Chapter Nine

Water

Historically, water has influenced development because of its importance for everyday uses, travel, and trade. Today, the opposite is true as development impacts water resources and the location of water does not necessarily influence where development occurs. As populations have grown and development has moved away from water sources, water supplies are strained to meet the needs of this growing population. Debate continues on how to serve and reach new developments. The general belief has been that potable water will always be available - but at what cost? More Florida communities are either piping water in from outside the region or looking to non-traditional sources such as desalinization plants located on the Atlantic Ocean or Gulf of Mexico. This begs the question of whether the local water supply is sufficient to meet the growing population, its consumptive demands and at what cost.

Water resources in the East Central Florida region are important sources of potable water and offer beneficial and unique habitats and ecosystems. These regimes play a major role in the economy of the region, promote the health of the environment and residents, and provide for recreational opportunities. Thus the protection of these resources along with their functionality is of critical importance to ensure their sustainability.

I. SURFACE WATER

A. St. Johns River

The St. Johns River, located in East Central Florida, is the longest river in Florida, traveling 300 miles from its headwaters in Indian River County to the Atlantic Ocean in Jacksonville. The river is fed by numerous creeks, springs and swamps and drains 9,415 square miles of land. Some of the well known springs associated with the St. Johns River include Silver Springs

St. Johns River in Lake County
Photo Courtesy of St. Johns River Alliance

in Marion County, Alexander Springs in Lake County and Blue Spring in Volusia County. Major tributaries in the region include the Econlockhatchee River which originates from cypress swamps in south Orange and north Osceola Counties, the spring fed Wekiva River originating in northwest Orange County and Oklawaha River whose system headwaters extend south to Lake Apopka and travel north through the Harris Chain of Lakes near Leesburg.

St. Johns River Photo Courtesy of St. Johns River Alliance

Sections of the St. Johns River, along with some of its tributaries, have been designated as Outstanding Florida Waters (OFW). The Lake Woodruff National Wildlife Refuge, Blue Spring, Tosohatchee State Reserve, and Econolockhatchee River are all OFWs. The entire Wekiva River system is designated as a OFW and the lower Wekiva is designated as a Florida Wild River, with upstream segments designated as scenic.

The St. Johns River system is of significant ecological and economic value and provides a navigatable waterway for barges along with commercial fishing and recreational opportunities. Historically, the St. Johns River and its tributaries helped to shape development in East Central Florida. Today, it influences regional development patterns in a different way. Wetland regulations and publicly owned lands have begun to form a large riparian greenway along the St. Johns River creating a natural development buffer.

B. Kissimmee River

The Kissimmee River Watershed covers 3,054 square miles from South Orlando to Lake Okeechobee. The Kissimmee River system, which encompasses St. Cloud, Kissimmee and Orlando, drains southern Orange County and most of Osceola County. The Kissimmee River and its tributaries are a part of the water system that eventually becomes the Everglades, giving Shingle Creek a Kissimmee River tributary, its name "Headwaters to the Everglades". The major surface water features of the river system include the Butler Chain of Lakes, Upper Kissimmee Chain of Lakes, Alligator Chain of Lakes, Lake Wales Ridge lakes, and more. The Butler Chain of Lakes, which drains into the Reedy Creek system, one of the major tributaries of the river, is designated as an OFW.

Kissimmee River
Photo Courtesy of Wikepedia

Historically, the Kissimmee River and its 3-mile wide floodplain provided ranchers and farmers with fertile land for cattle and agricultural operations. Modifications made to the river for flood control and agricultural purposes have altered the one 103-mile meandering river to the point of being referred to as a 56-mile long canal. This had major ecological ramifications for Lake Okeechobee, the Everglades, and the Kissimmee River itself. The Kissimmee River restoration project, which is expected to be completed by 2014, began in 1999 by backfilling 8 miles of the C-38 canal. Through three completed projects, 24 miles of meandering river has been reestablished. Efforts continue towards the restoration of the Kissimmee River to its original 40-mile meandering course, which includes re-creating the natural drainage patterns of the surrounding lands and re-establishing the freshwater marshes and wetlands along the river. The project is the result of a partnership between the South Florida Water Management District and the U.S. Army Corps of Engineers. According to the SFWMD, the department is working to identify the volume and timing of waters needed to sustain the restored river and floodplain ecology.

While residential, commercial and industrial development has been diverted from the immediate floodplain of the Kissimmee River System, the area of the Kissimmee basin headwaters, especially Shingle Creek, is dominated by urban development. Agriculture and ranching are dominate land uses throughout the remainder of the basin. Public and private land acquisitions in the watershed have redirected growth in other areas of the watershed helping to make Kissimmee River, Reedy Creek, and Boggy Creek future urban defining open space or greenway corridors.

Indian River Lagoon
Photo Courtesy of St. Johns River Water Management District

Indian River Lagoon
Photo Courtesy of St. Johns River Water Management District

C. Indian River Lagoon and Halifax River

The Indian River Lagoon is the most biologically diverse estuary in North America. It is 155 miles long and 2,280 square miles in area, spanning from Ponce de Leon Inlet in Volusia County in the north to Jupiter Inlet in Palm Beach County in the south. The system comprises nearly one third of Florida's East Coast. The Indian River Lagoon Estuary is a shallow estuary bounded by a series of sandy barrier islands on the east and the mainland on the west. It is comprised of the Mosquito Lagoon, Indian River Lagoon, and the Banana River. There are three access points to the

Lagoon in east central Florida including Ponce de Leon Inlet, the Sebastian Inlet, and Port Canaveral/Haulover Canal.

The Halifax River and the Indian River Lagoon are connected through a man-made connection maintained as part of the Florida's Intercoastal Waterway, between the Mosquito Lagoon and the northern portion of the Indian River Lagoon in the Turnbull Basin. In the region, the main tributaries emptying into the lagoon and river are the Tomoka River, Spruce Creek, and Sebastian Creek. The Indian River Lagoon is designated as an Outstanding Florida Water and is also an Aquatic Preserve.

The Indian River Lagoon is home to over 4,300 different species of plants and animals including the endemic Atlantic Salt Marsh Snake. The green and loggerhead sea turtles nest and forage in the area while the West Indian Manatee uses the lagoon's warm shallow waters for calving and feeding. In addition, more than 92,000 acres of coastal mangrove, wetland, and seagrass habitat support shellfish, commercial fishing, and sport fishing industries in Volusia and Brevard Counties.

D. The Wekiva River

Derived from Seminole words meaning "flowing water," the Wekiva River begins its meandering journey at Wekiva Springs State Park and is joined by the spring-fed waters of Rock Springs Run, the Little Wekiva River, and Seminole Creek. Blackwater Creek, named for its darker tannic color, flows from Lake Norris and merges with the Wekiva near its confluence with the St. Johns. The basin is part of a greater ecological corridor extending north into the Ocala National Forest, which encompasses half a million acres of federally managed woods and wetlands.

Over time, the Wekiva River system has received various protective designations, including recognition as a Federal Wild and Scenic River and an Outstanding Florida Water. In 1988, the Florida legislature adopted the Wekiva River Protection Act to ensure protection of the waters, wetlands and wildlife. In 2004, the Wekiva Parkway and Protection Act was passed to further safeguard the system from the impacts of a proposed beltway to be constructed around Orlando. An outcome of this act was the formation of the Wekiva Commission which was established as an oversight committee to protect the natural resources of the Wekiva Basin as the beltway develops.
The East Central Florida Regional Planning Council acts as the support staff to the Wekiva Commission.

E. Lake Apopka Basin

Lake Apopka was once a world-class Bass Fishery

Lake Apopka, located in northwest Orange and southeast Lake Counties, is the headwaters of the Ocklawaha Chain of Lakes and flows through the Apopka-Beauclair Canal and into the Beauclair and Dora Lakes and eventually into Lake Eustis, Lake Griffin, and then north into the Ocklawaha River. In addition to Lake Apopka, there are many lakes, tributaries, and rivers in the Lake Apopka Basin, all of which are home to a variety of plant and animal species.

The expansion of development into west Orange County and Lake County has posed a threat to the basin's water and ecological resources. Loss of surrounding wetlands, treated wastewater discharges, and agricultural practices have degraded the water quality making Apopka one of Florida's most polluted lakes. More than $100 million has been invested to restore the lake thanks to the Lake Apopka Restoration Act of 1985 and Florida's Surface Water Improvement and Management Act (SWIM) in 1987. Water quality continues to improve with a 56% reduction in phosphorous levels and water clarity that has improved by more than 54% over previous levels. Nevertheless, the lake is still not safe for swimming and its fish should not be consumed.

Lake Tohopekaliga
Photo Courtesy of Osceola County

F. Upper Chain of Lakes

Lake Tohopekaliga, East Lake Toho, Lake Cypress, Lake Hatchineha, Lake Kissimmee, and the related canal system, make up the Upper Kissimmee Chain of Lakes and the Headwaters of the Everglades. Combined, the Kissimmee Chain of Lakes creates over 176 square miles of ecological resources. These lakes have been managed by the Florida Fish and Wildlife Conservation Commission in order to help maintain their water quality and aquatic habitat essential for flood control, sport fishing and agriculture. Historically, water levels in the lake system fluctuated as much as 10 feet between flood and drought years. After the 1960's, fluctuations in the water levels reduced drastically, harming the marshes of the lakes. Draw down projects have helped to restore the lake's ecosystem by simulating the natural flood and drought regimen. Through cooperation with state agencies, the SFWMD and the USACE are working towards incorporating a more natural

range in seasonal water fluctuations for the health of the lake ecosystem. Agriculture practices have also contributed to the disruption of the ecosystem by increased phosphorous entering the waterways, resulting in poor water quality. The FWC has been conducting numerous projects and studies such as muck removal to improve the lake's ecology (audobonofflorida.org). Lake Tohopekaliga is the largest lake in Osceola County and is widely known as one of the best bass fishing lakes in Florida. The lake is almost 19 thousand acres in size and spans a 42 mile diameter. The C-31 Canal joins Lake Toho with East Lake Toho while South Port Canal, at the southern tip, links the lake to Cypress Lake.

As development occurs along the shores of Lake Toho, various stakeholders are involved in ensuring Developments of Regional Impact work together to maintain the sustainability of the lake, its resources, and accessibility to the public. In 1997, the USACE adopted the Headwaters Revitalization Regulation Schedule to allow for an increase in water storage for the lake system. The SFWMD and the State of Florida have been in the process of purchasing lands surrounding the lake to help accommodate the increased water storage. In 2003, the South Florida Water Management District authorized the Kissimmee Chain of Lakes Long –Term Management Plan.

II. GROUND WATER

Ninety-three (93%) percent of Florida's drinking water and potable water comes from groundwater. The supply is threatened by overuse and it is anticipated that by 2015, the rate of withdrawals will exceed the rate of recharge. It is imperative to protect the quantity and quality of water confined within the aquifers and to further prevent contamination and over-withdrawal which can lead to saltwater intrusion, sinkholes, and wetland degradation. Groundwater contamination can occur through a variety of sources such as landfills, fuel storage tanks, and industrial and agricultural practices, and runoff. Communities can take an active role in protecting groundwater supply by developing programs aimed at protecting:

- well head areas:
- areas necessary for aquifer recharge:
- areas prone to sinkhole activity (Karst).

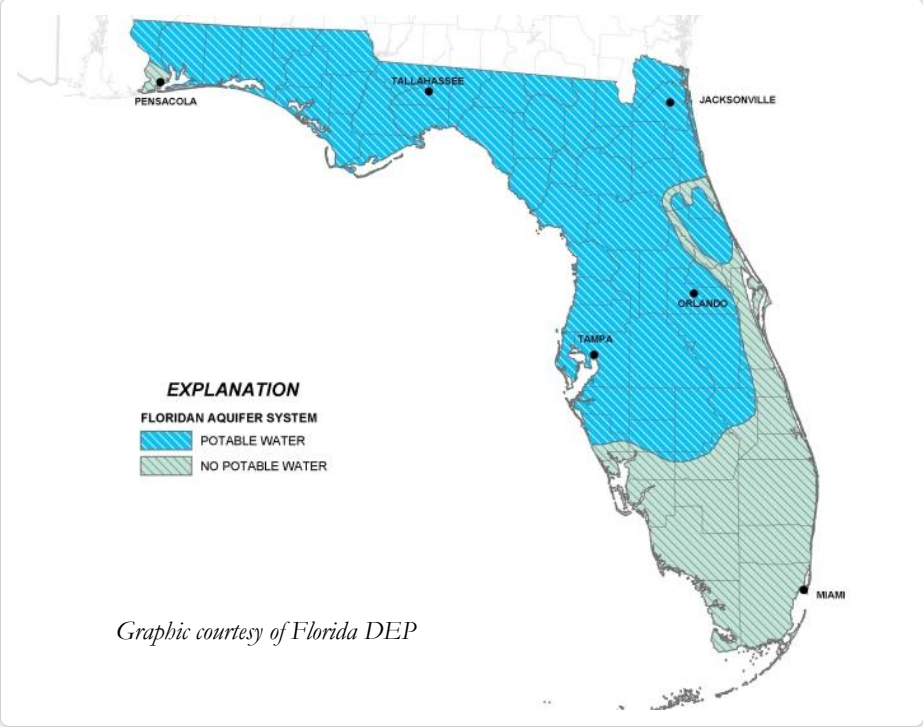
Likewise, efficient groundwater withdrawal and utilizing alternative water supplies, reducing nutrient overuse in landscaping, implementing creative land-use patterns and properly maintaining septic tanks can also help protect groundwater systems (Water Smart Communities, SJRWMD).

A. Floridan Aquifer

Groundwater withdrawals account for the majority of public water supply in the region. The Floridan Aquifer is one of the world's largest aquifers and extends from southern Florida northward to coastal South Carolina. The aquifer is hundreds of feet thick in certain areas and is linked to the surface through springs and major discharge points including the St. Johns River system. The springs are vital to the health of the St. Johns and Kissimmee Rivers and Green Swamp. Therefore, it is relevant to emphasize not only the importance of the aquifer for potable water, but also for the ecological health of East Central Florida springs and rivers.

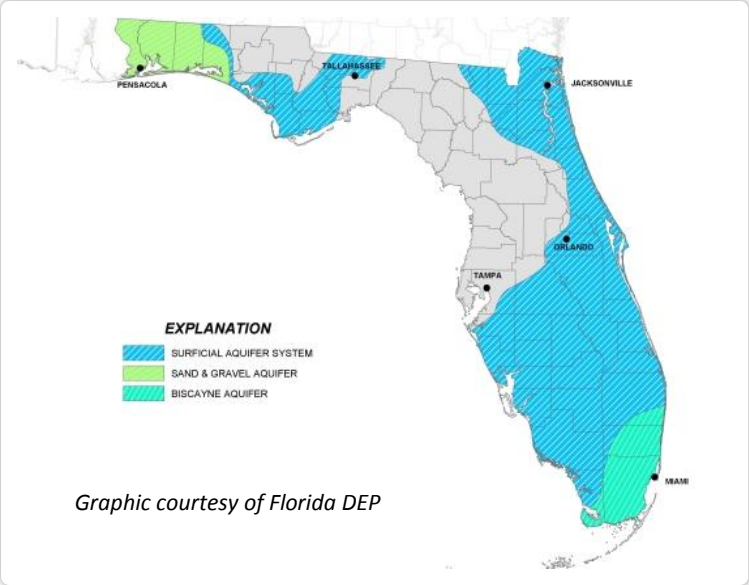
Rainfall continuously recharges the aquifer, however, some areas receive very little surface freshwater recharge. Water percolates through sandy soils and infiltrates into the aquifer in areas referred to as aquifer recharge areas. Sinkholes and limestone solution channels are other sources of water recharge. Unfortunately, the best recharge areas are typically high, arid, dry land most often sought after for land development. Protection of high recharge areas for the future of the region's water supply and health of the interconnected water systems and other ecosystems is of vital importance. The Floridan Aquifer is protected by consumptive use review and permits, groundwater quality protection ordinances, and various water conservation measures.

Figure 1.



Graphic courtesy of Florida DEP

Figure 2. Surficial Aquifer



B. Surficial Aquifer System

The upper surficial aquifer system is generally less than 50 feet deep. Water from rainfall enters the aquifer and flows toward the coast from areas of higher elevation where it is discharged or recharges deeper aquifers. This aquifer is often used for domestic, commercial, and municipal well water supplies. Water withdrawal from the aquifer has major effects on the flow of water in the aquifer and springs as well as lake and wetland levels. It is important to maintain the integrity of the water in the aquifer for the health of the environment and sustainability of groundwater resources.

C. Springs

Springs in the east central Florida offer regional value and provide natural, recreational, and economic benefits. Springs such as Wekiva and Blue Springs are popular eco-tourism destinations. To protect and restore the state's 600 springs, the Florida Department of Environmental Protection established the Florida Springs Protection Initiative in 1999. One of the Initiative's goals is to develop strategies for the long term protection of the springs through "scientific research, biological and water quality monitoring, regulation and management, education and outreach, and landowner assistance and land acquisition projects" (FDEP, 2009).

Nova Spring, Seminole County
Photo Courtesy of St. Johns River Water Management District

Springs are classified by rates of discharge, ranging from first magnitude springs (over 100 cubic feet per second (cfs) or more) to eight magnitude springs (less than 1 pint/min). First magnitude springs produce over 100 cfs of discharge. In the East Central Florida region, Blue Spring and Alexander Springs are the only first magnitude springs.

The drawdown of aquifer levels affects spring flow and ecosystems. To help maintain spring discharge, state law has mandated the development of Minimum Flows and Levels (MFL) (Section 373.042, *Florida Statutes,* (F.S.) for the springs of Florida. Rule 62-40.310(4)(a), *Florida Administrative Code* (F.A.C.), directs the establishment of MFL's that seek to protect water resources, considering the environmental values associated with marine, estuarine, freshwater, and wetlands ecology. Minimum flows and levels for surface water courses define the limit at which further water withdrawals would be significantly harmful and would take into account biological, soil, and topographic data (SJRWMD, 2009). For example, the St. Johns River Water Management District has developed Minimum Flows and Levels taking into account habitat requirements for manatees that frequent Blue Spring and Blue Spring Run. According to the St. Johns River Water Management District (SJRWMD) Chapter 40C-8, F. A. C Minimum Flows and Levels, long term mean flows should improve from 133 cfs to 157 cfs between 2006 and 2024.

The East Central Florida Region is home to 43 springs ranging from 1st Magnitude to 5th Magnitude Springs.

Green Springs, Volusia County
Photo Courtesy of St. Johns River Water Management District

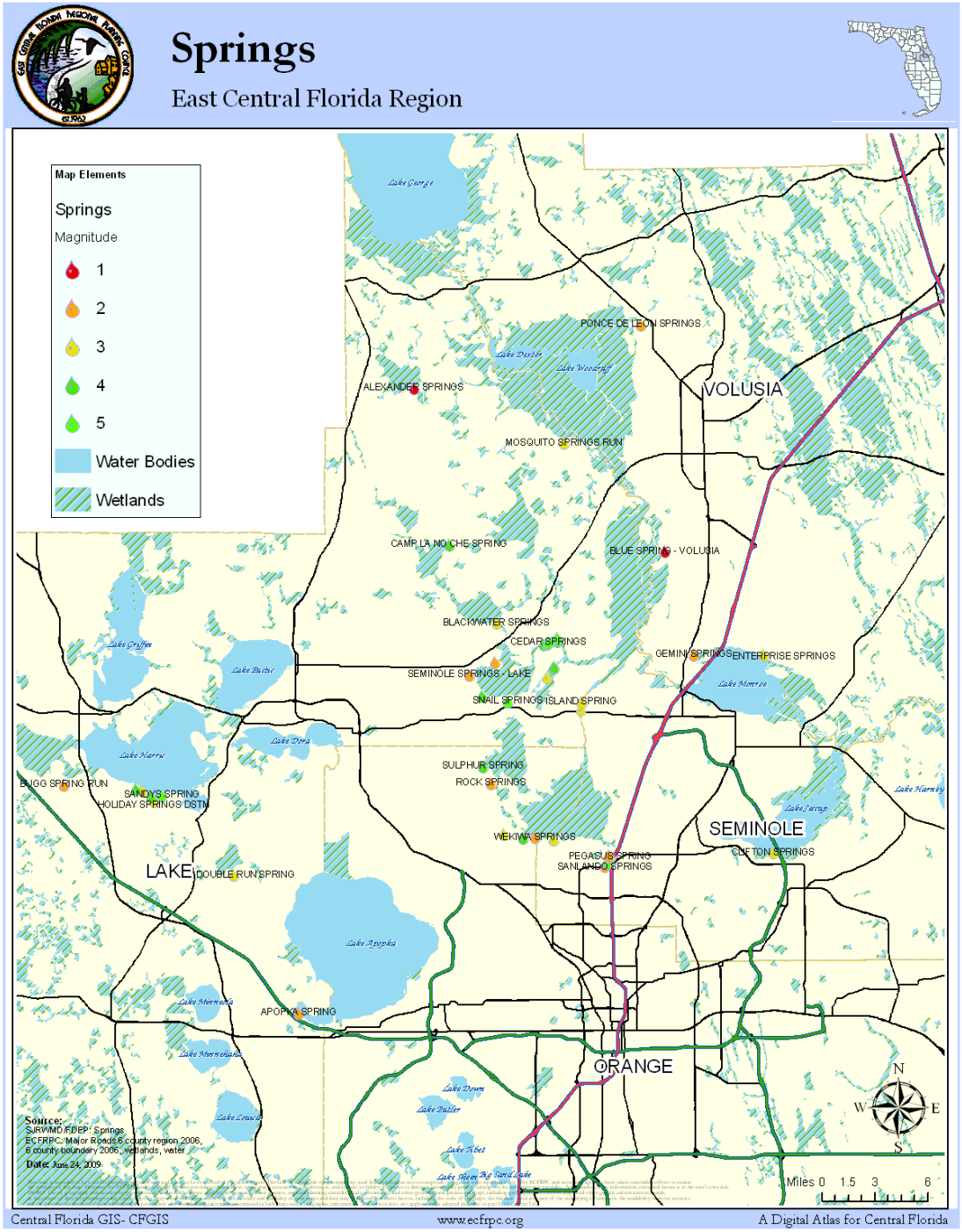
The health of springs is vulnerable to the effects of land-use activities occurring in the recharge basins. The coordination of land planning and water conservation techniques will be necessary to protect the quantity and quality of springs and their habitat. Additional techniques can also help including:

- Establishing Wellhead Protection Areas around current or planned water supply wells
- Directly acquiring the most critical lands in the recharge basins
- Developing new and innovative programs to protect sensitive recharge areas

As an example, the voluntary Bluebelt amendment tax reduction programs have been implemented in various communities helping to preserve land in high recharge areas (Water Smart Communities, SJRWMD).

Additional strategies, cited in the Department of Community Affairs Publication *Protecting Florida's Springs – Land use Planning Strategies and Best Management Practices,* include:

- The development of spring protection policies
- Establishing Springshed protection Zones and Overlay Protection Districts
- Managing development impacts through appropriate site selection and design
- Implementing storm and waste water management best practices
- Implementing water conservation and erosion and sediment control programs
- Environmentally sensitive golf course siting, design, and management
- Implement best management practices in the agricultural and silvicultural industries
- Promoting managed public recreation.


Springs
East Central Florida Region
Map Elements
Springs
Magnitude
1
2
3
4
5
Water Bodies
Wetlands
Lake George
PONCE DE LEON SPRINGS
ALEXANDER SPRINGS
VOLUSIA
MOSQUITO SPRINGS RUN
CAMP LA NOCHE SPRING
BLUE SPRING - VOLUSIA
BLACKWATER SPRINGS
CEDAR SPRINGS
GEMINI SPRINGS
ENTERPRISE SPRINGS
SEMINOLE SPRINGS - LAKE
SNAIL SPRINGS ISLAND SPRING
SULPHUR SPRING
ROCK SPRINGS
BUGG SPRING RUN
SANDYS SPRING
HOLIDAY SPRINGS DSTN
WEKIWA SPRINGS
SEMINOLE
PEGASUS SPRING
SANLANDO SPRINGS
CLIFTON SPRINGS
LAKE
DOUBLE RUN SPRING
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Source:
SJRWMD,FDEP : Springs
ECFRPC: Major Roads,5 county region 2006,
6 county boundary 2006, wetlands, water
Date: June 24, 2009
Miles 0 1.5 3 6
Central Florida GIS- CFGIS
www.ecfrpc.org
A Digital Atlas for Central Florida

Figure 3.

D. Saltwater Intrusion

One of the biggest threats to the region's potable water supply is saltwater intrusion. Ground water supplies near the region's coast are typically shallow and sensitive to water withdrawal. Over withdraw from the aquifer could result in lowering lake levels, reduced spring flow, increased saltwater intrusion, and contamination of the aquifer. Even if the coastal aquifer is properly managed, sea level rise still poses a real threat. As sea level rises, the interface between fresh and saline groundwater will move inland and coastal wetlands will play an important role in slowing or preventing these occurrences. The Florida Department of Environmental Protection has already begun to use Florida Forever funds to acquire coastal wetlands in order to preserve these critical recharge areas.

E. Recharge

The recharge of the Floridan Aquifer is of critical concern due to the amount of water taken from the aquifer and the intense drought conditions that can occur in the region. Methods for protecting recharge areas and water quality include:

- **Direct Land Acquisition** – Offers the most control and is effective at prohibiting land uses that are contrary to effective recharge

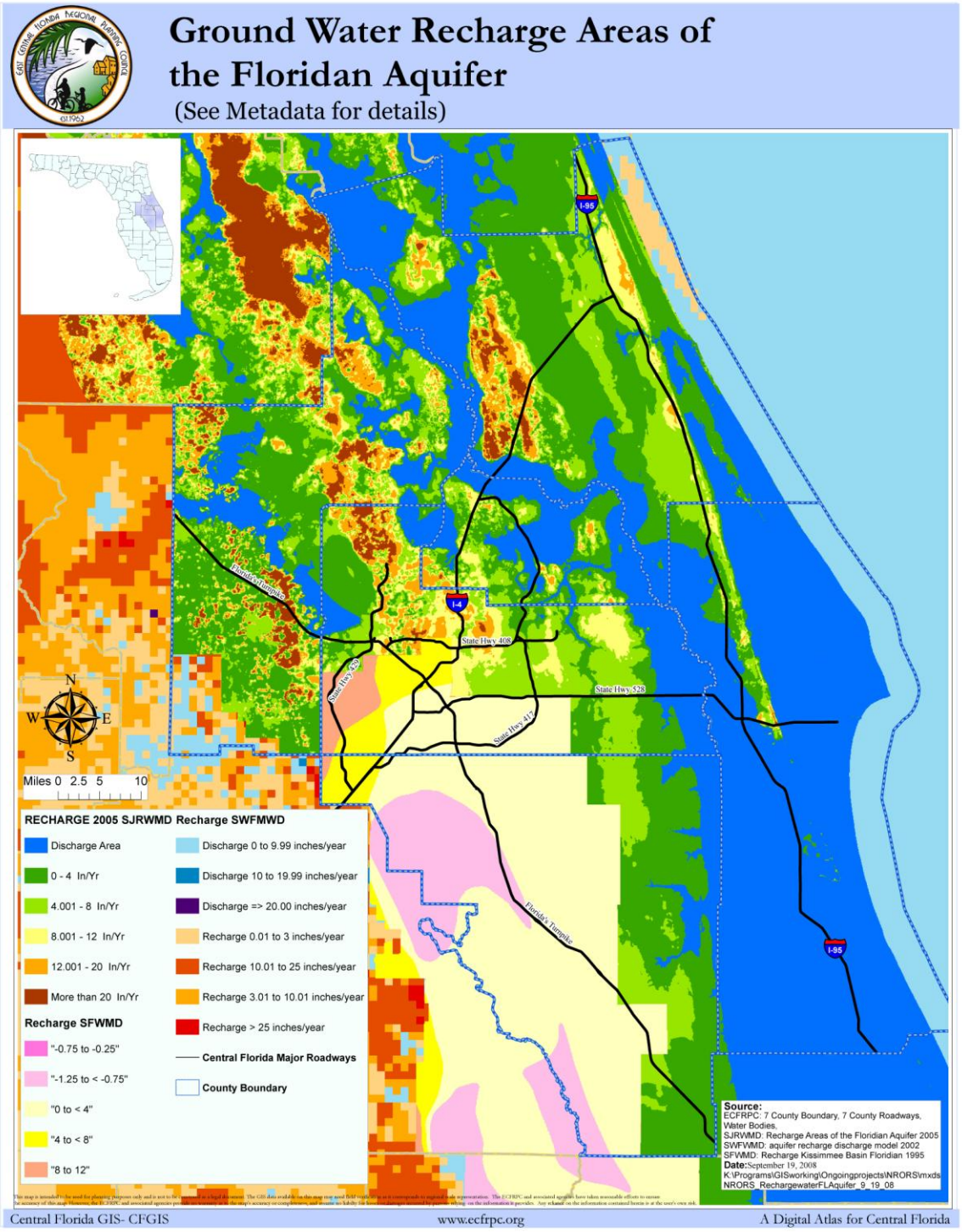
- **Recharge Opportunities** - Reclaimed water and storm water can be used for irrigation and to recharge the aquifer, especially during the wet season

- **Development and Design** - Effective development design clusters structures and incorporates conservation areas and large green spaces. This not only decreases infrastructure costs but also decreases the amount of impervious surfaces and increases the amount of area available for groundwater recharge

- **Analytical Geographic Information System (GIS) Tools** - The Floridan Aquifer System Response layer (a part of the Floridan Aquifer Vulnerability Assessment (FAVA) Data developed by Florida Geological Survey) is a vulnerability - to - contamination dataset for the Floridan Aquifer System. The GIS Model looks at an area's soil drainage, proximity to karst features, and the intermediate confining unit thickness to determine a relative - vulnerability output

Figure 4: Groundwater Recharge Areas of the Floridan Aquifer

This figure illustrates the areas of high groundwater recharge in the East Central Florida Region. High recharge areas are shown in the redish/ brown colors.



The Wekiva Aquifer Vulnerability Assessment (WAVA) model, Figure 5, is based on the modeling technique used in the statewide FAVA. These data can be used to help establish protection zones for decision making and rule development for conservation and growth management. Figure 6 depicts the Aquifer Vulnerability Assessment model for a portion of the East Central Florida region.

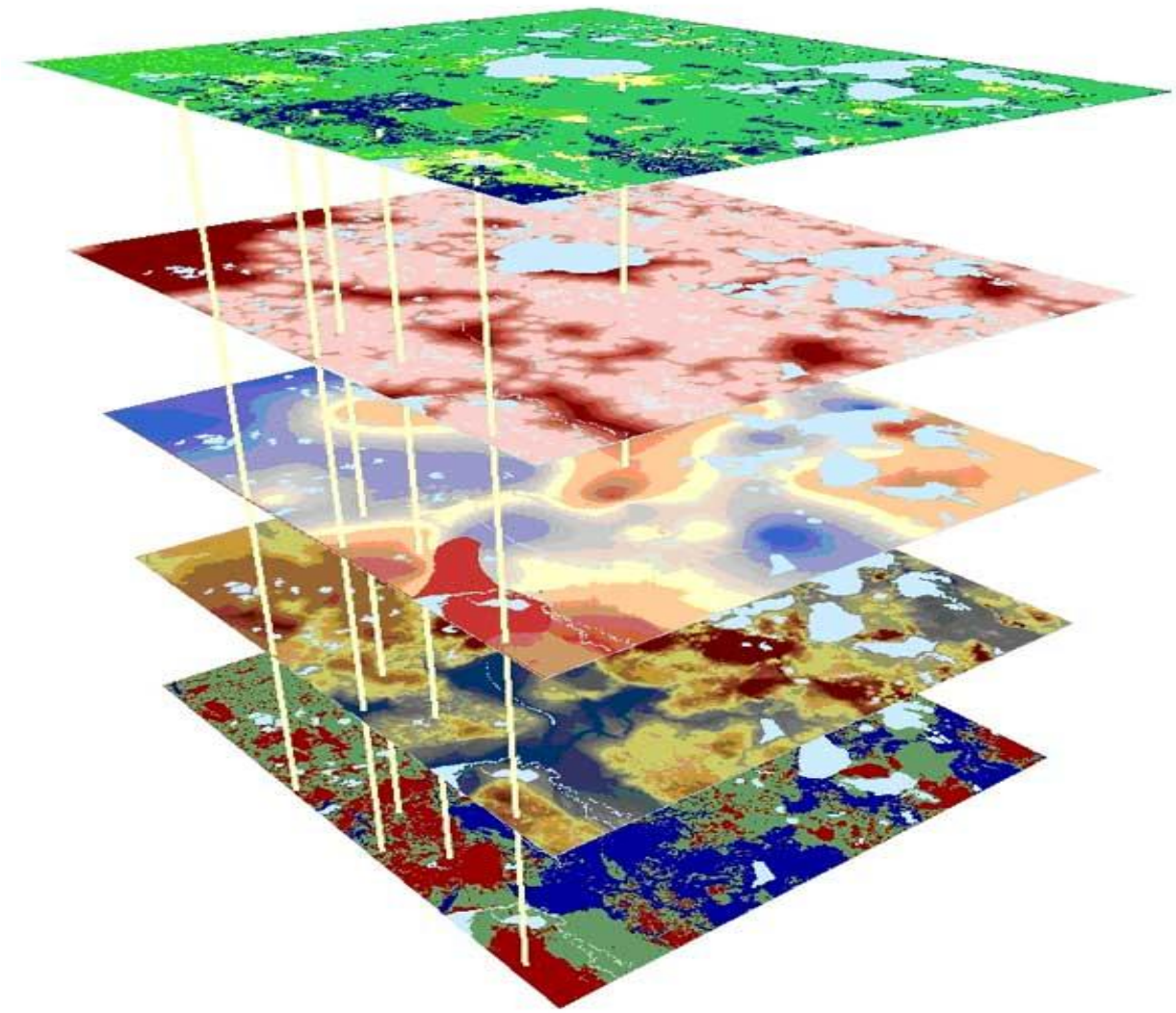


Figure 5. Wekiva Conceptual Model

Vertical lines are training point wells. Spatial geologic layers from top down include soil permeability, proximity to karst, thickness of confinement, and head difference between the water table and the Florida Aquifer potentiometric surface. The bottom layer is the response theme or relative vulnerability model output. (Source: FDEP, 2009)

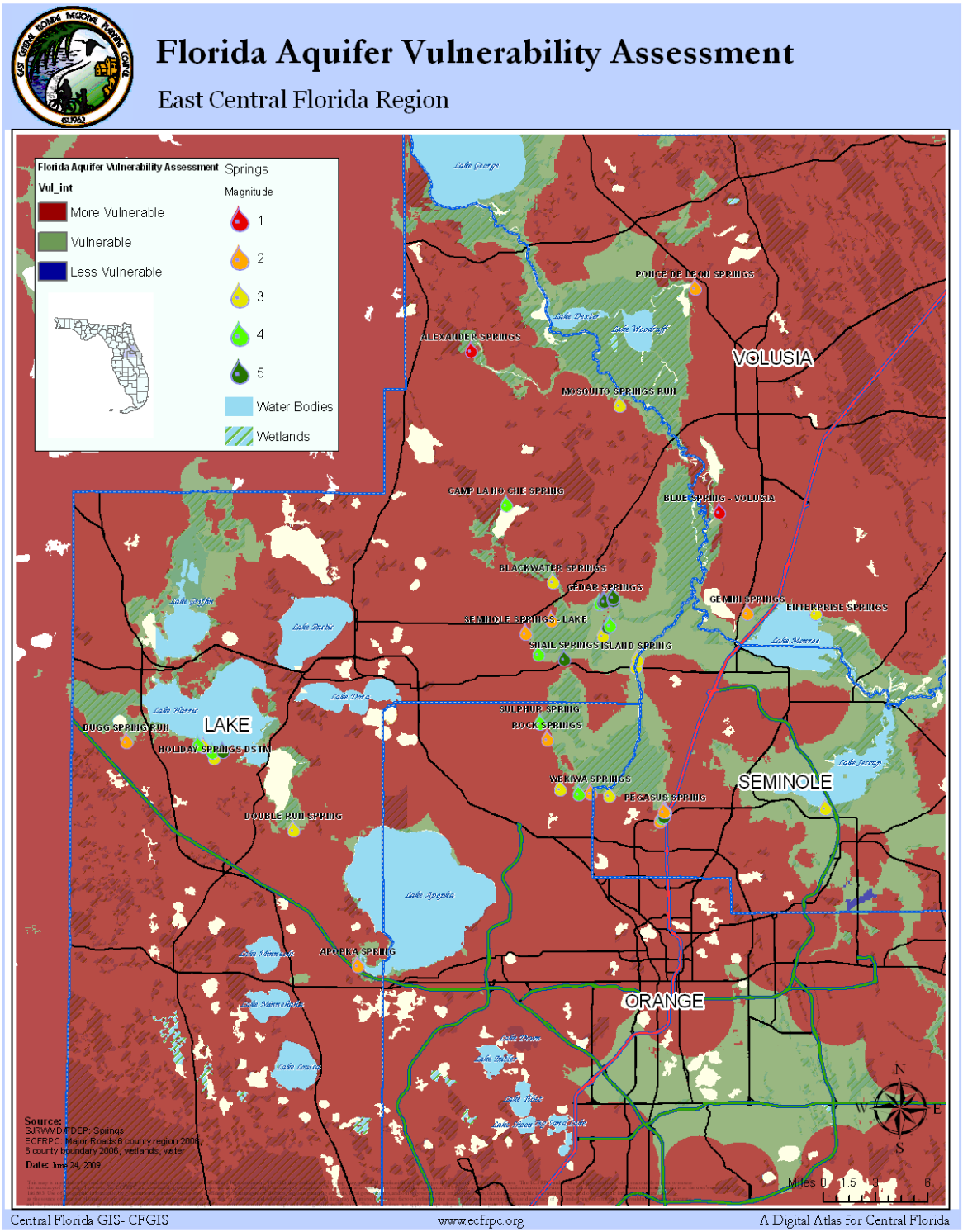


Figure 6. – Florida Aquifer Vulnerability Assessment ***(Also see 'Groundwater Recharge Areas of the Floridan Aquifer' located in Chapter 3, Figure 13).***

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Local efforts should include:

- Erosion control on construction sites
- Buffers and setbacks for wetlands, water bodies and drainage canals
- Stormwater treatment to address specific local protection goals
- Impervious surface reduction through parking lot and road width standards
- Maintaining existing stormwater systems
- Preserving open space in floodplains
- Coordinating stormwater management on a watershed basis
- Adopting land use designations and densities that protect wetlands and water bodies and preserve floodplain functions

(From Water Smart Communities, SJRWMD)

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F. Stormwater Management

As the population in the East Central Florida region increases and development and infrastructure expand, so do surface and groundwater contamination and the cost of stormwater management. Historically, the main goal of stormwater management was flood control and directing stormwater to a nearby channel, ditch, river, or lake. We now know that the long-term effect of this practice has resulted in adverse impacts to water quality. Today, stormwater management practices have evolved and holistically look at surface drainage, flood control, erosion and sediment control, water quality treatment, and habitat protection.

There are two types of surface water pollution; nonpoint source, a result of rainwater runoff, and point source, the discharge from industries into a waterbody through a pipe or outflow source. Nonpoint pollution sources are often difficult to determine and regulate because the sources are not always readily obvious. For example, sediment loads can come from a variety of sources, such as construction sites, roadways and driveways which may generate toxic materials during a rain event.

Photo Courtesy of Wikipedia/NOAA

Approximately 90% of the nonpoint source water quality impacts are due to the first inch of rainfall. Runoff which contains phosphorous and nitrogen can cause an increase in algae and aquatic weed growth, impacting aquatic ecosystems.

Natural areas provide for the filtration of stormwater. However, as impervious surfaces continue to increase and natural shoreline vegetation is destroyed, less natural areas are available to perform this function. Wetlands function as nature's "kidneys" by filtering pollutants before they reach surface and groundwater, thus the protection of and the incorporation of these natural pollutant filters into stormwater management is of utmost importance for the sustainability of surface and groundwater.

While wetlands help to filter pollutants, natural wetlands are susceptible to excessive pollutant damage. Stormwater infiltration basins are useful in removing pollutants through detention and filtration, helping to recharge groundwater. Due to pollutant loads, soil requirements, and existing infrastructure, basins should be located in areas that ensure appropriate filtration and designed to minimize potential for groundwater contamination (EPA, 2006).

Stormwater Infiltration Basin
Source: *EPA Office of Water*

The use of stormwater for non-potable uses can help to reduce water withdrawals from the aquifer and surface waters. Stormwater can be collected from impervious surfaces such as rooftops, driveways, roads, and pavement. Collecting, treating, storing and distributing stormwater can be performed on various scales, from home by home basis, large agricultural lands, and suburban areas, for purposes such as residential landscaping, toilet flushing and other non-potable uses. In some stormwater re-use systems, treatment may occur within the collection system through measures such as sediment traps, ponds, and infiltration systems. To ensure stormwater is suitable for public access or use on commercial crops, additional treatment is needed to remove all suspended particles, reduce nutrients and disinfect. Wetlands and sand filters can be used to remove particulate matter and reduce nutrients while ozone, UV radiation or chlorine disinfection can be used to disinfect the stormwater. In the case of aquifer storage and recovery, the collected stormwater must be treated prior to injection into the aquifer to prevent contamination (Cardno, 2006). To assist with effective stormwater management, the public should be educated about proper fertilizer and pesticide use and the preservation of native and shoreline vegetation.

The new water quality numeric standards proposed by the United States Environmental Protection Agency could impact land use by possibly changing the requirements for stormwater management design. New criteria and requirements to meet the impending water quality rules will need to be developed by the Water Management Districts, FDEP and local governments. To assist with effective stormwater management, the public should be educated about proper fertilizer and pesticide use and the preservation of native and shoreline vegetation.

G. Low Impact Development (LID)

Low Impact Development (LID) is generally described as a stormwater management approach that strives to produce pre-development hydrologic systems in land development. LID techniques typically include bio-retention, green roofs, permeable pavers, rain barrels and cisterns, soil amendments, and tree box filters. In an effort to mimic natural processes, LID uses uniformly distributed and decentralized micro-scale controls to infiltrate, evapotranspirate, filter, store, and detain stomrwater runoff close to its source. Avoiding centralized retention, the process of controlled runoff generation keeps pollutants out of natural waterways and helps to prevent flooding.

The case of the Madera subdivision, outside of Gainesville, Florida illustrates the cost savings potential of LID compared to a traditional stormwater management approach. On a per lot basis, capital and installation costs were $1,149 less for LID than conventional techniques. As shown in the table below, the maintenance savings totaled over $1,800 for the first year, not including water costs, indicating the long-term economic benefits of LID. In addition, when the value of LID in reduced stormwater pond depth, reduced roadway pavement and curb/gutter, and reduced right-of-way is considered, there is a $1,425 credit to the site costs (developer's pro forma) for each lot. To implement LID, many stakeholders in land development and maintenance must be informed and trained. This includes municipal planners, landscape architects, civil engineers, water management districts, and landscape maintenance firms.

Madera Subdivision Maintenance Costs (annual Costs in 2003/2004 Dollars)			
Task	**LID**	**Conventional**	**LID Savings**
Landscape Service (incl. Mowing)	$1,470	$3,150	$1,680
Pesticide Applications by Service	$200 (IPM)	$300	$100
Irrigation	$72	$168	$116
Water Used	31,602 gallons	74,120 gallons	n/a
SUB TOTAL	$1,722	$3,618	$1,896

Source: *Glenn Acomb, University of Florida 2010*

III. WATER CONSUMPTION

In the East Central Florida region, the Floridian Aquifer supplies almost all of the public and agricultural demand. Overdrawing the aquifer to meet the continuing growing water supply demand will have damaging effects on wetlands, lakes, spring flows, and will increase the likelihood of saltwater intrusion. In this region, 78 public utilities supply water needs. By optimizing groundwater withdrawals, consumption and alternative water supplies, aquifer flow levels could be maintained, and less stress would be placed on the aquifer and springs.

As the population and urban areas in the region continue to grow, so do the demands and conflicts associated with water attainability and service. The St. Johns River Water Management District has identified areas whose water needs cannot be met without adversely impacting water resources and natural systems such as wetlands, lakes, and springs. These areas are referred to as priority water resource caution areas (PWRCAs).

The SJRWMD PWRCAs cover approximately 39% of the district and includes all or parts of Brevard, Lake, Orange, Osceola, Seminole, and Volusia Counties. Much of the Kissimmee Basin, under the jurisdiction of the SFWMD is considered a water resource caution area as well. In order to accurately track water usage and demand, and implement appropriately focused and feasible policies and conservation techniques, the St. Johns River Water Management district will begin tracking and analyzing water usage by category such as residential, commercial, and agriculture.

The goal for local governments and water supply managers should be to increase water supplies while reducing the demand for potable groundwater. Public education, restrictions on water usage, and incentives for water conservation are some strategies aimed at reducing potable water demand.

The reuse of reclaimed water programs are being implemented around the region. In the water reuse process, wastewater undergoes treatment and disinfection, resulting in a quality of water that can be used for irrigation, groundwater recharge, industrial uses, and other non-potable uses. Not only does reuse decrease groundwater demand, it reduces the cost and energy associated with water treatment and disposal as well as the creation of new water facilities.

Water Management Districts vary in methods to track water usage, therefore comprehensive and consistent data was derived from the USGS. Tables 1 and 2 are derived from the Florida Water Use Program, a project between the USGS and FDEP. Data are obtained from the five water management districts every 5 years and available in the Florida Statistical Abstract 2009.

Table 1: Fresh and saline water withdrawals by category in Florida by County in 2005 (million gallons/day)

County	Public Supply	Domestic	Industrial*	Agricultural Irrigation	Recreational Irrigation	Thermoelectric	Thermoelectric	Fresh	Fresh	Saline	Total
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Ground	Surface	Total	All water
Brevard	33	1	5	48	5	0	868	70	23	868	960
Lake	41	6	10	20	10	0	0	76	10	0	86
Orange	204	11	23	30	10	0	0	267	11	0	279
Osceola	31	5	0	100	10	0	0	139	8	0	147
Seminole	56	3	0	8	2	0	0	68	1	0	69
Volusia	59	3	1	18	2	89	0	77	95	0	171
Total	424	28	39	224	40	90	868	697	148	868	1713
Average	71	5	6	187	7	15	145	116	25	145	285

Source: *USGS*

The St. Johns River Water Management District will soon begin tracking water usage by category such as residential, commercial and agriculture.

Table 2: 2005 Public Supply Water Use

County	Total Water Use (mgd)	Per Capita Water Use
Brevard	59	114
Lake	41	193
Orange	179	189
Osceola	31	169
Seminole	56	147
Volusia	59	127
Total	425	--
County Average	71	157

(***Source:*** *BEBR 2009)*

In order to meet water supply needs, the following strategies are being implemented throughout the region:

- Water conservation techniques
- Increase use of reclaimed water
- Development of alternative water supply sources

More water management specific water use data are available in the Data and Analysis section of the document.

IV. WATER CONSERVATION

A. Waterwise Florida Landscapes

Waterwise landscaping is based upon some of the basic principles of Florida Friendly Landscaping and refers to landscaping and gardening in ways that reduce or eliminate the need for supplemental irrigation. The concept is typically promoted in areas that do not have easily accessible supplies of fresh water, and is gaining acceptance in other areas as climate patterns shift.

Using the correct plants under the right conditions and minimizing the use of water, pesticides, and fertilizer is the main objective behind waterwise landscaping. In the East Central Florida region, drought-tolerant landscaping is more adept to surviving the region's extreme conditions and acts to conserve water supply and reduce pollutant runoff. Incorporating this practice into new and existing development will help to conserve water.

B. Florida Water Star

Florida Water Star is a voluntary program for new and existing residential and commercial development that encourages water efficiency in household appliances plumbing fixtures, irrigation systems, and landscapes. Criteria for community development have been developed and are currently being pilot-tested. The SJRWMD, SFWMD, and the SWFWMD are cooperative partners of the program.

Water Related Principles of Florida Friendly Landscaping

- *Plan and Design based on the site conditions, existing vegetation and topography*
- *Choose proper plants to match the conditions of specific areas in the landscape and which are disease and pest resistant*
- *Use turf and fertilizer wisely to ensure that it aids in water conservation and is in the most functional area of the landscape*
- *Irrigate efficiently based on vegetation's water needs and place plants in appropriate moist or well drained soils*
- *Recycle yard wastes and use mulches to help hold moisture in the soil, moderate temperature, release nutrients, decrease weed growth and slow erosion*
- *Use plants and turf that reduce stormwater runoff and protect waterfronts*

C. Water Source Options

Florida law directs Water Management Districts to identify potential water sources and further examine the development of environmentally sensitive alternative water supplies. As of April 10, 2010, the St. Johns Water Management District (which oversees the majority of the East Central Florida region) has approved 55 Alternative Water Supply projects for cost-share funding through the Water Protection and Sustainability Program in fiscal years 2006, 2007, and 2008. The total construction cost for these projects is approximately $1.2 billion of which $111 million has been provided through the Water Protection and Sustainability Trust Funds (WP&STF) and cost-share funds. The projects vary in scope but include the use of reclaimed water, brackish and freshwater, and seawater sources, which will yield approximately 197 Million Gallons per Day (MGD) when completed.

Since 2003, the South Florida Water Management District has funded 169 alternative water supply projects including 80 projects in 2006 and 62 more in 2007. The projects have generated approximately 400 Million Gallons per Day at a cost of $35 million.

Each Water Management District has established minimum flow rules and criteria to help them monitor system impacts to various spring groups, such as the Wekiva. Should the reduction of flow or other impacts occur to natural systems, the District has the ability to modify or rescind a previously issued consumptive use permit and mandate additional restrictions.

To capture surface water from rivers such as the St. Johns or the Ocklawaha, withdrawal must be in compliance with all established Minimum Flow and Levels (MFL's) criteria before a consumptive use permit will be issued.

Aquifer recharge enhancement is the process of using reclaimed water as a source of recharge for the aquifer. In addition, the use of reclaimed water in general offsets the use of potable water for irrigation. Regional aquifer management is an idea being pursued in Volusia County which includes wetland hydration.

Desalinization is the process of turning saltwater into drinking water. The largest desalinization facility in the country is located in Tampa, Florida and has the capacity to produce 25 million gallons per day (95,000m^3) of water a day, with a future planned expansion to increase this by an additional 35 million gallons per day (37,000m^3). The Tampa Bay Seawater Desalinization plant is owned by Tampa Bay Water and is established as a special district of the State of Florida. It is funded through the non-profit sale of water to member governments.

D. Creating a Regional Water Strategy

In July of 2009, the Urban Land Institute (ULI) of Central Florida along with *myregion.org* , assembled a Regional Water Steering Committee to discuss regional water issues. The committee is comprised of the three water management districts, the Florida Department of Environmental Planning, the Urban Land Institute, the University of Central Florida, and community representatives from the public and private sector. The goal of the committee was to make recommendations to help ensure an economical and sustainable water supply for future generations and to avoid intra-regional litigation over water issues. Some of the Regional Water Strategy recommendations include:

Conservation and Environment

- Create consistent, standard methodology for how all water suppliers/users report their use for water management district review.
- Establish a meaningful water consumption target by utility service area to set meaningful water conservation goals, ensure accountability, and reduce water use in Central Florida.
- Revisit/update laws and rules governing domestic self-supply and residential irrigation wells, as applied by the water management districts and the county branches of the Florida Department of Health.
- Modify Chapter 373, of the Florida Statutes such that when local governments desire to institute more restrictive conservation measures, such measures should not be considered a preemption.

Education and Outreach

- Develop and implement a regional coordinated campaign strategy to educate consumers on the value of water and promote simple behaviors that reduce water use.
- Unite stakeholders in support of a regional water strategy for Central Florida.

Economics and Pricing

- Utility rate structures should provide sufficient revenue to allow the utility to finance incentives to retrofit customers' homes and businesses with devices and equipment for water conservation (indoor/outdoor) and use of reclaimed water.
- Restore statewide funding for alternative water supplies to the water management districts.

Alternative Water Supply:

- Use best-available science, modeling, empirical data and professional judgment to quantify and forecast the availability of water resources.

- Encourage congruent planning between utilities, local governments and water management districts to ensure consistency in long-range planning between land use and water use.
- Encourage utilities, local governments and water management districts to adopt policies to allow for recommendations made through this process.
- Water management districts must coordinate to adopt consistent policies and guidelines for the region.
- Better manage water supply by working on a regional basis to address water system interconnections and collaborations.

Other strategies that communities may wish to employ independently might include:

- ✓ Adopting regulations to enforce the applicable water management district's landscape and irrigation standards.

- ✓ Adopting landscape regulations that provide waterwise landscape and irrigation standards such as the use of soil moisture sensors, drought tolerant native plants and grasses and other water reducing landscaping techniques.

- ✓ Adopting regulations that incentivize installation of water-saving plumbing devices.

- ✓ Adopt regulations that override green lawn deed restrictions.

- ✓ Implementing water conservation public education and outreach programs.

- ✓ Implementing incentive programs to replace inefficient landscapes, plumbing devices, and appliances.

- ✓ Implementing a program that provides indoor water audits and leak detection and irrigation system audits.

- ✓ Promoting and encouraging the use of low impact development techniques.

CHAPTER 9: WATER	
Goal	To protect, conserve, and enhance the quantity and quality of the region's sustainable water resources.
Goal	To attain a reduction in potable water consumption from a regional average of 157 gals/person/day in 2005 to 90 gals/person/day by 2025.
Policy 9.1	Prior to the expansion and future distribution of water supplies, local governments, water managers and providers should first encourage the implementation of water conservation measures. (See pages 24 – 25)
Policy 9.2	Protect groundwater recharge areas. 9.2.1 Use compact development designs that protect significant natural pervious open space/recharge areas. 9.2.2 Promote the increased use of pervious surface materials. 9.2.3 Encourage projects that address increased aquifer recharge. 9.2.4 Encourage the use of sanitary sewer systems or performance based septic systems in areas identified as high vulnerability in Florida Aquifer Vulnerability Assessment data.
Policy 9.3	Promote the use of Best Available Control Technologies and/or Best Management Practices to minimize runoff impacts on receiving waters. Examples include, but are not limited to, cisterns, on-site water storage for reuse, and regional stormwater and offsite master retention areas.
Policy 9.4	Promote the incorporation of nonstructural methods of stormwater management. 9.4.1 Establish and protect naturally vegetated buffer zones adjacent to water bodies. 9.4.2 Utilize wetlands in the design of stormwater management systems to provide a natural filtering of pollutants. 9.4.3 Encourage the use of rain gardens, swales, and pervious pavements.
Policy 9.5	Protect hydrologic ecosystems. 9.5.1 Discourage new groundwater withdrawals that would increase salt water intrusion. 9.5.2 Discourage the discharge of reverse osmosis brine into estuarine environments.

	9.5.3 Promote restoration of historic hydrologic regimes with the objective of improving natural water storage. 9.5.4 Promote the protection and restoration of springs.
Policy 9.6	Avoid point and non-point discharges that may harm hydrologically dependent resources.
Policy 9.7	Encourage the development of sustainable alternative water supplies.
Policy 9.8	Support the development of alternative methods of wastewater treatment, disposal, and reuse to reduce degradation of water sources.
Policy 9.9	To increase the reuse of non-potable water to offset demands on the potable water supply, local governments should: 9.9.1 Use reuse water for irrigation and other non-potable needs in place of potable water when it is available. 9.9.2 Consider installation of dual water distribution lines in new developments that will initially use the existing water source until the reuse source is available. 9.9.3 Consider connection of new development or substantial redevelopment to a reuse system. 9.9.4 Consider installation of meters for individual connection to the reuse systems. 9.9.5 Enter partnerships with wastewater utilities to retrofit existing development with connections to a reuse system.

CHAPTER 9: WATER INDICATORS	
Change in residential (public supply) water consumption. The policy plan goal for public supply is 90 gallons/person/day.	Baseline: Public Water Use per Capita - 157 gallons/person/day Source (2000): BEBR
Alternative water supply development resulting from Water Supply Development Plan projects	Baseline: 640 MGD (82 projects) Source: SJRWMD and SFWMD

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