residential & recreational use (4 middens in state parks)
- Bulldozed (1 midden in state parks)
- Deterioration (1 midden in state parks)

Law Enforcement Issues

- Secluded sites can be accessed with little or no knowledge of land managers or law enforcement, and thus are difficult to protect.

Management Needs

- Continue to survey areas that have not previously been investigated to identify and document archaeological sites.
 - Wekiva basin state parks – Some areas have been surveyed, however there is a need for more formal archaeological surveys of areas in LWRPSP, RSRSR, and WSSP.
 - SJRWMD lands – No surveys are completed.
 - Seminole State Forest – Surveys have been performed.
 - LCWA lands – No surveys are completed.
 - Local public parks – Among Orange County parks, no surveys have been conducted on Sandhill Preserve, Lake Lucie Conservation Area or the county's portion of Pine Plantation. Status of local public parks in other jurisdictions is unknown.
 - Private lands – Some areas have been surveyed.

- Guidelines for physical management of historic and cultural resources (see Best Management Practices Guide, Bureau of Archeological Research) should be included in management plans and followed-up with operational plans that can respond to threats or damage. (Note: Ground disturbing activities must be conducted in accordance with FDHR guidelines.)
 - Wekiva basin state parks management plan covers management and research needs; covers ground disturbing activities.
 - SJRWMD management plan broadly covers identification and monitoring; covers ground disturbing activities.
 - Seminole State Forest management plan covers ground disturbing activities.
 - LCWA lands – unknown
 - Local public parks – unknown
 - Private lands – unknown
- Train staff and volunteers to manage and monitor cultural resources.
 - Wekiva basin state parks have personnel trained to recognize sites and to monitor ground disturbing activities.
 - SJRWMD has one archaeological monitor and utilizes consultants as needed.
 - Seminole State Forest has one archaeological monitor.
 - LCWA lands – unknown
 - Local public parks – unknown
 - Private lands – unknown
- Monitor sites using an archaeological resources checklist (provided by the Bureau of Archeological Research).
- Continue and expand education and interpretation of the area to improve public awareness and encourage protection.

Research Needs

- A compiled written history of all public lands and known archeological/cultural sites associated with the Wekiva River System (A useful archeological summary has recently been compiled by Wekiva Springs State Park and Wekiva Wilderness Trust.)
- Environmental change and prehistoric adaptation
- Aboriginal history and culture
- Post-Columbian history including First Spanish, British, Second Spanish, Territorial, Second Seminole War, Confederacy, and Reconstruction periods
- History and evidence of communities, commerce, and social complexity in the basin
- Historic and evidence of unique settlements, such as the Ethel settlement and African American community of Markham, including genealogies of descendents
- History and evidence of farming, timber, and turpentine industries
- History of tourism in the area; history of transportation
- History of acquisition, development, and operation of Wekiva basin state parks
- Role of Apopka Sportsmen's Club in land preservation
- History of lands in private ownership within the basin, such as the Seminole Woods property and Spanish land grants

Table 8. Inventory of Current Conditions for Historic and Cultural Values by Site

Criterion (number of sites)	Current Conditions*	Management Authority	Current Actions
<i>Sites on Public Lands</i>			
Underwater Shipwreck (1)	Poor	FDHR, FPS, CAMA	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.
Middens (32)	Good (5) Fair (8) Poor (13) Unknown (5) 18 are often inaccessible due to high water conditions 3 are inaccessible due to overgrowth/heavy vegetation	FDHR, FPS, CAMA	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.
Prehistoric Village Site (1)	Poor	FDHR, FPS	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.
Preceramic Lithic Waste Scatter (4)	Fair (2) Unknown (2) 2 sites are often inaccessible due to high water conditions and/or overgrowth.	FDHR, FPS, CAMA	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.
African American Sites from Town of Markham (3)	Fair (1 Cemetery) Poor (1 Historic Site) Destroyed (1 Church)	FDHR, FPS	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.
Artifact Scatter (1)	Unknown Often inaccessible due to high water conditions and/or heavy vegetation and overgrowth.	FDHR, FPS, CAMA	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.
Isolated Finds (4)	Not Applicable – these finds were collected	FDHR, FPS	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.

Criterion (number of sites)	Current Conditions*	Management Authority	Current Actions
Cemetery from Ethel settlement (1)	Fair	FDHR, FPS	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.
Burial Mound (1)	Destroyed	FDHR, FPS	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.
Logging Trail circa 1940s (1)	Fair Often inaccessible due to high water conditions.	FDHR, FPS	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.
Windmill Remains (1)	Poor Often inaccessible due to high water conditions.	FDHR, FPS, CAMA	Conduct ground disturbing activities in accordance with FDHR guidelines; Education; Enforcement of Agency Rules.
Pottery – limited surface scatter (1)	Unknown	FDHR, FPS	Conduct ground disturbing activities in accordance with FDHR guidelines.
Unknown (1)	Unknown	FDHR, SJRWMD	Identify and monitor sites for any disturbances; Any ground disturbing activities will be coordinated with FDHR.
Evidence of Pre-Columbian Settlement	Unknown	FDHR, Orange County	Unknown
Early Homestead Site (1)	Unknown	FDHR, Orange County	Unknown
<i>Sites on Private Lands</i>			
Middens (7)	Unknown (7)	FDHR	Unknown
Prehistoric Habitation (3) (Shell Island, Wekiva Hillside, and Serenity)	Unknown (Wekiva Hillside and Serenity) Shell Island has evidence of pilfering, sanitary issues, and general deterioration.	FDHR Rollins College owns Shell Island site	Unknown (Wekiva Hillside and Serenity) Shell Island is unmanaged.
Lithic Waste Scatter (1)	Unknown	FDHR	Unknown
Artifact Scatter (15)	Unknown (15)	FDHR	Unknown
Isolated Finds (5)	Unknown	FDHR	Unknown

Criterion (number of sites)	Current Conditions*	Management Authority	Current Actions
Burial Mound (1) (Rock Springs Burial Mound)	Unknown	FDHR	Unknown
Windmill Remains (1)	Unknown	FDHR	Unknown
19 th Century American Homestead (1) (Twin Oaks)	Unknown	FDHR	Unknown
WCC Blackwater Creek Sawmill Remains (1) (includes segment of railroad grade and historic road)	Unknown	FDHR	Unknown
Unknown, 20 th Century American Site (1)	Unknown	FDHR	Unknown

*Evaluative scale:

Good = structural stability and physical wholeness, where no obvious deterioration other than normal occurs.

Fair = there is discernable decline in condition between inspections, and the wholeness or physical integrity is and continues to be threatened by factors other than normal wear.

Poor = describes an unstable condition where there is palpable, accelerating decline, and physical integrity is being compromised quickly; suffers obvious declines in physical integrity from year to year; suggests immediate action to reestablish physical stability.

(Source of evaluative scale: Wekiva River Basin State Parks Multi-unit Management Plan.)

Table 9. Inventory of Current Conditions for Historic and Cultural Values by Topic

Criterion	Current Conditions*	Management Authority	Current Actions
<i>Topic</i>			
Law Enforcement	Isolated and secluded sites are difficult to protect.	Florida Department of State, FPS, FDEP, Office of Agriculture Law Enforcement, LCWA	FDEP has law enforcement coverage on state park property and throughout the Wekiva River System. Periodic patrols by FDEP law enforcement and in response to incidents.
Management	Although some areas have been surveyed to identify new sites, many other areas have not been surveyed. Management is broadly covered in management plans; however, guidelines for physical management of archaeological sites (Best Management Practices Guide) are not included. Trained staff are in place for Wekiva Basin State Parks, Seminole State Forest and SJWMD lands. There are no trained volunteers. Site monitoring is not regularly performed. Some education and interpretation is in place, mostly at the Wekiva Basin State Parks.	FPS, SJRWMD, FFS	Wekiva Basin State Parks: some areas have been surveyed; Unit Management Plan covers management and research needs and ground disturbing activities; trained staff are in place; has interpretive programs, kiosks, and interpretive panels that discuss various periods of history. Aquatic Preserve: CAMA staff monitors conditions of riverine sites and coordinates with Rollins for management of Shell Island. SJRWMD: Conservation Area Land Management Plan broadly covers identification and monitoring and covers ground disturbing activities; has one certified archaeological monitor and uses consultants as needed. Seminole State Forest: most areas have had cursory surveys and more detailed surveys have been conducted at specific locations; Five-year Resource Management Plan covers ground disturbing activities; has one certified archaeological monitor.
Research	Facts and history on the Wekiva basin are scattered. Online resources were found to include unrelated and incorrect information. Museum resources are not readily available online.	FPS, SJRWMD, FFS	Unknown

4.4.2. Goals and Objectives

The following objectives are prioritized in the Action Program. An effort to implement one or more of the objectives may be part of a program already in place.

Historic and Cultural – Goal 1:

Identify, protect, and preserve historic and cultural resources from human-related and natural threats.

Objectives:

- A. Complete a comprehensive survey of the historic and cultural resources within the Wekiva basin, particularly those that are either directly or indirectly functionally related to the river system.
- B. Establish a system to prioritize significant historic and cultural resources for protection efforts.
- C. Implement the “Best Management Practices Guide to Protecting Archaeological Sites” (Florida Bureau of Archaeological Research) to stabilize and protect, at a minimum, high priority sites.
- D. Assign at least one trained public agency staff member (“Cultural Resources Coordinator”) to regularly monitor and implement protection and management strategies associated with historic and cultural resources.
- E. Work with the law enforcement divisions of each agency to target high priority sites for regular patrol and enforcement of state cultural resources protection laws to deter vandalism and looting. Frequently patrolled sites receive less vandalism.
- F. Ensure that law enforcement personnel attend training on archaeological resource protection.
- G. Continue regular maintenance by public employees and volunteers at sites that receive regular public use to deter vandalism and looting. Well maintained sites receive less vandalism.
- H. On private lands, work closely with the landowner to protect and preserve identified priority sites, using Best Management Practices as needed.
- I. Establish additional protections for Shell Island through discussions with Rollins College, with advisement from the Florida Division of Historical Resources.
- J. Establish site specific strategies to protect high priority cultural resources from looting in accordance with Best Management Practices.

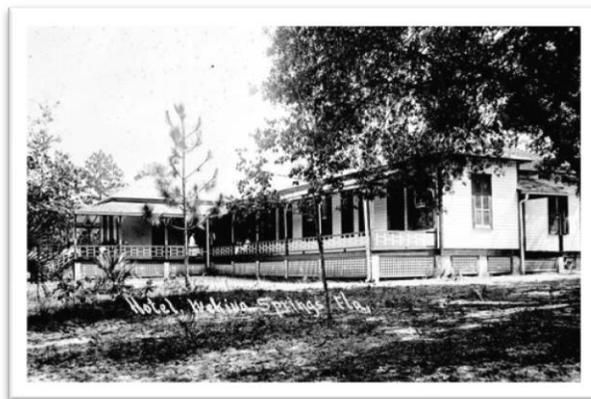
- K. Assess causes of erosion and other forms of natural degradation at high priority sites and take site-specific corrective actions to problems as needed.
- L. Ensure that, wherever feasible, all current and future recreational trails are routed at least 50 feet from cultural sites with adequate natural vegetation barriers between the trail and site to discourage access.
- M. Create partnerships with educational institutions to promote research of the significant historic and cultural resources in the Wekiva basin.

Historic and Cultural – Goal 2:

Foster an understanding among the public of the significance of the historic and cultural resources of the Wekiva basin.

Objectives:

- A. Write a comprehensive history of human habitation in the Wekiva basin area. Use this information to update all documentation (land management plans, websites, and printed materials) with an accurate account of the history of the basin.
- B. Ensure that messages provided by resource managers, private businesses and concessioners include clear language to indicate that looting and vandalism of cultural resource sites is illegal and that enforcement actions will be taken.
- C. Ensure that educational programs and interpretation of cultural resources within the Wekiva basin include a consistent message about the importance of these resources.
- D. Incorporate historic and cultural research findings into educational programs, interpretation, and public relations materials, as appropriate.
- E. Identify and establish at least one cultural site within the basin to be used as a public education site.



4.4.3. Action Program

Key to the Action Program Table:

- Priority – Priority of the Objective is High, Medium, or Low
- Responsibility – A list of acronyms is provided at the beginning of the plan
- Duration – Duration of the Action is either Once (discreet action) or Ongoing (continuous action)

NOTE: The ability to carry out these activities will be dependent on the availability of funds and participant priorities.

Historic and Cultural – Goal 1: Identify, protect, and preserve historic and cultural resources from human-related and natural threats.		
Objective	Priority	
A. Complete a comprehensive survey of the historic and cultural resources within the Wekiva basin, particularly those that are either directly or indirectly functionally related to the river system.	High	
Actions	Responsibility	Duration
i. Identify and prioritize areas that have not been surveyed.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once
ii. Survey the areas.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
iii. Document a description of each new site found.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
iv. File a record of each site with the Florida Master Site File.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
Objective	Priority	
B. Establish a system to prioritize significant historic and cultural resources for protection efforts.	Medium	
Actions	Responsibility	Duration
i. Identify significant resources based on existing archaeological surveys and results of the comprehensive survey in Objective 1A.	FDHR, AMC	Once
ii. Use expert input as recommended by the Florida Division of Historical Resources to create a priority system.	FDHR, AMC	Once

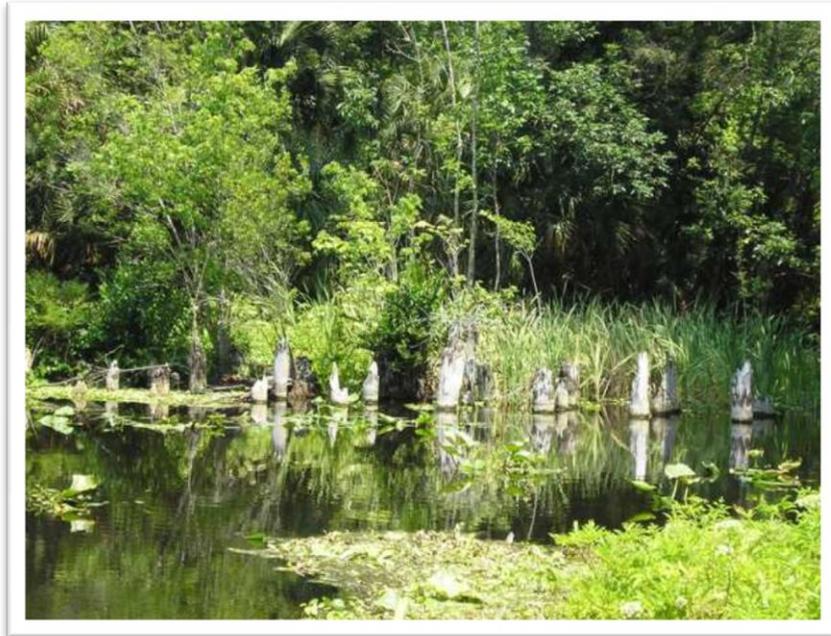
iii. The priority system should address items outlined in the “BMP Guide” (see Objective 1C.)	FDHR, AMC	Once
iv. Use the priority system to assign a priority to known sites and newly discovered sites.	FDHR, AMC	Once
Objective	Priority	
C. Implement the “Best Management Practices Guide to Protecting Archaeological Sites” (Florida Bureau of Archaeological Research) to stabilize and protect, at a minimum, high priority sites.	Medium	
Actions	Responsibility	Duration
i. Create a protocol for implementing the Best Management Practices.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once
ii. Implement the Best Management Practices based on the priority assigned to sites.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
Objective	Priority	
D. Assign at least one trained public agency staff member (“Cultural Resources Coordinator”) to regularly monitor and implement protection and management strategies associated with historic and cultural resources.	High	
Actions	Responsibility	Duration
i. Assess staff roles and availability within each agency.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once
ii. Create a strategy to assign one person as the Cultural Resources Coordinator, specifying the percent of their time that is devoted to monitoring sites and implementing protection and management strategies.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once
iii. Establish an agreement or Memorandum of Understanding to create this position through a partnership of multiple agencies.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once
iv. The Cultural Resources Coordinator should focus on coordinating the accomplishment of objectives in this section, particularly Objectives 1A, 1B, and 1C.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
Objective	Priority	
E. Work with the law enforcement divisions of each agency to target high priority sites for regular patrol and enforcement of state cultural resources protection laws to deter vandalism and looting. Frequently patrolled sites receive less vandalism.	Medium	
Actions	Responsibility	Duration

i. Implement regular communication between resource managers and local law enforcement.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
ii. Ensure that a list of law enforcement contact information is readily available to agency staff.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
iii. Familiarize law enforcement personnel with high priority sites.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
iv. Use off-duty law enforcement officers to patrol during weekends and holidays.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
Objective	Priority	
F. Ensure that law enforcement personnel attend training on archaeological resource protection.	High	
Actions	Responsibility	Duration
i. Identify key law enforcement personnel who need to attend the training that is available from the Florida Bureau of Archaeological Research.	AMC, FDHR	Ongoing
Objective	Priority	
G. Continue regular maintenance by public employees and volunteers at sites that receive regular public use to deter vandalism and looting. Well maintained sites receive less vandalism.	High	
Actions	Responsibility	Duration
i. Use resources from the Florida Bureau of Archaeological Research, such as the Stewardship Volunteer Program and Sitewatch Program.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
Objective	Priority	
H. On private lands, work closely with the landowner to protect and preserve identified priority sites, using Best Management Practices as needed.	Medium	
Actions	Responsibility	Duration
i. Establish and implement an outreach protocol to inform private landowners of the importance of the site(s), why the site(s) should be protected, and the resources available to assist them in protecting and managing the site(s).	AMC, FDHR, LG	Ongoing
ii. Refer to the resources of the Florida Bureau of Archaeological Research for guidance on cultural resource protection for private landowners, including the document “Best Management Practices: An Owner’s Guide to Protecting Florida’s Archaeological Sites for Future Generations”, the document “Conservation Easements Guidebook to Protecting Sites on Private Lands” and the Site Stewardship Agreement.	AMC, FDHR, LG	Ongoing

Objective	Priority	
I. Establish additional protections for Shell Island through discussions with Rollins College, with advisement from the Florida Division of Historical Resources.	High	
Actions	Responsibility	Duration
i. Perform an assessment of the Shell Island site to determine additional site protections needs.	FDHR, FPS, CAMA, Rollins College	Once
ii. Consider all options for additional protection, including public acquisition.	FDHR, FPS, CAMA, Rollins College	Ongoing
Objective	Priority	
J. Establish site-specific strategies to protect high priority cultural resources from vandalism and looting in accordance with Best Management Practices.	Medium	
Actions	Responsibility	Duration
i. Consider strategies outlined in the BMP guide identified in Objective 1C, such as the use of native groundcover and natural barriers for camouflage.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
ii. As soon as vandalism or looting is discovered at a site, prevent further disturbance by immediately repairing the damage.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
iii. Use expert input to design and implement site-specific strategies.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
iv. Coordinate with the Florida Division of Historical Resources before conducting any ground-disturbing activities.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
Objective	Priority	
K. Assess causes of erosion and other forms of natural degradation at high priority sites and take site-specific corrective actions to problems as needed.	Medium	
Actions	Responsibility	Duration
i. Consult with an archaeologist and other qualified professionals to determine the nature of the threats and the appropriate site-specific protection measures to stabilize the site.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
ii. Coordinate with the Florida Division of Historical Resources before conducting any ground-disturbing activities.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
Objective	Priority	

L. Ensure that, wherever feasible, all current and future recreational trails are routed at least 50 feet from cultural sites with adequate natural vegetation barriers between the trail and site to discourage access.	Medium	
Actions	Responsibility	Duration
i. Assess the current trail system to make sure it adheres to this objective.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG, FDOT	Once
ii. Evaluate all future proposed trails to ensure that they adhere to this objective.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG, FDOT	Ongoing
Objective	Priority	
M. Create partnerships with educational institutions to promote research of the significant historic and cultural resources in the Wekiva basin.	Medium	
Actions	Responsibility	Duration
i. The Cultural Resources Coordinator should identify educational institutions and create these partnerships.	Depends on Objective 1D	Ongoing
Historic and Cultural – Goal 2: Foster an understanding among the public of the significance of the historic and cultural resources of the Wekiva basin.		
Objective	Priority	
A. Write a comprehensive history of human habitation in the Wekiva River basin area. Use this information to update all documentation (land management plans, websites, and printed materials) with an accurate account of the history of the basin.	High	
Actions	Responsibility	Duration
i. Coordinate with historical societies, etc., to identify a qualified person or a small team to write a comprehensive history of the Wekiva basin area.	AMC, FDHR	Once
ii. Publish the history in hard copy and make it, or some version of it, available online.	AMC, FDHR	Once
iii. Perform an inventory and assessment to identify all documents (land management plans, websites, and printed materials) that need to be updated.	AMC, FDHR	Once
iv. Update the documents identified in the inventory and assessment.	AMC, FDHR	Once
Objective	Priority	
B. Ensure that messages provided by resource managers, private businesses and concessionaires include clear language to indicate that looting and vandalism of cultural resource sites is illegal and that enforcement actions will be taken.	High	
Actions	Responsibility	Duration

i. Ensure that a consistent message is used on any signs at all access points to the river system.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
ii. Ensure that historic and cultural resource protection is addressed in all river use guidelines.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once
Objective	Priority	
C. Ensure that educational programs and interpretation of cultural resources within the Wekiva basin include consistent messages about the importance of these resources.	Medium	
Actions	Responsibility	Duration
i. Develop fact sheets on the historic and cultural resources in the Wekiva basin.	AMC, FDHR	Once
ii. Include key messages that should be delivered at every education and public relations opportunity.	AMC, FDHR	Ongoing
Objective	Priority	
D. Incorporate historic and cultural research findings into educational programs interpretation, and public relations materials, as appropriate.	Medium	
Actions	Responsibility	Duration
i. Provide a summary of research findings to agency education and outreach staff.	AMC, FDHR	Ongoing
Objective	Priority	
E. Identify and establish at least one cultural site within the basin to be used as a public education site.	Medium	
Actions	Responsibility	Duration
i. Identify a cultural site that is appropriate for use as a public education site.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once
ii. Create messages about cultural resources and the people who left them in the Wekiva basin. Include messages created in Objective 2C and information about proper treatment of the site and rules to prevent disturbance.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
iii. Ensure that construction of structures and facilities does not damage the site.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing
iv. Place interpretive and educational signs and related facilities to avoid or minimize visual intrusion on any scenic vistas associated with the site.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Once
v. Direct the flow of people and vehicles to prevent damage over the long term.	FDHR, FPS, CAMA, FFS, SJRWMD, LCWA, LG	Ongoing

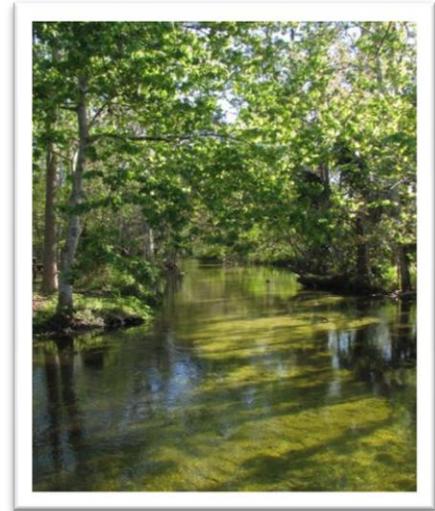


4.5. Water Quality and Quantity

4.5.1. Assessment

Scope

Water resources are critical to the nature of a National Wild and Scenic River. Water quality is linked to land uses and human activities in and along the river corridor and in the larger region that contributes groundwater and surface water to the Wekiva River System. Flow volume and rate are also affected by human activities and long-term climate patterns that affect rainfall, which is the fundamental source of water for the river system. Because water quality and quantity depend on both the surface water drainage basin and the groundwater capture area of springs in the Wekiva River System, the surface watershed and springshed are both considered when analyzing this value. (See Figures 2 and 3.)



All of the Wild and Scenic River segments covered in this plan have been designated as “Outstanding Florida Waters” (OFWs) under Ch. 62-4 of the Florida Administrative Code (FAC). Although this status gives these river segments the highest protection from water quality degradation that is possible under state regulatory programs, it does not completely prohibit surface water discharges or eliminate all sources of pollution

Given the influence of land use on surface water and groundwater, the rapid conversion of natural and agricultural lands to urban or suburban development throughout much of the watershed and springshed poses a threat to water quality and water quantity in the Wekiva River System. For example, intense development can lead to a reduction in spring flow because of greater demand for water from the aquifer and an increase in impervious surfaces that reduce infiltration. Pollutant and nutrient loading can also be worsened by intense development that brings increased use of chemicals and fertilizers for lawns and landscaping, runoff from roads, and wastewater discharges to surface water and groundwater.

The character of water in the Wekiva River System ranges from the crystal-clear flows of the artesian springs and spring runs to the tannin-colored waters of blackwater creeks and streams. This contributes to a high diversity of aquatic communities and habitats that support numerous animal and plant species, including invertebrates unique to springs of the Wekiva River System. Water quality and quantity, which are affected by spring flow and drainage from adjacent land, contribute to the popularity of the springs and river system as recreational resources and to the overall health and integrity of ecosystems in the basin.

Background

Water Quality

Much of the material in this section is cited from the Pollutant Load Reduction Goal (PLRG) study recently completed by SJRWMD as directed by the Wekiva Parkway and Protection Act (Mattson et al. 2006). Additional water quality data was drawn from the semiannual “EcoSummary” reports by FDEP staff. Appendix D summarizes current water quality data from the St Johns River Water Management District for the Wekiva River and Rock Springs Run.

A detailed review of the water quality status of the Wekiva River and Rock Springs Run was included in the recent PLRG study (Mattson et al. 2006). The waterways have high concentrations of dissolved minerals because of their natural setting in an area influenced by karst geology. However water quality in some reaches is also influenced by inflows of surface water with dark color and acidity from decomposing vegetation.

A distinctive characteristic of the Wekiva River is that spring flow is a significant component of the total flow of the river. Therefore, the water quality of the freshwater springs that contribute to the Wekiva is especially important to the river's overall water quality. Based on average annual flow rates, the two largest springs in the Wekiva River System are Wekiwa Springs and Rock Springs, which are among the most southerly-occurring of east Florida's freshwater springs. These two springs are situated next to limestone outcroppings, which are rare in central Florida and indicate that the top of the Floridan Aquifer is at or near the land surface.

Studies completed during the 2000 FDEP Statewide Stream Bioassessment Program included sampling for the Wekiva River and Rock Springs Run. Results show high concentrations of nitrate in both waterways - higher than those in 95% of other Florida waterways - and nutrient levels high enough to potentially support high levels of algal growth in both waterways. In contrast, concentrations of ammonia, total Kjeldahl nitrogen and total phosphorus levels were near the statewide stream median. Despite the high nitrate concentrations, Habitat Assessment scores and Macroinvertebrate Stream Condition Index scores indicated good to excellent conditions at the sampled sites. These findings suggest that aquatic communities were healthy at the time of the bioassessment. Nevertheless, there is reason to be concerned about nitrate concentrations that have the potential to affect these communities.



Elevated nitrate concentrations are a concern for many of Florida's freshwater springs (Florida Springs Task Force 2000 and 2006). A concentration of 0.20 mg/L is widely cited as the naturally occurring baseline (background concentration) for Florida springs. In some of the springs of the Wekiva River System, nitrate levels greatly exceed the threshold of 0.35 mg/L used by FDEP staff to indicate potential groundwater-surface water impacts. The high levels of nitrates in the springs that feed the Wekiva River System are believed to be related to present and past agricultural uses as well as present urban/suburban land uses.

Contributors to nitrogen levels in the Wekiva River System include but are not limited to individual onsite wastewater disposal systems (e.g., septic systems), centralized wastewater treatment plants; and fertilizer applications to agricultural land and urban/suburban landscapes. Nitrogen is also introduced to the river system through natural processes such as atmospheric

deposition and decay of organic material; however these sources correlate to much lower background nitrate concentrations that exist within the environment absent human impacts (< 0.2 mg/L).

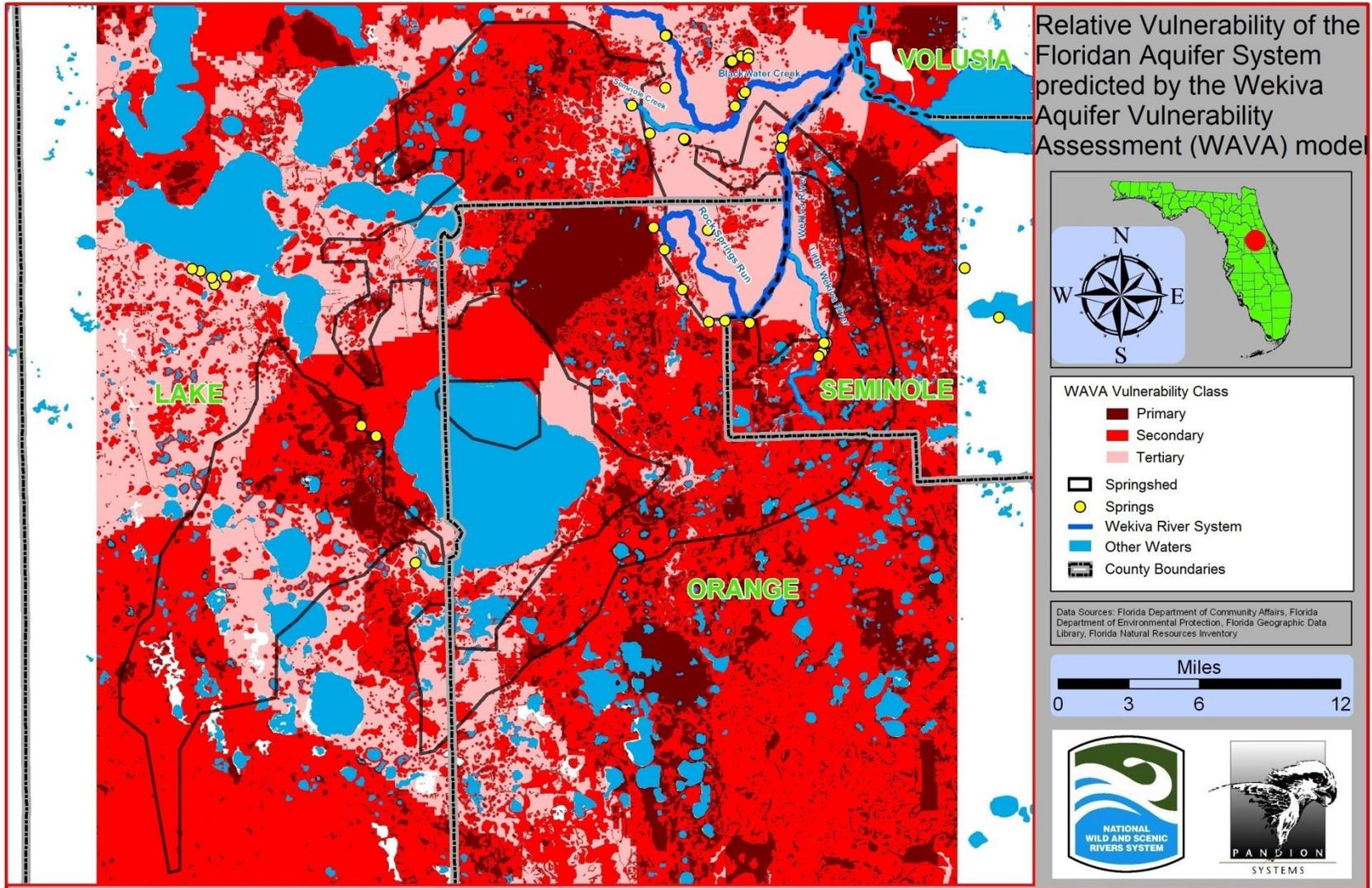
Trend analysis since 1984, done as part of the PLRG study, shows a decline in nitrate and total phosphorus for the Wekiva River. However even with these declines, the concentrations greatly exceed those considered healthy for a spring-fed river system. Nitrate concentrations within waterways associated with both the Wekiva River and Rock Springs Run were found to be high (> 1.0 mg/L) at the spring outlets. This corresponds to observations that the highest biomass of attached algae was found in and around the springs. For nitrate (but not phosphorus), concentrations decrease significantly with distance downstream. This effect is thought to be caused by uptake by algae and aquatic plants as the water travels downstream as well as dilution.

The groundwater that contributes to each of the springs in the Wekiva River System may be strongly influenced by land use activities that are located far from the river system itself, such as agriculture and urban or suburban development. Due to latency in the transport of nutrients through the aquifer, agricultural activity in past years may still be affecting water quality of the springs as well.

Within the area that contributes to a spring, some land areas are more strongly connected to the Floridan Aquifer, making the aquifer in these areas more vulnerable to impacts from land use. These areas of vulnerability are not easily determined and are influenced by soil and geological characteristics. Studies by the Florida Geological Survey (FGS) have determined which areas are most vulnerable for the Wekiva River and its springs (Wekiva Aquifer Vulnerability Assessment, FGS 2005). The largest area of aquifer vulnerability lies approximately three miles north-northeast of Lake Apopka and to the west of Rock Springs Run. Figure 12 depicts relative vulnerability of the Floridan Aquifer predicted by the Wekiva Aquifer Vulnerability Assessment (WAVA) model.



Figure 12: Relative Vulnerability of the Floridan Aquifer Predicted by the WAVA Model



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Water Quantity and River Flow

Maintaining the volume of water and discharge characteristics are important management considerations for any river system. This is particularly important to sustaining a wild and scenic river given the effect that flow has on aquatic communities, ecosystem processes, water quality, and river recreation. For the Wekiva River System, water volume and flow characteristics are influenced by spring flow, water storage characteristics of adjacent floodplains, and land use (including agriculture and urban or suburban development). The impacts of development that took place before current stormwater management practices went into effect are also particularly important (prior to the mid 1980's). It should be noted that development has affected the Little Wekiva River to a much greater degree than the Wekiva and has changed this tributary's flow characteristics so that peak flow rates are higher, resulting in channel scouring and erosion. Although the Little Wekiva River is not included in the national wild and scenic river system, these problems still translate into Wekiva River impacts downstream.



Approximately half of the Wekiva River's flow originates from springs. Flow data for Wekiwa Springs and Rock Springs show a trend of decreasing spring flow during the time period from the early 1970s until 2003. Decreasing flow trends were also noted for springs along the Little Wekiva River (Palm, Sanlando, and Starbuck Springs). Factors that may be causing this decline include the effects of urbanization and reduced recharge because of increased impervious surface, groundwater pumping from the Wekiva springshed, and a long-term decline in annual rainfall. Studies indicate that urbanization of the Rock Springs groundwater contributing area has been responsible for a 10 to 15 percent decrease in spring flow. Urbanization that results in a loss of groundwater recharge, such as loss of infiltration because of pavement, can also be an important factor in flow declines. Figure 13 depicts Aquifer Recharge Rates within the Wekiva springshed.

In 1992 the SJRWMD adopted Minimum Flows and Levels (MFLs) for the Wekiva River at SR 46, Black Water Creek at SR 44, and eight springs along the Wekiva and its tributaries (Messant, Miami, Palm, Rock, Sanlando, Seminole, Starbuck, and Wekiwa). These levels are intended to protect the water resources and ecology of the area from harm caused by water withdrawals. Pursuant to the Wekiva Parkway and Protection Act, MFLs for Rock Springs and Wekiwa Springs were reviewed and analyzed again, and determined to be sufficiently protective of the water resource. A reevaluation of the Wekiva River is planned for 2015.

To ensure that the Wekiva River system MFLs and other environmental resources in the area are protected, the St. Johns River Water Management District recently amended its consumptive use permitting rules regarding the use of groundwater, with specific limitations on the amount of

additional groundwater that can be developed within a geographic area designated as the Central Florida Coordination Area. This area includes some, but not all, of the Wekiva springshed.

The St. Johns River Water Management District is currently updating its 2005 regional water supply plan. This plan, like the existing plan, will include conservation measures, alternative water supply development projects, and water resource development projects intended to meet the demands of existing and future water users and ensure the sustainability of water resources and related natural systems. The plan is required pursuant to Section 373.709, F.S.

The Little Wekiva River’s Influence on the Wekiva River System

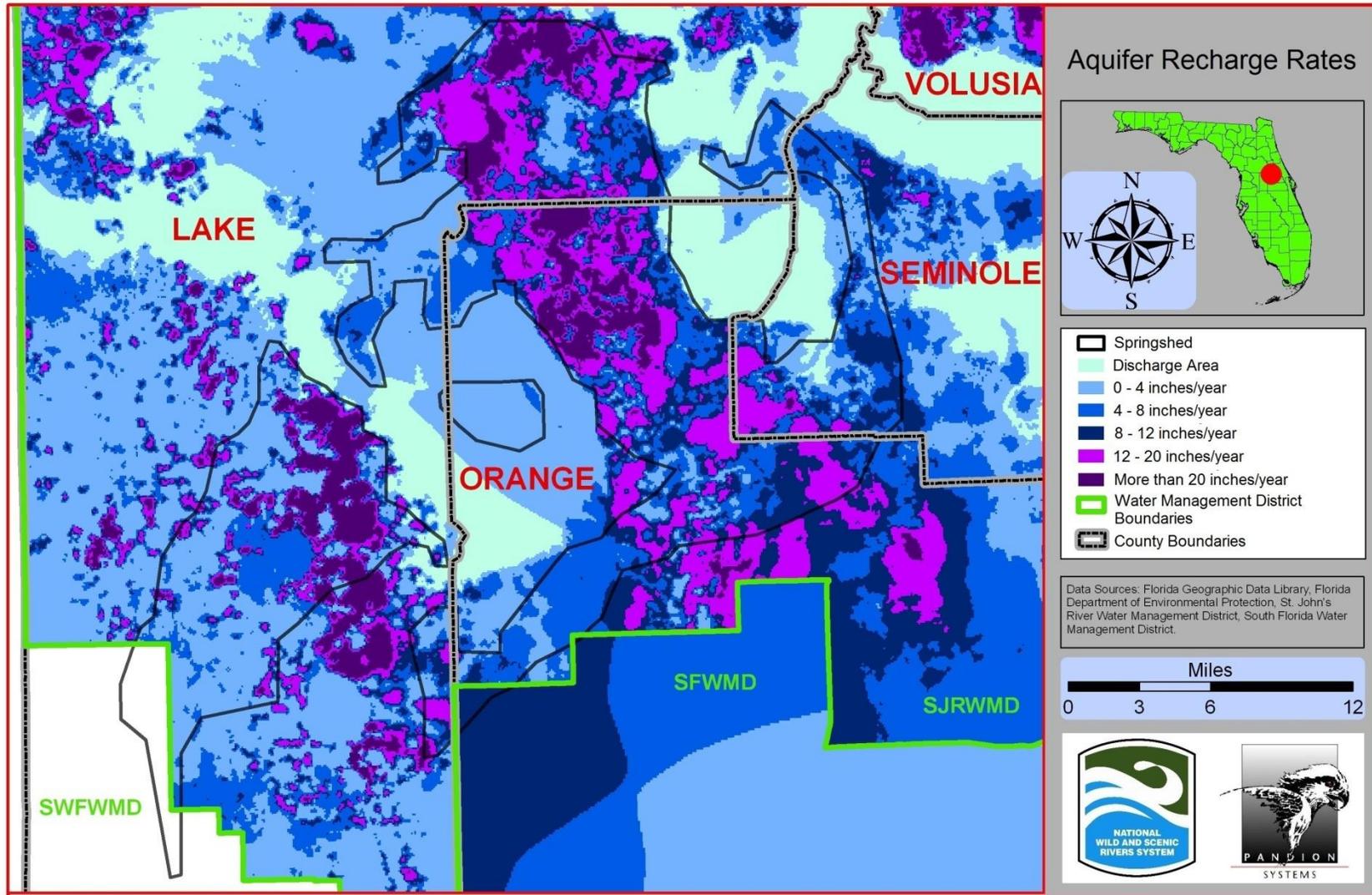
The Little Wekiva River drains an urbanized watershed of 42 square miles located northwest of downtown Orlando, eventually merging with the Wekiva River downstream of Wekiwa Springs. Although the Little Wekiva River is not included in the national wild and scenic river system, development has significantly altered flow characteristics of this tributary, creating impacts to the Wekiva River.

Many water quality problems within the drainage basin of the Little Wekiva River can be attributed to a lack of stormwater treatment controls, such as retention and infiltration, which were not required at the time of construction in much of the watershed. Impacts to the natural floodplain of the Little Wekiva produce high peak flow rates, resulting in channel scouring, erosion, and sediment transport. Pollution resulting from inadequate stormwater treatment is significant.

Although past changes within the Little Wekiva River watershed remain a problem, a reduction in the direct discharge of pollutants occurred in the 1980’s with implementation of the APRICOT (A Prototype Realistic Innovative Community of Today) project undertaken by the city of Altamonte Springs. Described as a landmark for modern water treatment and conservation, the APRICOT project sought to integrate components of stormwater, wastewater, and groundwater, in part through the reuse of treated wastewater effluent. APRICOT successfully reduced effluent discharges to the Little Wekiva River and has provided for the reuse of treated effluent, which reduces overall groundwater demands.



Figure 13: Aquifer Recharge Rates



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Recent Initiatives Pursuant to the Wekiva Parkway and Protection Act

Several studies and actions relating to water resources were set into motion by passage of the 2004 Wekiva Parkway and Protection Act (WPPA). As described below, some of these have been completed while others are still being carried out .

- ***St. Johns River Water Management District (SJRWMD)***

Section 369.318 of the WPPA directed the SJRWMD to consider adoption of new rules to protect aquifer recharge. Pursuant to this, the District revised rule 40-C41 F.A.C. in December 2006 to extend recharge criteria for the Wekiva River Hydrologic Basin to the Wekiva Study Area (WSA). This requires that in “Most Effective Recharge Areas”, defined as Type A soils within the WSA, the applicant for a project must demonstrate that the first three inches of runoff will be retained on-site and percolate within 72 hours, or alternatively, that post-development recharge capacity will be equal to or greater than pre-development recharge capacity.

In 2006 the SJRWMD completed a Pollutant Load Reduction Goal (PLRG) study as required by the WPPA for nitrate, total phosphorus, and total coliform bacteria. Recommended PLRGs (Table 10) were subsequently used by FDEP to establish TMDLs for impaired waters within the WSA. As previously noted, the WPPA directed the SJRWMD to review and update MFLs for Rock Springs and Wekiwa Springs; however based on this review, the District found that the MFLs adopted in 1992 continue to be protective (WSI, 2007). The WPPA also directed the SJRWMD to consider the impact of redevelopment upon aquifer recharge, however the District concluded that the expansion of recharge criteria WSA combined with requirement stormwater treatment would adequately protect recharge. Pursuant to the WPPA, rulemaking was initiated by the District to establish a consolidated environmental resource permit/consumptive use permit for projects involving urban landscape, golf course, or recreational areas.

In addition to the above, the SJRWMD initiated a study to assisted local governments in implementing Section 369.319 of the WPPA, which required development of a master stormwater management plan by all local governments in the WSA. (CDM, 2005). 14 local governments participated in this cooperative effort. The final report provided a decision-making strategy for local governments to evaluate and prioritize stormwater improvements, suggesting examples for various sub-basins within the WSA.

Table 10. Pollutant Load Reduction Goals

Recommended Percentage Reductions in Nitrate and Total Phosphorus for Wekiwa Springs, Wekiva River, Rock Springs, and Rock Springs Run

River Segment	Nitrate *	Total Phosphorus *
Wekiwa Springs	79%	64%
Upper Wekiva River (to Little Wekiva River)	68%	61%
Lower Wekiva River (to Blackwater Creek)	47%	57%
Rock Springs	81%	23%
Rock Springs Run	63%	58%

* Percentage reduction to achieve target concentrations of 0.286 mg/l for Nitrate and 0.065 mg/l for Total Phosphorus

- **Florida Department of Environmental Protection (FDEP)**

To limit the nutrient loading to groundwater from wastewater treatment plants, Section 369.318 of the WPPA required that the FDEP evaluate the efficacy of current standards and adopt new rules as appropriate. FDEP subsequently issued a report that included recommendations for enhanced treatment standards within defined primary and secondary protection zones based on a draft of the FGS Wekiva Aquifer Vulnerability Assessment (WAVA) (FDEP, 2004). Pursuant to this, in 2006 FDEP adopted F.A.C. Rule 62-600.550. The rule established enhanced restrictions on the concentration of Total Nitrogen from domestic wastewater treatment facilities, referencing an aquifer vulnerability map (Figure 12) contained in the final WAVA report produced by FGS in 2005. The rule also prohibited land application of most Class A and B wastewater residuals in primary and secondary protection areas of the Wekiva Study Area.

As required by the WPPA, FDEP also adopted TMDLs for the Wekiva Study Area in June 2008, based on PLRGs established by the SJRWMD. This process was initiated by the addition of the Wekiva River and Rock Springs Run to Florida’s Impaired Waters List in 2007. FDEP and a group of stakeholders are presently using the adopted TMDLs to create a Basin Management Action Plan.

- **Florida Department of Health (FDOH)**

Section 369.318 of the WPPA directed the FDOH in coordination with FDEP to study the effect of septic systems within the WSA and consider the adoption of rules for enhanced onsite disposal systems to reduce nitrogen loading. An initial study (FDOH, 2004) resulted in a number of questions and concerns that led to the appropriation of additional funding by the Florida legislature to study the impact of septic systems. In parallel with FDOH efforts, the FDEP and SJRWMD received funding to conduct a “Wekiva River and Floridan Aquifer” study to determine sources of nitrate in the Wekiva area. To date, rules requiring the use of enhanced onsite systems have not been adopted.

- ***Florida Department of Agriculture and Consumer Services (FDACS)***
Pursuant to the WPPA, the FDACS is required to study methods of reducing non-point source pollution from agriculture and promulgate rules as necessary to implement new or revised Best Management Practices (BMPs) protective of water bodies, including basins with impaired water bodies addressed by the TMDL program.

Strategies to Reduce Nutrient Loads

Among the various studies and reports issued to date, a number of strategies for reducing nutrient loading to the aquifer have been suggested. These include the replacement of conventional septic tanks with performance-based onsite systems that use aerobic and anaerobic processes to remove nitrogen. It has been noted that the efficacy and cost of these systems must be considered relative to the overall contribution of septic tanks as a source of nutrients. The need for a governmental management entity has also been identified as important to the successful implementation of any such program. In areas of high septic tank density, conversion to central sewer may be more effective.

Efforts to reduce nutrient loading from fertilizers could involve regulatory or incentive-based programs to control the sale of soluble fertilizers and more effectively implement best management practices. In addition, greater efforts to educate homeowners about ways to reduce or eliminate landscaping or turf grass that requires fertilizer, as well as efforts to educate lawn care specialists, golf course managers, and the agricultural industry could be pursued.

Strategies to Conserve Groundwater

Substantial reductions in groundwater consumption can be achieved by addressing wasteful lawn and landscape irrigation practices. Reducing the frequency of watering, eliminating or reducing the size of lawns that require irrigation, and utilizing drought-tolerant plants can significantly reduce the amount of water needed in residential and commercial applications. More efficient micro-irrigation techniques, as well as rain and moisture sensors, can improve efficiency in areas requiring irrigation. Reclaimed water lines that provide treated wastewater for irrigation are available in parts of the Wekiva area. Stormwater reuse and cisterns can also be used to capture rainwater for irrigation. In the nursery industry, advanced techniques to recapture and recycle water are emerging. Indoors, water efficient appliances, toilets and shower heads can help reduce personal water consumption.

From a regulatory standpoint, pricing structures that charge users at a higher rate for excessive water use have been suggested, as well as further restrictions on watering. SJRWMD has initiated rulemaking to increase water conservation by further limiting landscape irrigation. In addition to limiting water consumption, design techniques that promote recharge, such as the reducing impervious surfaces and conserving non-irrigated natural open space, can help protect groundwater resources. As with efforts to reduce nutrient loads, education is an important component of an effective water conservation strategy.

Key Issues and Resources

- Nutrients from contributing areas are causing the degradation of aquatic communities and excessive algae growth in some segments, and threaten to affect more segments in the future. Causes of nutrient loading include but are not limited to individual onsite wastewater disposal systems (septic systems), centralized wastewater treatment plants, and fertilizer applications to agricultural land and urban/suburban landscapes.
- Aquifer recharge that contributes to spring flow could decline as the result of development unless requirements for the protection of recharge are implemented throughout the springshed. The Wekiva Study Area designated in the 2004 Wekiva Parkway and Protection Act does not include parts of the Wekiva springshed located west of the Lake Apopka.
- Surface water runoff affects some portions of the Wekiva River System, especially from older residential and commercial developments that were constructed before the SJRWMD adopted Special Wekiva Hydrological Basin criteria, Management and Storage of Surface Waters criteria, and Environmental Resource Permit criteria. Public land acquisition, protection zones adopted following passage of the Wekiva River Protection Act, and current regulations have helped to reduce input of untreated stormwater to the river system.
- Extensive urbanization around the Little Wekiva River, has significantly impacted flow characteristics and water quality, creating sediment and pollutant transport downstream to the Wekiva River.
- Withdrawal of water from the Floridan Aquifer, which is likely to increase in the future, contributes to reduced spring flows. (Rainfall is also a factor.)
- Increased recreational use could create new water quality problems (for example streambank erosion in areas extensively used by the public).
- Invasive species of aquatic vegetation proliferate in varying amounts throughout the Wekiva River System. Filamentous algae is prolific in certain reaches and has increased, especially near some of the springs.
- The protection of flows and levels necessary to safeguard outstandingly remarkable values of the National Wild and Scenic River (including aquatic habitat) may require additional measures, such as MFL revisions or water reservations for the Wekiva River System.

Table 11. Inventory of Current Conditions for Water Quality and Quantity

Criterion	Current Conditions	Management Authority	Current Actions
Nutrient loading from stormwater	Affecting some segments of river and some springs; may increase with development in the future.	FDEP, SJRWMD, LG	SJRWMD under its ERP rules requires a nutrient loading analysis for discharges into waters that have impaired water quality. A TMDL program and Basin Management Action Plan is underway.
Nutrient loading from domestic onsite wastewater disposal systems	Source of nitrate in ground water, which flows to springs. Septic systems represent a significant nitrate load to Wekiva (MACTEC 2007).	FDOH	Continues to be studied by the Florida Department of Health (FDOH).
Nutrient loading from centralized wastewater treatment plants	Source of nitrate in ground water, which flows to springs. There are direct discharges from wastewater treatment plants on Sweetwater Creek and Little Wekiva River.	FDEP	New (April 2006) FDEP wastewater management requirements for Wekiva Study Area (Chapter 62-600.550) to be implemented by 2011.
Nutrient loading from fertilizer	Affects surface and groundwater. The combination of residential and agricultural fertilizers is a significant nitrate load to Wekiva (MACTEC 2007).	FDACS	Agricultural best management practices exist for application rates. New statewide rule (August 2007) requires reduced concentrations of N and P in fertilizers labeled for use on urban lawns and sports turf. The Florida Consumer Task Force has recommended a model ordinance for local governments. Residential fertilizer is currently not regulated.
Diminished flows from springs	Diminished flow regimes can alter instream communities and adversely affect water quality. While MFLs are being met, increasing water demand contribute to reduced flows; future population growth will increase this demand.	SJRWMD, LG	The Consumptive Use permitting program is designed to protect the Wekiva River system from harm through environmental permitting criteria and MFLs and also prohibits future increased groundwater withdrawals above 2013 levels in the CFCA, which includes much of the Wekiva basin and springshed.
Instream water quality impacts from recreation	Erosion, litter, engine fuel, and damage to vegetation from propellers and conoe/kayak paddles at some locations.	FPS, CAMA, FFS	Regular inspection of sites primarily by CAMA during resource management activities.
Occurrence of non-native invasive plants and filamentous algae	Hydrilla, wild taro, water lettuce, hyacinth, filamentous algae. Algae growth is linked to nutrients in groundwater and the springs.	FPS, CAMA, FDOH	Varies on Wekiva River and Rock Springs Run. Aggressive treatment by FWC-IPMS and CAMA for hydrilla, water hyacinth, and water lettuce. Yearly surveys; treatments as needed.

4.5.2. Goals and Objectives

The following objectives are prioritized in the Action Program. An effort to implement one or more of these objectives may be part of a program already in place.

Water Quality and Quantity – Goal 1:

Protect instream water quality of the Wekiva River System.

Objectives

- A. Protect springs, surface waters, wetlands, karst features, and high recharge areas within the Wekiva basin and springshed through land acquisition and the purchase of conservation easements.
- B. Continue to strictly interpret the Outstanding Florida Waters (OFWs) statute for all impacts to the Wekiva River System.
- C. Evaluate the effectiveness of stormwater treatment techniques, enforcement, and regulations currently in place, and as appropriate strengthen these provisions.
- D. Continue to monitor the condition of and any changes to submerged aquatic vegetation (SAV) beds, particularly eelgrass beds, which are a distinctive component of the Wekiva River System and indicative of a healthy riverine system.
- E. Support research and monitoring efforts pertaining to algal growth, particularly filamentous algae, which can indicate the presence of increased nutrients within the Wekiva River System.
- F. Support implementation of the Wekiva River System Total Maximum Daily Loads (TMDLs) /Basin Management Plan (BMAP) program, whose goal is to reduce nutrient loads in the Wekiva River and Rock Springs Run as well as other water bodies within the Wekiva River System.
- G. Create and implement a communication program for residents, businesses, landscaping professionals, and public employees whose work involves landscaping to address fertilizer application practices and the harm caused by nutrient loading to surface water and groundwater quality.
- H. Evaluate and implement feasible stormwater retrofit projects and new stormwater treatment technologies, both on-site and regionally, within the Wekiva basin and springshed to meet existing requirements and/or provide innovative treatment approaches for nutrient removal.
- I. Enforce, assess, and as appropriate strengthen regulations of the the St. Johns River Water Management District and state and local governments pertaining to sinkholes and other karst features that can be a direct conduit for nutrients and pollutants into the aquifer, including but not limited to adjacent land use, setbacks, buffers, and discharges.

- J. Encourage proper maintenance of existing septic systems throughout the Wekiva basin and springshed. Within areas identified to be "more vulnerable" and "vulnerable" by the Wekiva Aquifer Vulnerability Assessment, encourage the use of performance-based onsite wastewater treatment systems as appropriate.
- K. Evaluate impacts to water quality from septic systems within areas vulnerable to surface water contamination adjacent to the Wekiva River System, and as appropriate establish programs to replace existing systems, retrofit with performance-based systems, or connect to central sewer facilities if in close proximity to a regional wastewater treatment facility.
- L. Convert existing urban areas with a high density of individual onsite septic systems to central sewer where feasible and environmentally necessary within the Wekiva Study Area.
- M. Support ongoing projects that improve water quality in the Little Wekiva River. These projects include wastewater treatment plant upgrades, projects identified in the Little Wekiva watershed, and projects recommended in the Wekiva Parkway and Protection Act Stormwater Master Plan.
- N. Enforce, assess, and as appropriate strengthen regulations and educational efforts relating to lawn and landscaping practices and the responsible use of fertilizers to limit nutrient loading within the Wekiva basin and springshed.
- O. Support research regarding the impacts of land application of reclaimed water from wastewater treatment plants (advanced and conventional) on shallow groundwater and the Floridan Aquifer to determine if additional treatment is required.

Water Quality and Quantity – Goal 2:

Protect flow regimes of the Wekiva River System.

Objectives

- A. Evaluate existing and proposed withdrawals of water within the Wekiva River basin and springshed in light of their potential impact to the Wekiva River System, and as appropriate strengthen policies and regulations that limit and manage water consumption.
- B. Support planned efforts to evaluate and update existing Minimum Flows and Levels (MFLs) of the Wekiva River at the SR 46 Bridge. Identify whether there is a need for additional MFLs or revisions to existing MFLs to adequately protect the Wekiva River System.
- C. Evaluate the protection of Outstandingly Remarkable Values that may be affected by flows and water levels of the Wekiva River System; determine whether additional protection is required, and if so whether such protection may be achieved by refinement of MFLs, by a federal water reservation pursuant to Section 13(c) of the Wild and Scenic Rivers Act, by a

water management district water reservation pursuant to Section 373.223(4), Florida Statutes, or by other processes.

- D. Evaluate existing SJRWMD Environmental Resource Permit (ERP) and Consumptive Use Permit (CUP) rules and current enforcement methods that pertain to residential, commercial, industrial, and agricultural water use and landscaping to identify opportunities for additional water conservation.
- E. Work with the SJRWMD to evaluate and as appropriate strengthen regulations and incentive programs to conserve water within the Wekiva basin and springshed, including but not limited to those addressing water allocation, water consumption, water billing rate structures, irrigation, and lawn or landscaping practices. Work with local governments to evaluate and as appropriate strengthen regulations and incentive programs to conserve water within the Wekiva basin and springshed, including but not limited to those addressing plumbing codes, installation of irrigation systems, lawn and landscaping ordinances, and water billing rates.
- F. Promote the efficient use of reclaimed water within the Wekiva basin and springshed. Evaluate whether the use of reclaimed water has an adverse impact on Outstandingly Remarkable Values that may be affected by flows and water levels of the Wekiva River System. Evaluate whether transports of water outside of the Wekiva basin and springshed have an adverse impact on Outstandingly Remarkable Values that may be affected by flows and water levels of the Wekiva River System.
- G. Encourage compliance with Best Management Practices for irrigation by nursery, landscaping, and agricultural businesses.
- H. Work with local governments, agencies, and the private sector to encourage a more water-conscious form of development within the Wekiva basin and springshed.

4.5.3. Action Program

Key to the Action Program Table:

- Priority – Priority of the Objective is High, Medium, or Low
- Responsibility – A list of acronyms is provided at the beginning of the plan
- Duration – Duration of the Action is either Once (discreet action) or Ongoing (continuous action)

NOTE: The ability to carry out these activities will be dependent on the availability of funds and participant priorities.

Water Quality and Quantity – Goal 1: Protect instream water quality of the Wekiva River System.		
Objective	Priority	
A. Protect springs, surface waters, wetlands, karst features, and high recharge areas within the Wekiva basin and springshed through land acquisition and the purchase of conservation easements.	High	
Actions	Responsibility	Duration
i. Support Wildlife and Habitat Goal 2, Objective 2D, Action i.	AMC, CAMA, FPS, FFS, FDEP, SJRWMD, LG, FWC, TNC, NGCOs	Ongoing
ii. Create an acquisition inventory of potential areas of significance to the Wekiva System, including high recharge areas and areas of aquifer vulnerability in the Wekiva springshed that may not be in proximity to the river itself (with special emphasis on high recharge areas and areas of aquifer vulnerability that also have habitat value).	AMC, TNC, NGCOs	Once
iii. From the inventory in (ii), rank the importance of potential areas, thereby creating a prioritized list of potential acquisitions.	AMC, TNC, NGCOs	Once
iv. From steps (ii) and (iii), determine potential funding sources and steps for acquisition through existing programs.	AMC, CAMA, FPS, FFS, FDEP, SJRWMD, LG, FWC, TNC, NGCOs	Ongoing
v. Investigate/pursue additional funding mechanisms at the federal, state and local level for the protection of conservation lands within the Wekiva basin and springshed, including but not limited to appropriation of special funding for key acquisitions and easements, expansion of local government acquisition and easements programs, and the creation and strengthening of partnerships with private conservation organizations.	AMC, CAMA, FPS, FFS, FDEP, SJRWMD, LG, FWC, TNC, NGCOs	Ongoing
Objective	Priority	

B. Continue to strictly interpret the Outstanding Florida Waters (OFWs) statute for all impacts to the Wekiva River System.	Medium	
Actions	Responsibility	Duration
i. Review proposed activities for potential risk of water quality degradation and Outstanding Florida Waters violations.	AMC, FDEP, SJRWMD	Ongoing
ii. Investigate any activity that may be causing water quality degradation and pursue corrective actions.	AMC, FDEP, SJRWMD	Ongoing
Objective	Priority	
C. Evaluate the effectiveness of stormwater treatment techniques, enforcement, and regulations currently in place, and as appropriate strengthen these provisions.	Medium	
Actions	Responsibility	Duration
i. Review and evaluate the effectiveness of the local government stormwater master plans in the Wekiva basin and springshed.	AMC, FDEP, SJRWMD, LCWA, LG	Once
ii. Encourage local governments to identify and as feasible implement the most effective stormwater treatment measures.	AMC, FDEP, SJRWMD, LCWA, LG	Once
iii. Contact the Florida Department of Environmental Protection Watershed Management staff regarding the revision of the state stormwater rule that is underway, and request that a presentation be made to the advisory management committee regarding this revision.	AMC, FDEP	Once
iv. Assess resources used for enforcement purposes among responsible agencies. (The St. Johns River Water Management District and local governments have their own stormwater regulations.)	AMC, FDEP, SJRWMD, LCWA, LG	Once
v. Prioritize most important areas and regulations for water quality in the Wekiva River System based on (iii), and evaluate whether enforcement resources are sufficient in these areas based on (iv). Make recommendations for changes in efforts and/or priorities based on findings.	AMC, FDEP, SJRWMD, LCWA, LG	Once
Objective	Priority	
D. Continue to monitor the condition of and any changes to submerged aquatic vegetation (SAV) beds, particularly eelgrass beds, which are a distinctive component of the Wekiva River System and indicative of a healthy riverine system.	Medium	
Actions	Responsibility	Duration
i. Determine an optimal status for eelgrass beds within the Wekiva River System. Based on this determination, map areas in which the condition is degraded.	AMC, FDEP, SJRWMD, CAMA	Once
ii. Based on the results of (i), work with Wekiva River Aquatic Preserve personnel to determine whether limiting exposure to recreational use or management changes would improve the condition of eelgrass beds.	AMC, FDEP, SJRWMD, CAMA	Once

iii. If needed, based on (i) and (ii), establish a restoration program for eelgrass beds to reestablish the optimal condition, with a goal for time of completion.	AMC, FDEP, SJRWMD, CAMA	Ongoing
Objective	Priority	
E. Support research and monitoring efforts pertaining to algal growth, particularly filamentous algae, which can indicate the presence of increased nutrients within the Wekiva River System.	High	
Actions	Responsibility	Duration
i. Continue the research program that was initiated during the Pollutant Load Reduction Goals (PLRG) study on the Wekiva River and Rock Springs Run.	FDEP, SJRWMD	Ongoing
ii. Assess whether additional research and monitoring is needed.	AMC, FDEP, SJRWMD	Once
iii. Review findings annually and modify research and monitoring techniques accordingly.	AMC, FDEP, SJRWMD	Ongoing
Objective	Priority	
F. Support implementation of the Wekiva River System Total Maximum Daily Loads (TMDLs) /Basin Management Action Plan (BMAP) program, whose goal is to reduce nutrient loads in the Wekiva River and Rock Springs Run as well as other water bodies within the Wekiva River System.	High	
Actions	Responsibility	Duration
i. Review the future TMDL evaluations and provide input to the Florida Department of Environmental Protection on TMDL development prior to approval of any revised TMDLs.	AMC, NGCOs	Ongoing
ii. Promote public, local government and agency participation in preparing the Basin Management Action Plan and implementation of projects and activities designed to reduce pollutant loads.	AMC, FDEP, SJRWMD, LG, NGCOs	Ongoing
iii. Support research and the evaluation of new information regarding groundwater and surface water nutrient impacts in the Wekiva basin and springshed; and ensure that all information is appropriately used in any future decisions and actions.	AMC, FDEP, SJRWMD, LG, NGCOs	Ongoing
Objective	Priority	
G. Create and implement a communication program for residents, businesses, landscaping professionals and public employees whose work involves landscaping to address fertilizer application practices and the harm caused by nutrient loading to surface water and groundwater quality.	High	
Actions	Responsibility	Duration
i. Identify a lead agency to create this program.	AMC, FDEP, CAMA, SJRWMD, LG, NGCOs	Once
ii. Develop the program based on concepts of community based social marketing.	AMC, FDEP, CAMA, SJRWMD, LG, NGCOs	Ongoing
Objective	Priority	

H. Evaluate and implement feasible stormwater retrofit projects and new stormwater treatment technologies, both on-site and regionally, within the Wekiva basin and springshed to meet existing requirements and/or provide innovative treatment approaches for nutrient removal.	Medium	
Actions	Responsibility	Duration
i. Identify potential retrofit projects and technologies on individual properties within the Wekiva basin and springshed.	AMC, FDOT, FDEP, SJRWMD, LCWA, LG	Ongoing
ii. Select projects for feasibility studies and future construction.	AMC, FDOT, FDEP, SJRWMD, LCWA, LG	Ongoing
iii. Identify future opportunities for new regional stormwater treatment projects.	AMC, FDOT, FDEP, SJRWMD, LCWA, LG	Ongoing
Objective	Priority	
I. Enforce, assess, and as appropriate strengthen regulations of the St. Johns River Water Management District and state and local governments pertaining to sinkholes and other karst features that can be a direct conduit for nutrients and pollutants into the aquifer, including but not limited to adjacent land use, setbacks, buffers, and discharges.	Medium	
Actions	Responsibility	Duration
i. Request that representatives of the St. Johns River Water Management District, Florida Department of Environmental Protection, and local governments make a presentation to the advisory management committee regarding existing regulations and potential improvements to regulations relating to the protection of groundwater quality from nutrients and pollution via sinkholes and other karst features.	AMC, SJRWMD, FDEP, LG	Once
ii. Evaluate resources for enforcement.	AMC, SJRWMD, FDEP, LG	Once
iii. Prioritize most important areas and regulations for protection of groundwater quality in the Wekiva River System based on (i), and evaluate whether enforcement resources are sufficient in these areas based on (ii).	AMC, SJRWMD, FDEP, LG,	Once
iv. Make recommendations for changes in protection efforts and priorities based on findings.	AMC, SJRWMD, FDEP, LG	Once
Objective	Priority	
J. Encourage proper maintenance of existing septic systems throughout the Wekiva basin and springshed. Within areas identified to be "more vulnerable" and "vulnerable" by the Wekiva Aquifer Vulnerability Assessment, encourage the use of performance-based onsite wastewater treatment systems as appropriate.	High	
Actions	Responsibility	Duration

i.	In consultation with the county health departments, develop and implement a program to ensure the periodic pump-out of existing septic systems.	AMC, FDOH, LG	Ongoing
ii.	Develop and implement an educational program to support (i).	AMC, FDOH, LG	Ongoing
iii.	Develop and implement a program of incentives for property owners who have septic systems within the "more vulnerable" and "vulnerable" areas of the basin and springshed to upgrade to performance-based systems as appropriate.	AMC, FDOH, LG	Ongoing
iv.	Create a program to ensure maintenance of performance-based systems in the Wekiva basin and springshed.	AMC, FDOH, LG	Ongoing
Objective		Priority	
K. Evaluate impacts to water quality from septic systems within areas vulnerable to surface water contamination adjacent to the Wekiva River System, and as appropriate establish programs to replace existing systems, retrofit with performance-based systems, or connect to central sewer facilities if in close proximity to a regional wastewater treatment facility.		High	
Actions		Responsibility	Duration
i.	Review and update the inventory of properties on septic systems that are adjacent to Wekiva River System water bodies.	AMC, FDOH, FDEP, LG, CAMA	Once
ii.	Collaborate with the Florida Department of Health to determine age of systems and whether there are known problems or complaints regarding these systems.	AMC, FDOH, FDEP, LG, CAMA	Once
iii.	Coordinate with the Florida Department of Health and Florida Department of Environmental Protection to assess the impact on water quality of septic systems adjacent to the Wekiva River System.	AMC, FDEP, FDOH, CAMA	Once
iv.	Determine whether anticipated water quality improvement warrants retrofit or replacement of those septic systems adjacent to the Wekiva River System, or connection to central sewer facilities.	AMC, FDEP, FDOH, CAMA	Once
v.	Depending upon the results of (iv), develop incentive-based programs to offer landowners for retrofit, replacements, or connection to central sewer facilities where appropriate.	AMC, FDEP, FDOH, LG, CAMA	Once
Objective		Priority	
L. Convert existing urban areas with a high density of individual onsite septic systems to central sewer where feasible and environmentally necessary within the Wekiva Study Area.		High	
Actions		Responsibility	Duration
i.	Expand septic system mapping undertaken for TMDL documentation to better map areas with high septic system density, and include the entire springshed.	AMC, FDOH, LG, FDEP	Once
ii.	Evaluate central sewer expansion and mandatory hook-up plans of local governments.	AMC, FDOH, LG, FDEP	Once

iii. Consider results of (i) and (ii) in light of aquifer vulnerability in high septic density areas. Prioritize areas based on aquifer vulnerability.	AMC, FDOH, LG, FDEP	Once
iv. Collaborate with local governments to incorporate results of (iii) into central sewer expansion and mandatory hook-up plans as appropriate.	AMC, FDOH, LG, LG Utilities, FDEP	Once
Objective	Priority	
M. Support ongoing projects that improve water quality in the Little Wekiva River. These projects include wastewater treatment plant upgrades, projects identified in the Little Wekiva watershed, and projects recommended in Wekiva Parkway and Protection Act Stormwater Master Plan.	High	
Actions	Responsibility	Duration
i. Review St. Johns River Water Management District and local government project listings, using these to create a “master project list” of ongoing projects. Include wastewater treatment plant upgrades and shoreline stabilization.	AMC, FDEP, SJRWMD, LG	Once
ii. Prioritize project list based on impacts to the Little Wekiva River	AMC, FDEP, SJRWMD, LG	Once
iii. Refer to action steps for Objective 1F (TMDL/BMAP program) since a final BMAP will include a similar list of projects.	AMC, FDEP, SJRWMD, LG	Once
Objective	Priority	
N. Enforce, assess, and as appropriate strengthen regulations and educational efforts relating to water quality impacts of lawn and landscaping practices and the responsible use of fertilizers to limit nutrient loading within the Wekiva basin and springshed.	High	
Actions	Responsibility	Duration
i. Support implementation and enforcement of the FDACS Urban Turf Fertilizer Rule (Rule 5E-1.003(2) Florida Administrative Code - Labeling Requirements for Urban Turf Fertilizers) and appropriate nutrient limitation recommendations of the Urban Fertilizer Task Force.	AMC, FDACS	Ongoing
ii. Evaluate agency legislative authority; determine potential ways of strengthening agency regulations and enforcement regarding fertilizer use, including expansion of authority as needed.	AMC, FDEP, SJRWMD, FDACS	Once
iii. Strengthen agency regulations and enforcement as appropriate, pursuant to (ii).	AMC, FDEP, SJRWMD, FDACS	Once
iv. Evaluate existing local government regulations and enforcement relating to turf grass, landscaping, and fertilizer use; identify potential ways of strengthening regulations and enforcement.	AMC, LG	Once
v. Strengthen local government regulations and enforcement as appropriate, pursuant to (iv).	AMC, LG	Once
vi. Continue to support the Wekiva Promise initiative, an education program that addresses residential fertilizer use and promotes personal stewardship in protecting the Wekiva River basin and Springshed	AMC, FDEP, CAMA, SJRWMD, LG	Ongoing

vii. Work with state agencies and local governments to establish incentive programs to reduce turf grass area and promote landscaping that does not require the intense use of fertilizers.	AMC, FDEP, SJRWMD, LG	Ongoing
viii. Request information from local wastewater treatment utilities or the Florida Department of Environmental Protection regarding the typical water quality concentrations, including nutrients, of reclaimed water intended for irrigation.	AMC, FDEP, SJRWMD, LG	Once
ix. Promote education regarding the nutrient concentrations and fertilizer effect in reclaimed water and that fertilizer application can be reduced when reclaimed water is used for irrigation.	AMC, FDEP, SJRWMD, LG	Ongoing
Objective	Priority	
O. Support research regarding the impacts of land application of reclaimed water from wastewater treatment plants (advanced and conventional) on shallow groundwater and the Floridan Aquifer to determine if additional treatment is required.	Medium	
Actions	Responsibility	Duration
i. Invite a representative of the FDEP, SJRWMD or an academic establishment to present information to the advisory management committee regarding what is known about the impacts of using reclaimed water on groundwater quality.	AMC, FDEP, SJRWMD	Once
ii. Based on (i), determine whether research is ongoing to address data gaps and pursue additional research if appropriate.	AMC, FDEP, SJRWMD	Once
iii. Based on (ii), determine whether reclaimed water application presents a potential threat to groundwater quality and pursue additional treatment if determined necessary.	AMC, FDEP, SJRWMD, LG, LG Utilities	Ongoing
Water Quality and Quantity – Goal 2: Protect flow regimes of the Wekiva River System.		
Objective	Priority	
A. Evaluate existing and proposed withdrawals of water within the Wekiva River basin and springshed in light of their potential impact to the Wekiva River System, and as appropriate strengthen policies and regulations that limit and manage water consumption.	Medium	
Actions	Responsibility	Duration
i. Obtain an inventory and map of existing water withdrawals in the Wekiva springshed and basin requiring a Consumptive Use Permit (CUP) and develop an estimate of private individual wells that do not require a CUP.	AMC, SJRWMD, LG, NGCOs	Once
ii. Evaluate impacts to the Wekiva River System from existing and proposed withdrawals.	AMC, SJRWMD, LG, NGCOs	Once
iii. Review new withdrawal proposals and provide comment during the Consumptive Use Permit process.	AMC, SJRWMD, LG, NGCOs	Ongoing

iv. Continually update inventory and evaluations in (i) and (ii).	AMC, SJRWMD, LG, NGCOs	Ongoing
v. Participate in the rulemaking process: (1) to consolidate Environmental Resource Permits (ERPs) and Consumptive Use Permits (CUPs) for projects requiring both an ERP and a CUP that involve irrigation of urban landscapes, golf courses, or recreation areas; and (2) to further limit and manage water consumption as may be appropriate.	AMC, SJRWMD, LG, NGCOs	Once
B. Support planned effort to evaluate and update existing Minimum Flows and Levels (MFLs) of the Wekiva River. Identify whether there is a need for additional MFLs or revisions to existing MFLs to adequately protect the Wekiva River System.	High	
Actions	Responsibility	Duration
i. Request an identification (including a MFL map) of and status report on all MFLs within the Wekiva River basin.	AMC, SJRWMD, LG, NGCOs	Once
ii. Review and comment on the existing MFLs, proposed MFLs, and the St. Johns River Water Management District's MFL Priority List and Schedule.	AMC, SJRWMD, LG, NGCOs	Ongoing
iii. Pursue the adoption of new MFLs or the revision of existing MFLs as appropriate based on (ii).	AMC, SJRWMD, LG, NGCOs	Ongoing
Objective	Priority	
C. Evaluate the protection of Outstandingly Remarkable Values that may be affected by flows and water levels of the Wekiva River System; determine whether additional protection is required, and if so whether such protection may be achieved by refinement of MFLs, by a federal water reservation pursuant to Section 13(c) of the Wild and Scenic Rivers Act, by a water management district water reservation pursuant to Section 373.223(4), Florida Statutes, or by other processes.	High	
Actions	Responsibility	Duration
i. Determine if existing flow and water level protection measures adequately protect the Outstandingly Remarkable Values of the Wekiva River System.	AMC, SJRWMD, NPS, NGCOs	Once
ii. If additional protection is needed, determine whether that protection can be best achieved by refinement of MFLs, by a federal water reservation pursuant to Section 13(c) of the Wild and Scenic Rivers Act, by a water management district water reservation pursuant to Section 373.223(4), Florida Statutes, or by other processes.	AMC, SJRWMD, NPS, NGCOs	Once
iii. Work with the SJRWMD and the National Park Service to take the most appropriate action based on (ii).	AMC, SJRWMD, NPS, NGCOs	Once
Objective	Priority	
D. Evaluate existing SJRWMD Environmental Resource Permit (ERP) and Consumptive Use Permit (CUP) rules and current enforcement methods that pertain to residential, commercial, industrial, and agricultural water use and landscaping to identify opportunities for additional water conservation.	High	

Actions	Responsibility	Duration
i. Evaluate existing ERP and CUP rules and request a presentation from the SJRWMD on existing rules and methodology for permit review.	AMC, SJRWMD	Once
ii. Compare the SJRWMD rules to local ordinances.	AMC, SJRWMD, LG	Once
iii. Assess water conservation enforcement programs and resources of local governments and the SJRWMD.	AMC, SJRWMD, LG	Ongoing
iv. Identify opportunities for improving efficiency and water conservation, such as limiting turf grass, requiring Florida-friendly landscaping, use of dry retention, preserving non-irrigated open space to reduce water consumption and promote aquifer recharge, and use of water-efficient fixtures/appliances for new construction.	AMC, SJRWMD, LG	Ongoing
v. Revise SJRWMD rules and local regulations as appropriate based on (iv).	AMC, SJRWMD, LG	Ongoing
Objective	Priority	
E. Work with the SJRWMD to evaluate and as appropriate strengthen regulations and incentive programs to conserve water within the Wekiva basin and springshed, including but not limited to those addressing water allocation, water consumption, water billing rate structures, irrigation, and lawn or landscaping practices. Work with local governments to evaluate and as appropriate strengthen regulations and incentive programs to conserve water within the Wekiva basin and springshed, including but not limited to those addressing plumbing codes, installation of irrigation systems, lawn and landscaping ordinances, and water billing rates.	High	
Actions	Responsibility	Duration
i. In light of results of Objective 2D, determine the need for revisions to regulations of the SJRWMD to improve water conservation; revise regulations as appropriate.	AMC, SJRWMD, LG, LG Utilities	Once
ii. Revise local government regulations as appropriate.	AMC, SJRWMD, LG, LG Utilities	Ongoing
iii. Work with agencies and local governments to establish incentive programs to reduce turf grass area, promote landscaping that does not require intense irrigation, and promote other means of water conservation.	AMC, SJRWMD, LG, LG Utilities	Ongoing
Objective	Priority	
F. Promote the efficient use of reclaimed water within the Wekiva basin and springshed. Evaluate whether the use of reclaimed water has an adverse impact on Outstandingly Remarkable Values that may be affected by flows and water levels of the Wekiva River System. Evaluate whether transports of water outside of the Wekiva basin and springshed have an adverse impact on Outstandingly Remarkable Values that may be affected by flows and water levels of the Wekiva River System.	Medium	
Actions	Responsibility	Duration

i.	Request information from the Florida Department of Environmental Protection or local wastewater treatment utilities regarding existing reclaimed water programs and plans for expansion.	AMC, FDEP, SJRWMD, LG Utilities	Once
ii.	Evaluate whether the use of reclaimed water (including reclaimed water supplies supplemented with groundwater or surface water) can have an adverse impact on ORVs that may be affected by flows and water levels.	AMC, FDEP, SJRWMD	Once
iii.	Revise strategies and plans for the use of reclaimed water as necessary based on (i) and (ii), and promote the use of reclaimed water only where appropriate.	AMC, FDEP, SJRWMD, LG Utilities	Ongoing
iv.	Study whether transports of water outside of the Wekiva basin and springshed can have an adverse impact on ORVs that may be affected by flows and water levels.	AMC, SJRWMD	Once
v.	Revise strategies and plans for the transport of water as necessary based on (iv).	AMC, SJRWMD	Ongoing
Objective		Priority	
G. Encourage compliance with Best Management Practices for irrigation by nursery, landscaping, and agricultural businesses.		Medium	
Actions		Responsibility	Duration
i.	Request information on the results of Best Management Practices compliance surveys from the Florida Department of Agriculture and Consumer Services.	AMC, FDACS, LG	Once
ii.	Request information from the St. Johns River Water Management District regarding compliance with consumptive use permit requirements and permitted withdrawal amounts.	AMC, SJRWMD, LG	Once
iii.	Based on (i) and (ii), determine whether additional action is needed to protect groundwater volume and achieve compliance with Best Management Practices and Consumptive Use Permits.	AMC, FDACS, SJRWMD, LG	Ongoing
Objective		Priority	
H. Work with local governments, agencies, and the private sector to encourage a more water-conscious form of development within the Wekiva basin and springshed.		High	
Actions		Responsibility	Duration
i.	Promote Low Impact Development workshops, such as those offered by the Program on Resource Efficient Communities (University of Florida); arrange for workshops to be offered in the Wekiva area.	AMC, LG, FDEP, SJRWMD, NGCOs	Ongoing
ii.	Coordinate with local governments, agencies, and the private sector to encourage a more water-conscious form of development using techniques identified in Objective 2D (iv).	AMC, LG, FDEP, SJRWMD	Ongoing

5. Public Education and Outreach

5.1. Assessment

A coordinated widespread education and outreach effort is required to deliver a strategically crafted message that raises awareness about the need for sustainable behaviors to protect the Wekiva River System.



Efforts that exist at this time include the following:

- Interpretive signs or kiosks at Wekiwa Springs State Park, Lower Wekiva River Preserve State Park, Rock Springs Run State Reserve, Seminole State Forest, and near the spring and at Kelly Park
- The museum at Wekiwa Springs State Park
- The annual Wekiva River Festival
- The annual Florida Black Bear Festival
- The Wekiva Promise, a program to promote personal stewardship and educate the public about responsible behavior protective of water resources such as water conservation, water-wise landscaping, fertilizer use, and maintenance of septic systems (The Wekiva Promise initiative was developed by Aquatic Preserve staff and the Rotary Club of South Seminole County in partnership with Friends of the Wekiva River.)
- Programs, talks or tours offered by private organizations such as Friends of the Wekiva River, local Audubon chapters, Sierra Club, Native Plant Society, and Florida Trekkers, Wekiva Wilderness Trust, and South Seminole Rotary (Wekiva Promise)
- Programs, talks, or tours offered by or with support of public agencies such as the Wekiva River Aquatic Preserve (including efforts of the Wekiva Wild and Scenic River Ambassador); the Seminole Education, Restoration and Volunteer (SERV) program; the Seminole County Natural Lands program; the Orange County Green PLACE program; the Lake County Park Ranger program; and the Lake County Water Authority (including its Preserve Pals program)
- Occasional media stories generated by events or issues such as the Wekiva River Festival, the Wekiva Parkway or proposed development
- Materials published or posted on the websites of public agencies, private businesses, conservation organizations, and outdoor recreation organizations

Events such as the annual Wekiva River Festival are successful and attract a large number of people. The festival is an opportunity to both reinforce the message of stewardship among supporters and provide additional learning for those less familiar with the river system.

Numerous opportunities exist for additional education and outreach efforts, including but not limited to the following:

- A more concerted effort to encourage the media to run regular features on different aspects of Wekiva River System and its protection. This option might include “media days” organized to inform media representatives of the river system and associated issues.
- A more concerted effort to attract the attention of school teachers and private organizations involving outreach efforts such as tours, field trips and other educational activities for school children and adults.
- Consistent and effective displays on public conservation lands and at parks that describe the connection between these places and the Wekiva River System and the National Wild and Scenic Rivers program.
- Consistent and effective signage on the Wekiva River System, including at all boat ramps and canoe/kayak access points that promote the river system as part of the National Wild and Scenic Rivers program.
- More interpretive displays at parks within the Wekiva basin, including but not limited to Wekiwa Springs, Lower Wekiva River State Park, Seminole State Forest, Rock Springs Run Preserve, Lake Norris and Kelly Park, that describe the Wekiva River System and natural resources of the area, and that explains the link between the spring-fed river system, and household water use.
- A clear and simple indication of the National Wild and Scenic River status on all signs, educational publications, and other informative material produced by organizations that use the river system.
- An effort to use the principles of Community Based Social Marketing in the design of community education material on the Wekiva River System and its stewardship.
- Concerted and consistent cooperative educational efforts by all parties associated with management of the river system so that their resources and expertise can be pooled for greater effectiveness.
- Expansion of river cleanups and invasive plant removal activities with a focus on volunteer participation, and potential incorporation of these activities into school programs or extra-curricular programs.
- Participation in local Cooperative Invasive Species Management Area groups to foster partnerships and information exchange.
- Efforts to educate and work with landscape designers and developers to achieve more environmentally responsible development with a focus on habitat preservation, clustering, use of native vegetation, limiting turf grass, and water wise practices.

5.2. Management

5.2.1. Goals and Objectives

The following objectives are prioritized in the Action Program. An effort to implement one or more of these objectives may be part of a program already in place.

It should be noted that the objectives and actions in Goal 2 below are organized according to the target audience. Several objectives and actions associated with outstandingly remarkable values identified in the previous chapter also relate to public education and outreach. Those are included here as well, but in abbreviated form. Refer to the previous chapter for a more detailed description of those actions.

Public Education and Outreach – Goal 1:

Pursue a “branding initiative” to foster an identity for the Wekiva River System that reflects its designation as part of the National Wild and Scenic Rivers program.

Objectives

- A. Design and post signs incorporating the National Wild and Scenic River logo at all access points, resting areas, and bridges within the Wekiva River System and where roads enter the Wekiva basin.
- B. Include information about the National Wild and Scenic River designation and its role in protecting values of the Wekiva River System in all forms of public education and outreach.

Public Education and Outreach – Goal 2:

Pursue outreach efforts to educate target audiences about the Wekiva River System, importance of its Outstandingly Remarkable Values, and stewardship.

Objectives

- A. Develop programs, flyers, and display material for recreational users of the Wekiva River System such as boaters, paddlers, anglers, hikers, campers, and concessionaires in order to educate them about the river system, provide regulations and guidelines relating to recreational use, encourage behavior protective of the river system, and promote etiquette for sharing the resource with others.
- B. Develop outreach programs and publications to educate landowners, residents and businesses within the Wekiva basin and springshed about the Wekiva River System and responsible practices relating to land management, wildlife, and water resources.

- C. Develop programs for school children that incorporate a variety of techniques including classroom presentations, field trips, archeological samples, “biofacts”, and hands-on activities.
- D. Develop techniques to educate and mentor volunteers in stewardship of the Wekiva River System, including activities such as clean-ups, restoration activities, and outreach work.
- E. Develop programs and material for planners, developers, and landscape designers, as well as professionals involved in lawn and landscape maintenance, regarding environmentally sustainable techniques and water-wise practices.
- F. Communicate with elected leaders, agency heads, and decision-makers at the federal, state, and local level about the importance of the Wekiva River System, its Outstandingly Remarkable Values, and support needed to ensure their protection.
- G. Work with various media including television, radio, and newspaper to educate the public about the Wekiva River System, its Outstandingly Remarkable Values, and issues affecting their protection.



5.2.2. Action Program

Key to the Action Program Table:

- Priority – Priority of the Objective is High, Medium, or Low
- Responsibility – A list of acronyms is provided at the beginning of the plan
- Duration – Duration of the Action is either Once (discreet action) or Ongoing (continuous action)

NOTE: The ability to carry out these activities will be dependent on the availability of funds and participant priorities.

Public Education and Outreach – Goal 1: Pursue a “branding initiative” to foster an identity for the Wekiva River System that reflects its designation as part of the National Wild and Scenic Rivers program.		
Objective	Priority	
A. Design and post signs incorporating the National Wild and Scenic River logo at all access points, resting areas, and bridges within the Wekiva River System and where roads enter the Wekiva basin.	High	
Actions	Responsibility	Duration
i. Design new unified signage incorporating the National Wild and Scenic River logo.	AMC	Once
ii. Seek endorsements for the design of new signs from agencies and local governments within the Wekiva basin.	AMC, FDOT, LG,	Once
iii. Assess signs currently in place and determine if and how they can be incorporated into the unified signage structure.	AMC, FDOT, LG	Once
iv. Post and maintain signs with the National Wild and Scenic River logo at all access points, resting areas, and bridges within the Wekiva River System and where roads enter the Wekiva basin.	AMC, FDOT, LG	Ongoing
Objective	Priority	
B. Include information about the National Wild and Scenic River designation and its role in protecting values of the Wekiva River System in all forms of public education and outreach.	High	
Actions	Responsibility	Duration
i. Incorporate information about the National Wild and Scenic River designation and its role in protecting values of the Wekiva River System into all forms of public education and outreach described in Goal 2. (See Goal 2, Objectives A through G.)	AMC, others	Ongoing

ii. Incorporate the wild and scenic logo into presentations, publications, flyers, displays, and other visual media relating to the Wekiva River System produced by or for the National Park Service.	AMC, others	Ongoing
Public Education and Outreach – Goal 2: Pursue outreach efforts to educate target audiences about the Wekiva River System, importance of its Outstandingly Remarkable Values, and stewardship.		
Objective	Priority	
A. Develop programs, flyers, and display material for recreational users of the Wekiva River System such as boaters, paddlers, anglers, hikers, campers, and concessionaires in order to educate them about the river system, provide regulations and guidelines relating to recreational use, encourage behavior protective of the river system, and promote etiquette for sharing the resource with others.	Medium	
Actions	Responsibility	Duration
i. Develop flyers, displays, or other material that describe regulations and guidelines relating to recreational use of the river system, and identify the location of appropriate resting, picnic and camping facilities, and appropriate put-in and pull-out areas.	AMC, FPS, FFS	Once
ii. Develop flyers, displays, or other material to educate recreational users about aspects of the Wekiva River System and its values that they may experience.	AMC, FPS, FFS, NGCOs	Once
iii. Develop flyers, displays, or other material relating to appropriate behavior and etiquette, addressing issues such as shoreline protection, wake control, litter, and interaction with wildlife.	AMC, CAMA, FPS, FFS	Once
iv. Design signs or kiosks for public swimming areas of the Wekiva River System to describe the relationship between decisions people make that affect water resources (for example relating to conservation, nutrient loading, and pollution) and the quantity and quality of water in the river system.	AMC, CAMA, FPS	Once
v. Develop flyers, displays or other material about historic and cultural resources that could be encountered by recreational users (such as midens), and appropriate behavior to ensure their protection.	AMC, CAMA, FPS, FFS, FDHR	Once
vi. Provide material to concessionaires to educate their customers about appropriate use of the river system; if necessary communicate with concessionaires to ensure that their activities are protective.	AMC, CAMA, FPS,	Once
vii. Pursue special events that encourage people to directly experience and learn about the Wekiva River System, such as the Wekiva River Festival.	AMC, CAMA, FPS, FOWR, NGCOs	Ongoing

viii. Consider educational programs for frequent visitors of the Wekiva basin parks and river system so that they can learn more about the Wekiva River System, become better stewards of the environmental and share their knowledge with others.	AMC, CAMA, FPS	Ongoing
Objective	Priority	
B. Develop outreach programs and publications to educate landowners, residents and businesses within the Wekiva basin and springshed about the Wekiva River System and responsible practices relating to land management, wildlife, and water resources.	Medium	
Actions	Responsibility	Duration
i. Continue to support the Wekiva Promise, an educational initiative and pledge that encourage residents and businesses in the basin and springshed to protect water resources, addressing issues including water conservation, fertilizer/pesticide use, and septic system maintenance; organize programs for residents, homeowner associations, and business in coordination with this effort.	AMC, CAMA, FOWR, Rotary, NGCOs	Ongoing
ii. Organize programs and written material for landowners, residents, homeowner organizations relating to responsible stewardship of wildlife and habitat in the Wekiva basin, focusing on areas adjacent to or near public lands; topics to address should include but are not limited to land preservation, “backyard habitats”, invasive plants, animal feeding, safety of people and wildlife, noise/light intrusion, and garbage disposal.	AMC, CAMA, FPS, FFS, FWC, FOWR, LCWA, NGCOs	Ongoing
iii. Establish a targeted campaign to educate landowners, residents and businesses in problem areas about practices to reduce human-bear conflicts; issues to address should include the accidental or purposeful illegal feeding of bears, the use of bear-proof trash containers, and responsible disposal of garbage.	AMC, FWC, NGCOs	Ongoing
iv. Pursue communication strategies and distribute information to landowners, residents, and businesses that explain the importance of prescribed fire to maintain healthy ecosystems and reduce the risk of destructive wildfires.	AMC, FPS, FFS	Ongoing
v. Pursue a communication strategy for agricultural operations and nurseries, developing and distributing material as appropriate relating to water conservation, water reclamation, and fertilizer/pesticide use.	AMC, FDACS	Ongoing
vi. Develop educational material regarding historic and cultural resources of the basin, and incorporate into programs as appropriate.	AMC, FDHR, NGCOs	Ongoing
Objective	Priority	
C. Develop programs for school children that incorporate a variety of techniques including classroom presentations, field trips, archeological samples, biological samples, and hands-on activities.	Medium	
Actions	Responsibility	Duration

i. Work with educators to develop a curriculum for teaching about the Wekiva River System in the classroom.	AMC, NGCOs	Once
ii. Organize visits to schools by volunteers or agency staff to provide more information about the Wekiva River System, using various learning tools such as archeological and biological samples.	AMC, NGCOs	Ongoing
iii. Organize special field trips for children to experience the sights and sounds of the Wekiva River System and basin ecology first-hand.	AMC, NGCOs	Ongoing
iv. Provide extra-curricular opportunities for students to assist in stewardship activities, such as river cleanups and restoration.	AMC, NGCOs	Ongoing
Objective	Priority	
D. Develop techniques to educate and mentor volunteers in stewardship of the Wekiva River System, including activities such as clean-ups, restoration activities, and outreach work.	Medium	
Actions	Responsibility	Duration
i. Work with Aquatic Preserve and other agencies to develop educational messages about the Wekiva River System into volunteer activities such as river clean-ups and restoration.	AMC, CAMA, FPS, LCWA, LG, FOWR, NGCOs	Ongoing
ii. Integrate student activities with the above as appropriate. See objective C, action (iv) above.	AMC, CAMA, FPS, LCWA, LG, NGCOs	Ongoing
iii. Consider and if feasible develop a “docent program” capable of producing volunteers to further educate the public and target audiences about the Wekiva River System and its values.	AMC, NGCOs	Ongoing
Objective	Priority	
E. Develop programs and material for planners, developers, and landscape designers, as well as professionals involved in lawn and landscape maintenance, regarding environmentally sustainable techniques and water-wise practices.	Medium	
Actions	Responsibility	Duration
i. Promote Low Impact Development workshops, such as those offered by the Program on Resource Efficient Communities (University of Florida); arrange for workshops in the Wekiva area.	AMC, SJRWMD, LG, NGCOs	Ongoing
ii. Create an annual workshop on springsheds and strategies for springshed protection; consider content of programs such as “Welcome to Your Watershed” by The Nature Conservancy and “Know your Watershed” by Orange County (2001).	AMC, SJRWMD, LG, NGCOs	Ongoing

iii. Host workshops on sustainable open space design, such as those offered by Greener Prospects (R. Arendt); arrange for workshops in the Wekiva area.	AMC, LG, NGCOs	Ongoing
iv. Develop a communication program and/or workshops for landscaping professionals and public employees whose work involves lawns and landscaping to address appropriate plant selection, irrigation practices, and fertilizer application to limit water use and nutrient loading; include explanation of how reuse water can reduce the need for fertilizer.	AMC, SJRWMD, LG, NGCOs	Ongoing
v. Coordinate with the FDHR to develop a communication program and/or workshops relating to the identification and appropriate protection of historic and cultural resources when property is developed.	AMC, LG, FDHR, NGCOs	Ongoing
Objective	Priority	
F. Communicate with elected leaders, agency heads, and decision-makers at the federal, state, and local level about the importance of the Wekiva River System, its Outstandingly Remarkable Values, and support needed to ensure their protection.	High	
Actions	Responsibility	Duration
i. Develop effective relationships with elected leaders, agency heads, and decision-makers through proactive communication about the Wekiva River System, its values, and support needed to ensure their protection.	AMC, NGCOs	Ongoing
ii. Maintain communication on a regular basis, focusing not only on problems, but also opportunities to promote stewardship and awareness.	AMC, NGCOs	Ongoing
iii. Develop succinct material providing an overview of the Wekiva River System and its values for individuals unfamiliar with the resource, such as newly elected or appointed officials.	AMC, NGCOs	Once
Objective	Priority	
G. Work with various media including television, radio, and newspaper to educate the public about the Wekiva River System, its Outstandingly Remarkable Values, and issues affecting their protection.	Medium	
Actions	Responsibility	Duration
i. Develop effective relationships with local media representatives.	AMC, NGCOs	Ongoing
ii. Encourage media contacts to produce and publish segments on the Wekiva River System covering issues, events, successes, and challenges.	AMC, NGCOs	Ongoing

6. Plan Implementation

This plan has been written to guide the future management of the Wekiva National Wild and Scenic River System. Interagency cooperation with the advisory management committee will be needed to produce coordinated and targeted efforts to implement this plan. The following scheme for plan implantation is recommended.

The Wekiva River System Advisory Management Committee (AMC) was established according to National Park Service rules and the Federal Advisory Committee Act to be responsible for overseeing the development of this comprehensive management plan. This committee should continue to operate and oversee plan implementation. The Wekiva River Basin Working Group (WBWG), which has met for at least 15 years, should consider taking on a supporting role in the implementation of this plan. Many key members of the AMC currently serve on the working group, whose mission is to encourage interagency coordination within the Wekiva basin. Implementing this management plan would fit well with this mission. It may be advantageous for the AMC and the working group to hold occasional joint meetings.

Recommended Committee Structure for Plan Implementation

The Wekiva River System Comprehensive Management Plan is based upon the identification of five outstandingly remarkable values, as well as the need to implement a public education campaign. It is recommended that a separate subcommittee be formed for each value, and that subcommittees coordinate to integrate education and outreach into their collective efforts. Additional subcommittees may be created as needed. The subcommittees should consist of people who have special expertise on each value. It is recommended that each subcommittee contain up to ten people. Subcommittee members may or may not be members of the AMC; however, at least one member of the Committee should serve on each subcommittee (preferably as its chair initially). The remaining subcommittee members should be invited to participate based upon their expertise, willingness to share their work and talent, and enthusiasm to see the management plan implemented. It is hoped that professional members of the subcommittees will be supported in their service by the organizations for which they work, particularly if they are employed by organizations involved in the plan's implementation. The subcommittees should report their progress to the AMC at each of its meetings and make recommendations for action to be taken in order to implement the plan. The AMC should, in turn, provide guidance for the work of the subcommittees. AMC members who represent government agencies should regularly brief the agency that they represent, in order to keep information about implementation of this plan on "the front burner."

Interagency Cooperation

Interagency cooperation will be important to implement this plan successfully. Many actions will require more than one agency to work together and will require increased cooperation in the future. It is recognized that there is already considerable interagency cooperation occurring among the various government agencies that work within the Wekiva basin. This is largely because of the coordinated efforts of the Wekiva River Basin Working Group over many years.

A critical step to achieve interagency cooperation will be securing the support of state, county and municipal agencies that have jurisdiction in the Wekiva basin. An important component of this will be obtaining official endorsements for this plan from both local government entities and

state agencies. Endorsements are important tools to assist with the effort to secure funding for needed actions. It is hoped that members of the AMC will make it a high priority to brief their respective agencies and local government representatives on contents of the plan. Support must be ongoing, so members of the AMC will need to continue to brief their respective agencies and local governments to maintain momentum for plan implementation. Cooperation within the Wekiva basin is already strong, so this should facilitate a smooth transition into the implementation of this plan.

Each agency and local government that has jurisdiction to manage public lands within the Wekiva basin has its own mission and may produce a separate management plan based upon its own internal guidelines and management planning. Implementation of the approved Wekiva River System Comprehensive Management Plan will be facilitated if each management plan of agencies and local governments is reviewed to ensure compatibility with this plan. Most agency management plans receive periodic updates. It is recommended that particular attention be paid to the Wekiva River System Comprehensive Management Plan and associated Environmental Assessment produced by the NPS during any updates to ensure compatibility. A written section on interagency cooperation should be a regular part of all plan updates. Additionally, it is recommended that all agencies compare staffing structures for any overlaps or deficiencies to optimize staff resources.

Funding

Funds to implement the management plan can be sought from a variety of sources. These are briefly described below.

1. **State and Local Government Agencies:** These are the agencies involved with implementation of the plan and that have representatives on the Advisory Management Committee. Funding from state and local government agencies is very appropriate if the plan calls for actions that are similar to those either planned or already being implemented by one of these agencies. In kind services from specialized offices within these agencies should also be considered for specific actions.
2. **National Park Service:** The National Park Service has funds available for Wild and Scenic River management. These funds are disbursed annually on a competitive basis. A portion of the funds available are allotted to each NPS region and then disbursed to eligible rivers within each region based on need. Congressional funding levels, including earmarks for particular rivers, are subject to change. The Advisory Management Committee will therefore need to be engaged in this procurement process to acquire funding desired to implement the plan.
3. **Additional Funding Sources:** There are additional sources available to fund actions on a wild and scenic river although they may not be specifically allocated to this purpose. These funds are typically applied for on a case by case basis and may need matching monies to be awarded. Other funding sources include federal and state agency specialized program funds, such as for exotic plant management, and those from private foundations.

Securing necessary funding to implement the plan is an important task of the Advisory Management Committee. Committee members will need to encourage inclusion of important Wekiva projects in the annual budgeting processes of their own organizations as well as stay alert to additional funding opportunities that might become available. Other partnership Wild and Scenic Rivers have been successful in leveraging scarce resources to implement their respective river management plans. By leveraging funds from local, state, and federal governments, as well as the private sector, a level of river management is attainable that would not be possible with NPS-only support. (Examples of funding support for partnership wild and scenic rivers can be found at <http://www.nps.gov/nero/rivers/riversfunding.htm>).



7. References

The following references apply to both the Wekiva Wild and Scenic River System Management Plan and NPS Environmental Assessment, which contributed to this document. In addition, information contributing to this plan and the associated Environmental Assessment was obtained through communication with several individuals, including the following:

Joe Bishop, Forest Supervisor II, Seminole State Forest
 Mary Brabham, Basin Program Manager, St Johns River Water Management District
 Patricia Burgos, Environmental Program Manager, Lake County Water Authority
 Nancy Christman, Intergovernmental Coordinator, St Johns River Water Management District
 Lester Dillard, Graduate student, University of Central Florida, Orlando, Florida
 Jaime Doubek-Racine, National Park Service
 John Fillyaw, Manager, Florida Department of Environmental Protection,
 Wekiwa Springs State Park
 Kelly Gestring, Biologist, Florida Fish and Wildlife Conservation Commission
 Amy Giannotti, Regional Biologist, Florida Department of Environmental Protection,
 Bureau of Invasive Plant Management
 Melissa Gibbs, Professor, Stetson University, Orlando, Florida
 Beth Jackson, Environmental Program Supervisor, Orange County
 Paul Lammardo, Biologist, Florida Department of Environmental Protection,
 Wekiva River Aquatic Preserve
 Robert Mattson, Environmental Scientist, St Johns River Water Management District
 Kathryn Mennella, General Counsel, St Johns River Water Management District
 David Murray, Biologist, Florida Department of Environmental Protection,
 Wekiva River Aquatic Preserve
 Warren Poplin, Manager, Florida Department of Environmental Protection,
 Wekiwa Springs State Park (successor to J. Fillyaw)
 Keith Schue, Ocala-Wekiva Conservation Project Coordinator, The Nature Conservancy
 Deborah Shelley, Manager, Florida Department of Environmental Protection,
 Wekiva River Aquatic Preserve
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 Nathalie Visscher, Regional Biologist, Florida Fish and Wildlife Conservation Commission,
 Invasive Plant Management Section
 Gregg Walker, Biologist, Florida Department of Environmental Protection,
 Wekiva Basin State Parks

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8. Appendices

Appendix A. Applicable Federal and State Laws and Policies

Note: The following is a list of several applicable federal and state laws and policies, but does not constitute all applicable laws and policies. Local government policies and regulations are not listed. (Refer to the comprehensive plans and land development regulations of each local government for this information.)

Federal Policy/Regulations	Entity	Resource Protected	Type of Protection
Rivers and Harbors Act, 1899 Sections 9 and 10	USACE	Water and Wetlands	Prohibits unauthorized construction in or over navigable waters of the U. S. This includes construction of piers, docks, boat hoists, boat ramps, etc.
Clean Water Act, 1972 Amended 1977 Section 404 (33 CRF Parts 320-330) NPDES Permit Wastewater, Stormwater (40CFR Parts 122,123,124)	USACE EPA	Water and Wetlands	Controls discharge of dredged or fill material into waters of the U.S. Establishes permit requirements for wastewater treatment plants. Directs states to develop Total Maximum Daily Loads(TMDLs)
Fish and Wildlife Coordination Act of 1956	USACE	Water and Wetlands	Requires USACE to coordinate permit applications with state and federal fish and wildlife agencies.
Wild and Scenic Rivers Act, 1968 P.L. 90-542, as amended, 16 U.S.C. 1271-1287 Amended through H.R. 2773, 2000	BLM USFWS NPS USFS	Rivers and Watersheds	Establishes the process of how rivers are chosen, studied and considered protected for their natural, cultural and recreational values. Prohibits dams and other federally assisted water resources projects from affecting the river, ensures water quality standards are met and requires the creation of a comprehensive management plan that addresses resource protection, development, user capacities and other management practices. Amendment gives specific boundaries and the designation of the inclusion of the Wekiva River and its tributaries of Wekiva Springs Run, Rock Springs Run and the Black Water Creek as part of the national wild and scenic rivers system. It also mandates the advisory management committee and the composition thereof.
Archaeological and Historical Preservation and Protections Acts, 1974 PL 74-292; 16 U. S. C. 461 <i>et seq</i> PL 93-291; 16 U. S. C. 469 PL 89-665; 16 U. S. C. 470 PL 96-95 ; 16 U. S. C. 470aa-11	Dept. of Interior	Archeological and Historic	Establishes policy, programs, rules, and regulations regarding the preservation and protection of archeological and historic resources. Establishes civil and criminal penalties for unlawful excavation and removal. Requires permits for excavation and removal.

Federal Policy/Regulations	Entity	Resource Protected	Type of Protection
Endangered Species Act of 1973 PL93-205; 16 U. S. C. 1531 <i>et seq</i>	USFWS/ NMFS	Species and Habitat	Protects marine and non-marine endangered and threatened species and the critical habitat on which they depend.
Executive Order of 1979, Creation of Federal Emergency Management Agency (FEMA)	FEMA	Floodplain	Provides flood insurance and provides guidance on building codes and floodplain management
National Environmental Protection/Policy Act (NEPA), 1970 PL 91-190; 42 U. S. C. 4321-4370d	CEQ	Land, Water, Natural Resources	Requires federal agencies to prepare reports including an Environmental Impact Statement (EIS) for all major federal actions significantly affecting the quality of the human environment. An Environmental Assessment (EA) may be performed first with recommendations for either Findings of No Significant Impact (FONSI) or that an EIS is necessary.

State of Florida Policy/Regulations	Entity	Resource Protected	Type of Protection
Florida Aquatic Preserves Act, 1975 (Part II, Ch. 258, F.S.; Ch. 18-20, F.A.C.)	FDEP	Water	Establishes intent of the state aquatic preserve system and guidelines for administration and management of the preserves. Addresses the need to manage cumulative impacts within and surrounding the preserve, protection of indigenous life forms from sale or commercial use and the need for resource inventories and management plans for each preserve.
Wekiva River Protection Act, 1988 (Part II, Ch. 369.301-369.309, F.S.)	FDCA, FDEP, SJRWMD, ECFRPC, Local Government	Land, Water, Natural Resources	Defines the Wekiva River Protection Area. Requires that Orange, Lake, and Seminole Counties revise comprehensive plans and land development regulations to protect water quality and quantity, wetlands, aquatic and wetland dependent species, habitat of listed species, and native vegetation in the Wekiva River Protection Area. Requires that comprehensive plans ensure preservation of sufficient habitat to maintain viable populations of listed species, restrict clearing of native vegetation in the 100-year floodplain, prohibit development that is not low-density residential in nature unless that development has less impact on natural resources, provide setbacks along the Wekiva River not within established protection zones, restrict intensity of development adjacent to publicly owned lands to prevent adverse impacts, restrict filling and alteration of wetlands, encourage clustering to protect environmentally sensitive areas, and ensure that development in the aggregate is of rural density and character. Requires that density or intensity on parcels adjacent to the Wekiva River System be concentrated away from surface waters and wetlands, and prohibits such parcels from being subdivided to interfere with the implementation of this policy, protection zones, and applicable setbacks. Requires restrictions on septic tanks and drainfields in the 100-year floodplain and stormwater discharges to the Wekiva River System. Requires implementing land development regulations, and provides oversight by DCA. Reduces numerical thresholds by 50% for developments of regional impact located entirely or partially in the Wekiva River Protection Area, and requires that the ECFRPC adopt policies supporting purposes of the Act. Prohibits the operation of airboats on the Wekiva River System, except in emergencies or by government staff on official business. Declares the Wekiva River Protection Area to be a natural resource of state and regional importance, and directs FDEP to negotiate for acquisition of conservation and recreation lands.

State of Florida Policy/Regulations	Entity	Resource Protected	Type of Protection
<p>Wekiva Parkway and Protection Act, 2004 (Part III, Ch. 369.314-369.324, F.S.)</p>	<p>FDCA, FDEP, SJRWMD, FDOH, FDACS ECFRPC Local Government</p>	<p>Land, Water, Natural Resources</p>	<p>Defines the Wekiva Study Area, containing the Wekiva drainage basin and much of the Wekiva springshed. Authorizes the Wekiva Parkway, providing guiding principles for design and limiting the number of interchanges. Identifies priority properties near the parkway for protection by purchase or easement, and authorizes the Orlando-Orange County Expressway Authority to act as a third-party agent. Requires that various agencies including DEP, SJRWMD, DOH and DACS study and as appropriate initiate rule-making to reduce nitrogen loading and ensure aquifer recharge (involving consideration of pollutant load reduction goals and minimum flows and levels, onsite wastewater disposal systems, septic tank inspection, recharge criteria for development, CUP thresholds, consolidated CUP/ERP permitting, and best management practices). Requires that local governments establish master stormwater management plans, wastewater facility plans, and water reuse programs. Requires that local governments amend comprehensive plans to include the Wekiva Parkway and interchange land use plans, implement the stormwater master plan, and establish land use strategies to optimize open space and promote development patterns protective of recharge areas, karst features, and sensitive natural habitats (involving strategies such as coordinated greenway plans, conservation easements, land acquisition, clustering, density credits and incentives to permanently protect open space, and low to very low density development). Provides oversight by DCA, and requires adoption of implementing land development regulations. Creates the Wekiva River Basin Commission to monitor and ensure implementation. (Amendment in 2005 clarifies that local governments located partially within the Wekiva Study Area are only responsible for master stormwater plans and wastewater facility plans for the portion of their jurisdictions that are in the Wekiva Study Area.)</p>
<p>Outstanding Florida Water (OFW), 1979 (Ch. 62-302.700, F.A.C.; pursuant to Ch. 403.061, F.S.)</p>	<p>ERC & FDEP, SJRWMD</p>	<p>Water</p>	<p>Generally prohibits permitting of direct discharges to an OFW that would lower existing water quality, or permitting of indirect discharges that would significantly degrade a nearby OFW. Discharges or other activities, such as dredging and filling within a wetland or surface water, must be “clearly in the public’s interest”. Establishes a process for designating Outstanding Florida Waters (OFW) worthy of special protection with more protective standards. The Wekiva River System (state designation) was granted “special waters” designation in 1988.)</p>
<p>Surface Water Quality Standards (Rule 62-302. 400, F.A.C.)</p>	<p>FDEP</p>	<p>Water</p>	<p>Establishes surface water classifications for specific uses and corresponding water quality standards.</p>
<p>Consumptive Use of Water (Ch. 40C-2, 40C-20, 20C-22, F.A.C.; pursuant to Part II, Ch. 373, F.S.)</p>	<p>SJRWMD</p>	<p>Water</p>	<p>Requires permits and establishes standards and criteria for the use of ground and surface water. These standards and criteria address: need; efficiency; water conservation; use of lower quality sources; water quality; protection wetlands, lakes, rivers, and springs; minimum flows and levels; protection of existing legal users; and consistency with the public interest.</p>

State of Florida Policy/Regulations	Entity	Resource Protected	Type of Protection
Management and Storage of Surface Waters, Environmental Resource Permits (Ch. 40C-4, 40C-40, 40C-41, 40C-42, 40C-400, F.A.C.; pursuant to Part IV, Ch. 373, F.S.)	FDEP, SJRWMD	Land, Water, Natural Resources	Requires permits and establishes permit review standards and criteria for the construction and operation of surface water management systems (includes most development activity). These standards/criteria address water quantity, flood protection, water quality, including stormwater management, and environmental criteria (direct wetlands/surface water impacts; secondary impacts, cumulative impacts, minimum flows and levels. Establishes additional surface water management basin standards and criteria for the Wekiva River Hydrologic Basin and Recharge Protection Basin to protect water quantity and quality, including the protection of Most Effective Recharge Areas; designates a Riparian Habitat Protection Zone for the protection of riparian wildlife habitat, that includes: the wetlands abutting the Wekiva River, Little Wekiva River downstream of Maitland Blvd., Rock Springs Run, Black Water Creek, Sulpher Run or Seminole Creek, the uplands which are within 50 feet landward of the landward extent of these areas, the uplands that are within 550 feet landward of the stream's edge defined as the waterward extent of the forested wetlands abutting the Wekiva River, Little Wekiva River downstream of the northernmost crossing of the Little Wekiva River with S.R. 434, Rock Springs Run, Black Water Creek, Sulpher Run or Seminole Creek. (The construction of buildings, golf courses, impoundments, roads, canals, ditches, swales, and any land clearing is presumed to adversely affect habitat within the protection zone.)
Florida Endangered and Threatened Species Act, 1977 (Ch. 379.2291, F.S.; Ch. 68. F.A.C.)	FWCC	Wildlife	Provides for research and management to conserve and protect threatened and endangered species as a natural resource. Responsibility for research and management of upland, freshwater and marine species is given to the Florida Fish and Wildlife Conservation Commission (FWCC). Encourages FWCC to develop a public education program relating to endangered and threatened species. See also Ch. 68. F.A.C. relating to FWCC and Wildlife Code of the State of Florida (Ch. 68A)
Local Government Comprehensive Planning and Land Development Act, 1985 Community Planning Act, 2011 (Ch. 163.3161-163.3248, F.S.) Developments of Regional Impact (Ch. 380.06. F.S.)	FDCA, ECFRPC, Local Government	Land, Water, Natural Resources	Directs local governments to adopt comprehensive plans and land development regulations; outlines rules and minimum criteria; and outlines elements to be included in plans (Chapter 163, F.S.). Establishes criteria for Developments of Regional Impact (Chapter 380, F.S.). State oversight of growth management and local comprehensive planning, previously administered through the Florida Department of Community Affairs (FDCA), was substantially reduced in 2011 by amendments to the 1985 Act which eliminated the FDCA and repealed applicable 95-J F.A.C. rules.
ECFRPC Strategic Regional Policy Plan (SRPP) (pursuant to Ch. 186.507, 186.508, F.S.)	ECFRPC	Land, Water, Natural Resources	Identifies and maps natural resources of regional significance. Promotes the protection of natural resources of regional significance, regional ecosystems, ecological corridors, wetlands, wildlife, listed species, and native vegetation. Encourages compact development to protect open space, establishment of upland buffers around wetlands, best management practices, and wildlife underpasses. Discourages encroachment of development into conservation areas and development in 100-year floodplain. Recognizes and promotes compliance with the Wekiva River Protection Act and Wekiva Parkway and Protection Act. Establishes average potable-water consumption goal of 90 gallons/person/day by 2025. Prioritizes water conservation over expansion of new supplies. Promotes aquifer recharge through protection of natural open space, pervious surfaces, and recharge enhancement. Encourages central sewer or performance-based onsite disposal systems in areas of high aquifer vulnerability. Encourages best available control technology and best management practices for stormwater, promoting non-structural methods. Seeks to avoid surface and groundwater

State of Florida Policy/Regulations	Entity	Resource Protected	Type of Protection
			discharges harmful to water-dependent resources. Encourages vegetated buffer zones, integration of wetlands into treatment designs, rain gardens, swales, and pervious pavement. Discourages groundwater withdrawal resulting in saltwater intrusion. Promotes restoration of hydrologic regimes and spring protection. Encourages rainwater cisterns, reuse of stormwater, and reuse of treated wastewater for irrigation. Supports development of sustainable alternative water supplies. (SRPP adopted, but not codified.)

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Appendix B. Charter of the Wekiva River System Advisory Management Committee

U.S. Department of the Interior National Park Service

Wekiva River System Advisory Management Committee Charter

1. **DESIGNATION.** The official designation of the committee is the Wekiva River System Advisory Management Committee (Committee).
2. **AUTHORITY.** This is an Agency Federal advisory committee established under Section 5 of Public Law 106-299, October 13, 2000, and in accordance with the provisions of the Federal Advisory Committee Act (FACA), as amended, 5 U.S.C., Appendix 2.
3. **OBJECTIVES AND SCOPE OF ACTIVITIES.** The purpose of the Committee is to assist in the development of the comprehensive management plan for the Wekiva River System and provide advice to the Secretary in carrying out the management responsibilities of the Secretary under the Wild and Scenic Rivers Act (16 U.S.C. 1274).
4. **DESCRIPTION OF DUTIES.** The duties of the Committee are solely advisory. It does not have regulatory or land acquisition authority.
5. **AGENCY OR OFFICIAL TO WHOM THE COMMITTEE REPORTS.** The Committee will report to the Secretary through the Designated Federal Officer.
6. **SUPPORT.** The National Park Service will provide administrative and logistical support for the Committee.
7. **ESTIMATED ANNUAL OPERATING COSTS AND STAFF YEARS.** The annual operating costs associated with supporting the Committee's functions are estimated to be \$100,000, including all direct and indirect expenses and .25 of a work year of support.
8. **DESIGNATED FEDERAL OFFICER.** The Committee reports to the Secretary through the Designated Federal Officer (DFO). The DFO to whom the Committee reports will be the Regional Director, Southeast Region, National Park Service, Atlanta, Georgia. The DFO or the DFO designee or alternate DFO(s) will be full-time or permanent part-time Federal employees, and will approve all meeting agendas, attend all Committee and subcommittee meetings, adjourn any meeting when the DFO determines adjournment to be in the public interest, and chair meetings when directed to do so by the official to whom the advisory committee reports.
9. **ESTIMATED NUMBER AND FREQUENCY OF MEETINGS.** The Committee will meet approximately four times a year.
10. **DURATION.** The Committee is expected to exist into the foreseeable future, concurrent with the designation of the Wekiva River as a Wild and Scenic River.

11. **TERMINATION.** The Committee is subject to the provisions of the FACA and may take no action unless the charter filing requirement of Sections 9 and 14(b) of the Act have been complied with. The Committee is subject to biennial review and will terminate 2 years from the date this charter is filed, unless, prior to that time, the charter is renewed in accordance with Section 14 of FACA. If a determination is made that the Committee is no longer necessary, the Agency will terminate the Committee as of the date of such determination.
12. **MEMBERSHIP AND DESIGNATION.**
 - a. The Committee is composed of 18 or more members representing each of the following agencies or organizations. Each agency or organization will appoint one member and one alternate:
 - 1) The Department of the Interior, represented by the Director of the National Park Service or the Director's designee;
 - 2) The East Central Florida Regional Planning Council, representing the East Central Florida Regional Planning Council's interests;
 - 3) The Florida Department of Environmental Protection, Division of Recreation and Parks, representing the Florida Department of Environmental Protection, Division of Recreation and Parks' interests;
 - 4) The Florida Department of Environmental Protection, Wekiva River Aquatic Preserve, representing the Florida Department of Environmental Protection, Wekiva River Aquatic Preserve's interests;
 - 5) The Florida Department of Agriculture and Consumer Service, Division of Forestry, Seminole State Forest, representing the Florida Department of Agriculture and Consumer Service, Division of Forestry, Seminole State Forest's interests;
 - 6) The Florida Audubon Society, representing the Florida Audubon Society's interests;
 - 7) Friends of Wekiva's interests;
 - 8) The Lake County Water Authority, representing the Lake County Water Authority's interests;
 - 9) The Lake County Planning Department, representing the Lake County Planning Department's interests;
 - 10) The Orange County Parks and Recreation Department, Kelly Park, representing the Orange County Parks and Recreation Department, Kelly Park's interests;
 - 11) The Seminole County Planning Department, representing the Seminole County Planning Department's interests;
 - 12) The St. Johns River Water Management District, representing the St. Johns River Water Management District's interests;

- 13) The Florida Fish and Wildlife Conservation Commission, representing the Florida Fish and Wildlife Conservation Commission's interests;
 - 14) The City of Altamonte Springs, representing the City of Altamonte Springs' interests;
 - 15) The City of Longwood, representing the City of Longwood's interests;
 - 16) The City of Apopka, representing the City of Apopka's interests;
 - 17) The Florida Farm Bureau Federation, representing the Florida Farm Bureau Federation's interests;
 - 18) The Florida Forestry Association, representing the Florida Forestry Association's interests; and
 - 19) The Nature Conservancy, representing The Nature Conservancy's interests.
- b. The nonprofit organization known as the Friends of the Wekiva, representing the The Committee, by unanimous consent, may recommend to the Secretary that other interested parties be added to the Committee. If such recommendations are approved by the Secretary, such parties will be added to the Committee.
 - c. Representatives and alternates to the Committee will be appointed as follows:
 - 1) State agency representatives, by the head of the agency;
 - 2) County representatives, by the Boards of County Commissioners;
 - 3) Water management district, by the Governing Board;
 - 4) Department of the Interior representative, by the Southeast Regional Director, National Park Service;
 - 5) East Central Florida Regional Planning Council, by the Governing Board; and
 - 6) Other organizations, by the Southeast Regional Director, National Park Service.
 - d. Members will be appointed for staggered 4-year terms. If no new member is appointed on or prior to the expiration date of an incumbent's term, the incumbent member may continue to serve until the new appointment is made. Any vacancy on the Committee will be filled in the same manner in which the original appointment was made. All members serve at the pleasure of the Secretary.
 - e. Members of the Committee serve without compensation. However, while away from their homes or regular places of business, members who are engaged in Committee business approved by the (DFO) may be allowed travel expenses, including per diem in lieu of subsistence.

- f. Members are representatives of specific agencies and organizations. Additional appointment designations will be made in consultation with the Departmental Ethics Office.
 - g. Additional necessary Committee procedures will be developed as a part of the comprehensive management plan.
13. **ETHICS RESPONSIBILITIES OF MEMBERS.** No committee or subcommittee member shall participate in any specific party matter including a lease, license, permit, contract, claim, agreement, or related litigation with the Department in which the member has a direct financial interest.
14. **SUBCOMMITTEES.** The Agency may establish subcommittees or workgroups as it deems necessary or upon recommendation of the Committee or its chair, for the purposes of compiling information or conducting research. However, such subcommittees or workgroups shall not conduct business independent of the Committee and must report their recommendations to the full Committee for consideration and not directly to the Agency. The Committee Chair, with the approval of the DFO, will appoint subcommittee or workgroup members from the parent committee. The DFO will invite non-committee members to participate on subcommittees or workgroups and can do so in consultation with the Chair or Committee. Subcommittees or workgroups will meet as necessary to accomplish assignments, subject to the approval of the DFO and the availability of resources.
15. **RECORDKEEPING.** The records of the Committee, formally and informally established subcommittees, or other subgroups of the Committee, shall be handled in accordance with General Records Schedule 26, Item 2 or other approved agency records disposition schedule. These records shall be available for public inspection and copying, subject to the Freedom of Information Act, U.S.C. 552.

 / FEB 24 2010
Secretary of the Interior / Date

Date Charter Filed FEB 24 2010

Appendix C. Listed Species in the Wekiva Basin Area

PLANTS *

Scientific Name	Common Name	Federal Status	State of Florida Status
PLANTS AND LICHENS			
<i>Bonamia grandiflora</i>	Florida bonamia	<i>Threatened</i>	<i>Endangered</i>
<i>Calopogon multiflorus</i>	many-flowered grasspink		<i>Endangered</i>
<i>Carex chapmanii</i>	Chapman's sedge		<i>Endangered</i>
<i>Centrosema arenicola</i>	sand butterfly pea		<i>Endangered</i>
<i>Chionanthus pygmaeus</i>	pygmy fringe tree	<i>Endangered</i>	<i>Endangered</i>
<i>Clitoria fragrans</i>	scrub pigeon-wing	<i>Threatened</i>	<i>Endangered</i>
<i>Coelorachis tuberculosa</i>	Piedmont jointgrass		<i>Threatened</i>
<i>Cucurbita okeechobeensis</i>	Okeechobee gourd	<i>Endangered</i>	<i>Endangered</i>
<i>Deeringothamnus pulchellus</i>	beautiful pawpaw	<i>Endangered</i>	<i>Endangered</i>
<i>Dennstaedtia bipinnata</i>	hay-scented fern		<i>Endangered</i>
<i>Drosera intermedia</i>	spoon-leaved sundew		<i>Threatened</i>
<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	scrub wild buckwheat	<i>Threatened</i>	<i>Endangered</i>
<i>Hartwrightia floridana</i>	hartwrightia		<i>Threatened</i>
<i>Hasteola robertiorum</i>	Florida hasteola		<i>Endangered</i>
<i>Illicium parviflorum</i>	star anise		<i>Endangered</i>
<i>Lechea cernea</i>	nodding pinweed		<i>Threatened</i>
<i>Lupinus aridorum</i>	scrub lupine	<i>Endangered</i>	<i>Endangered</i>
<i>Monotropa hypopithys</i>	pinemap		<i>Endangered</i>
<i>Najas filifolia</i>	narrowleaf naiad		<i>Threatened</i>
<i>Nemastylis floridana</i>	celestial lily		<i>Endangered</i>
<i>Nolina atopocarpa</i>	Florida beargrass		<i>Threatened</i>
<i>Nolina brittoniana</i>	Britton's beargrass	<i>Endangered</i>	<i>Endangered</i>
<i>Ophioglossum palmatum</i>	hand fern		<i>Endangered</i>
<i>Panicum abscissum</i>	cutthroat grass		<i>Endangered</i>
<i>Paronychia chartacea pulvinata</i>	papery whitlow-wort	<i>Threatened</i>	<i>Endangered</i>
<i>Pecluma plumula</i>	plume polypody		<i>Endangered</i>
<i>Polygala lewtonii</i>	Lewton's polygala	<i>Endangered</i>	<i>Endangered</i>
<i>Polygonella myriophylla</i>	sandlace (Small's jointweed)	<i>Endangered</i>	<i>Endangered</i>
<i>Prunus geniculata</i>	scrub plum	<i>Endangered</i>	<i>Endangered</i>
<i>Pteroglossaspis ecristata</i>	giant orchid		<i>Threatened</i>
<i>Salix floridana</i>	Florida willow		<i>Endangered</i>
<i>Sideroxylon alachuense</i>	silver buckthorn		<i>Endangered</i>
<i>Stylisma abdita</i>	scrub stylisma		<i>Endangered</i>
<i>Vicia ocalensis</i>	Ocala vetch		<i>Endangered</i>
<i>Warea amplexifolia</i>	clasping (wide-leaf) warea	<i>Endangered</i>	<i>Endangered</i>
<i>Warea carteri</i>	Carter's warea	<i>Endangered</i>	<i>Endangered</i>
<i>Zephyranthes simpsonii</i>	rain lily		<i>Threatened</i>

* Not all species may occur in the Wekiva basin. Refer to FNAI and DACS for best information.

ANIMALS*

Scientific Name	Common Name	Federal Status	State of Florida Status
FISH			
<i>Pteronotropis welaka</i>	Bluenose shiner		<i>Species of Special Concern</i>
<i>Cyprinodon hubbsi</i>	Lake Eustis pupfish **		<i>Species of Special Concern</i>
<i>Acipenser brevirostrume</i>	Shortnose sturgeon	<i>Endangered</i>	<i>Endangered</i>
<i>Etheostoma olmstedii maculaticeps</i>	Southern tessellated darter		<i>Species of Special Concern</i>
AMPHIBIANS			
<i>Lithobates capito</i>	Gopher frog **		<i>Species of Special Concern</i>
REPTILES			
<i>Alligator mississippiensis</i>	American alligator	<i>Threatened (due to similarity of appearance)</i>	<i>Threatened (due to similarity of appearance)</i>
<i>Drymarchon couperi</i>	Eastern indigo snake	<i>Threatened</i>	<i>Threatened</i>
<i>Gopherus polyphemus</i>	Gopher tortoise		<i>Threatened</i>
<i>Pituophis melanoleucus mugitus</i>	Florida pine snake		<i>Species of Special Concern</i>
<i>Neoseps reynoldsi</i>	Sand skink	<i>Threatened</i>	<i>Threatened</i>
<i>Stilosoma extenuatum</i>	Short-tailed snake		<i>Threatened</i>
BIRDS			
<i>Ammodramus savannarum floridanus</i>	Florida Grasshopper sparrow	<i>Endangered</i>	<i>Endangered</i>
<i>Aphelocoma coerulescens</i>	Florida scrub-jay	<i>Threatened</i>	<i>Threatened</i>
<i>Aramus guarana</i>	Limpkin **		<i>Species of Special Concern</i>
<i>Athene cucularia</i>	Burrowing owl		<i>Species of Special Concern</i>
<i>Egretta caerulea</i>	Little blue heron		<i>Species of Special Concern</i>
<i>Egretta rufescens</i>	Reddish egret		<i>Species of Special Concern</i>
<i>Egretta thula</i>	Snowy egret **		<i>Species of Special Concern</i>
<i>Egretta tricolor</i>	Tricolored heron		<i>Species of Special Concern</i>
<i>Eudocimus albus</i>	White ibis **		<i>Species of Special Concern</i>
<i>Falco sparverius paulus</i>	Southeastern American kestrel		<i>Threatened</i>
<i>Grus canadensis pratensis</i>	Florida sandhill crane		<i>Threatened</i>
<i>Mycteria americana</i>	Wood stork	<i>Endangered</i>	<i>Endangered</i>
<i>Pelecanus accidentalis</i>	Brown pelican **		<i>Species of Special Concern</i>
<i>Picoides borealis</i>	Red-cockaded woodpecker	<i>Endangered</i>	<i>Species of Special Concern</i>
<i>Platalea ajaja</i>	Roseate spoonbill		<i>Species of Special Concern</i>
<i>Polyborus plancus audubinii</i>	Audubon's crested caracara	<i>Threatened</i>	<i>Threatened</i>
<i>Rostrhamus sociabilis plumbeus</i>	Everglade snail kite	<i>Endangered</i>	<i>Endangered</i>
<i>Sterna antillarum</i>	Least tern		<i>Threatened</i>
MAMMALS			
<i>Podomys floridanus</i>	Florida mouse **		<i>Species of Special Concern</i>
<i>Sciurus niger shermani</i>	Sherman's fox squirrel		<i>Species of Special Concern</i>
<i>Trichechus manatus latirostris</i>	West Indian (Florida) manatee	<i>Endangered/ Critical Habitat</i>	<i>Endangered</i>
<i>Ursus americanus floridanus</i>	Florida black bear **		<i>Threatened</i>
INVERTEBRATES			
<i>Promcambaris pictus</i>	Black Creek crayfish		<i>Species of Special Concern</i>

* Animal species identified are based on FNAI occurrence data, TNC Wekiva-Ocala conservation targets, and field observations. Not all species may occur in the Wekiva basin. Refer to FNAI and FWC for best information.
 ** Species proposed for delisting within Florida by FWC

Appendix D. Summary of Water Quality Average Data from the Wekiva River and Rock Springs Run in Comparison to Florida Class III Surface Water Criteria

Source: Robert Mattson (St Johns River Water Management District)

Note: Values are averages (means) of available data for the period of 2006 through 2010/2011.

Analyte	Wekiva River at SR 46 (2006-2010/2011)	Rock Springs Run in State Reserve (2006-2010/2011)	Class III Surface Water Criterion (62.302-500 FAC)
Conductivity (µmhos/cm)	387.00	295.20	Shall not be increased more than 50% above background or to 1275, whichever is greater.
pH (units)	7.37	7.59	> 6; see (1)
Alkalinity (mg/L as CaCO ₃)	111.28	97.09	> 20
Color (pcu)	50.71	55.90	NA
Turbidity (NTU)	1.08	1.42	NA
Dissolved O ₂ (mg/L)	5.06	6.89	Shall not be less than 5.0 mg/L. Normal daily and seasonal fluctuations shall be maintained.
Total Organic Carbon (mg/L)	7.11	7.49	NA
Total Nitrogen (mg/L)	0.79 e	1.31 e	See (2)
Total Kjeldahl Nitrogen (mg/L)	0.45	0.47	See (2)
Nitrate-Nitrite (mg/L)	0.34	0.84	See (2) and (3)
Ammonia (mg/L)	0.02	0.03	See (2)
Orthophosphorus (mg/L)	0.10	0.07	See (2)
Total Phosphorus (mg/L)	0.11	0.09	See (2)
Fecal Coliform (#/100ml)	100	Not measured	See (4) and (5)

Analyte = chemical substance being analyzed

NA = no criterion is stated in the rule for this analyte (chemical substance being analyzed)

e = estimated by adding TKN (Total Kjeldahl Nitrogen) and Nitrate-Nitrite

μmhos = a unit of measurement for conductivity expressed in either microSiemens ($\mu\text{S}/\text{cm}$) or micromhos ($\mu\text{mho}/\text{cm}$), which is the reciprocal of the unit of resistance, the ohm. The prefix "micro" means that it is measured in millionths of a mho. MicroSiemens and micromhos are equivalent units. Distilled water has a range of conductivity from 0.5 to 2 $\mu\text{mhos}/\text{cm}$. Drinking water is generally between 50 to 1500 $\mu\text{mhos}/\text{cm}$, and domestic wastewater may have conductivities above 10,000 $\mu\text{mhos}/\text{cm}$.

mg/L = milligrams/liter; 1mg/L represents 1 part per million (ppm).

NTU = Nephelometric turbidity unit

#/100ml = number per 100 milliliters or per 3.4 fluid ounces

- (1) Not to vary more than one unit above or below natural background of predominantly fresh waters and coastal waters as defined in Section 62-302.520(3)(b), *Florida Administrative Code* or more than two-tenths unit above or below natural background of open waters as defined in Section 62-302.520(3)(f), *Florida Administrative Code*, provided that the pH is not lowered to less than 6 units in predominantly fresh waters, or less than 6.5 units in predominantly marine waters, or raised above 8.5 units. If natural background is less than 6 units in predominantly fresh waters or 6.5 units in predominantly marine waters, the pH shall not vary below natural background or vary more than one unit above natural background of predominantly fresh waters and coastal waters, or more than two-tenths unit above natural background of open waters. If natural background is higher than 8.5 units, the pH shall not vary above natural background or vary more than one unit below natural background of predominantly fresh waters and coastal waters, or more than two-tenths unit below natural background of open waters.
- (2) Nutrients include total nitrogen, Kjeldahl-nitrogen, nitrate- nitrite ($\text{NO}_2/\text{NO}_3 - \text{N}$), total phosphorus, and orthophosphate. The Class III criterion is in narrative form: "The discharge of nutrients shall continue to be limited as needed to prevent violations of other standards contained in this chapter. Man-induced nutrient enrichment (total nitrogen or total phosphorus) shall be considered degradation in relation to the provisions of Sections 62-302.300, 62-302.700, and 62-4.242, *Florida Administrative Code*. In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna."
- (3) There is no Class III standard for nitrate. The Class I (drinking water) standard is 10 mg/L. The EPA and FDEP propose using 0.35 mg/L as a numeric criterion for nitrate in springs, and FDEP uses this threshold as an indicator or potential groundwater-surface water impacts. A concentration of 0.20 mg/L is widely cited as a "background concentration" for Florida springs, although in a sample of Florida springs unaffected by human population centers, the median value was found to be 0.08 mg/L (FDEP 2006). The SJRWMD and USGS refers to 0.2 mg/L as a background concentration for nitrate in groundwater. The Florida Geological Survey considers 0.05 mg/L to be a background concentration.
- (4) Not to exceed a monthly average of 200, nor exceed 400 in 10% of the samples, nor exceed 800 on any one day.
- (5) Fecal coliform was not measured by the SJRWMD in Rock Spring Run for the period cited. For the period of 1973 through 2003, the mean concentration of fecal coliform in Rock Springs Run was 54.2. (According to Orange County data, the mean concentration of fecal coliform measured at Kelly Park between 2006 and 2011 was 108.6.)

